APPENDIX A

CEQA NOTICES/INITIAL STUDY/ NOTICE OF PREPARATION COMMENTS

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CEQA Notices

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Vail Dam Seismic and Hydrologic Remediation Project

Summary

SCH Number	2020069048
Lead Agency	Rancho California Water District
Document Title	Vail Dam Seismic and Hydrologic Remediation Project
Document Type	NOP - Notice of Preparation of a Draft EIR
Received	6/29/2020
Present Land Use	The Project site land use designations are: Rural Residential, Open Space Rural, and Water. The Project site is zoned within the Rancho California zoning region, and is zoned as Rural Residential.
Document Description	Rancho California Water District proposes the Vail Dam Seismic and Hydrologic Remediation Project (Proposed Project) in order to remediate seismic and hydrologic hazards associated with the existing Vail Dam. The Proposed Project includes construction of a straight-axis concrete gravity dam structure immediately downstream of the existing arch dam and partial demolition of the existing dam. In addition, the Project site includes improvements to support construction and operation of the new dam. This would include improvements to access roads, provision for construction staging and material disposal areas, and partial demolition of the existing dam.

Contact Information

Name	Jake Wiley
Agency Name	Rancho California Water District
Contact Types	Lead/Public Agency
Address	42135 Winchester Road Temecula, CA 92590
Phone	(951) 296-6900
Email	wileyj@ranchowater.com
Name	
Agency Name	Rancho California Water District
Contact Types	Project Applicant

Location

Coordinates	33°29'27"N 116°58'8.1"W
Cities	Temecula
Counties	Riverside
Cross Streets	Pauba Road and De Portola Road
Zip	92536
Total Acres	1,100
State Highways	SR-79
Waterways	Vail Lake

Notice of Completion

State Review Period Start	6/29/2020
State Review Period End	7/28/2020
State Reviewing Agencies	California Air Resources Board (ARB), California Department of Conservation (DOC), California Department of Fish and Wildlife, Inland Deserts Region 6 (CDFW), California Department of Parks and Recreation, California Department of Transportation, District 8 (DOT), California Department of Water Resources (DWR), California Governor's Office of Emergency Services (OES), California Natural Resources Agency, California Public Utilities Commission (CPUC), California Regional Water Quality Control Board, San Diego Region 9 (RWQCB), California State Lands Commission (SLC), Office of Historic Preservation, State Water Resources Control Board, Division of Drinking Water, State Water Resources Control Board, Division of Water Quality, State Water Resources Control Board, Division of Water Rights, State Water Resources Control Board, Divison of Financial Assistance, California Native American Heritage Commission (NAHC)
State Reviewing Agency Comments	California Native American Heritage Commission (NAHC)
Development Types	Other (Dam Demolition and New Dam Construction)
Local Actions	Project Approval
Project Issues	Aesthetics, Agriculture and Forestry Resources, Air Quality, Biological Resources, Cultural Resources, Cumulative Effects, Drainage/Absorption, Flood Plain/Flooding, Geology/Soils, Growth Inducement, Hazards & Hazardous Materials, Hydrology/Water Quality, Land Use/Planning, Mineral Resources, Noise, Population/Housing, Public Services, Recreation, Schools/Universities, Septic System, Sewer Capacity, Solid Waste, Transportation, Vegetation, Wetland/Riparian, Wildfire

Attachments

Environmental Document	Notice of Preparation PDF 817 K Summary Form PDF 191 K

Vail Dam Initial Study June 2020 PDF 13549 K

NOC

Notice of Completion PDF 1108 K

Notice of Completion - Attachment PDF 73 K

State Comments

2020069048_NAHC Comment PDF 369 K

Disclaimer: The Governor's Office of Planning and Research (OPR) accepts no responsibility for the content or accessibility of these documents. To obtain an attachment in a different format, please contact the lead agency at the contact information listed above. You may also contact the OPR via email at state.clearinghouse@opr.ca.gov or via phone at (916) 445-0613. For more information, please visit OPR's Accessibility Site.

NOTICE OF PREPARATION

To:	Responsible and Trustee Agencies	From:	Jake Wiley, Engineering Manager-CIP & Development Rancho California Water District 42135 Winchester Road Temecula, CA 92590

SUBJECT: Notice of Preparation of a Draft Environmental Impact Report

The Rancho California Water District will be the Lead Agency and will prepare an Environmental Impact Report (EIR) for the Project identified below. We need to know the views of your agency as to the scope and content of the environmental information, which is germane to your agency's statutory responsibilities in connection with the Proposed Project. Your agency will need to use the EIR prepared by our agency when considering your permit or other approval for the project.

The Project description, location, and the potential environmental effects are contained in the attached materials.

☒	A copy of the Initial Study IS attached. The Initial Study is also available at: https://www.ranchowater.com/127/CEQA-Compliance
☐	A copy of the Initial Study IS NOT attached.
☒	The proposed project IS considered a project of statewide, regional or area-wide significance.
☐	The proposed project IS NOT considered a project of statewide, regional or area-wide significance.
☐	The proposed project WILL affect highways or other facilities under the jurisdiction of the State Department of Transportation.
☒	The proposed project WILL NOT affect highways or other facilities under the jurisdiction of the State Department of Transportation.
☒	A scoping meeting WILL be held by the Lead Agency.
☐	A scoping meeting WILL NOT be held by the Lead Agency.

If the project meets the criteria requiring the scoping meeting, or if the agency voluntarily elects to hold such a meeting, the date, time and location of the scoping meeting are as follows:

Date: Wednesday July 15, 2020	Time: 5:00 p.m.	Location: Rancho California Water Districts YouTube Channel www.youtube.com/user/TheRanchoCAWater For those wishing to submit comments for the scoping meeting, please submit your comments by 5:00 p.m. on Friday July 10, 2020 at the following link: www.ranchowater.com/comments

Due to the time limits mandated by State law, your response must be sent at the earliest possible date, but not later than 30 days after receipt of this notice.

Please send your response to Rancho California Water District, Attn: Jake Wiley, at the address shown above. We will need the name of a contact person in your agency.

Project Title:	Vail Dam Seismic and Hydrologic Remediation Project
Project Location – Specific: Identify street address and cross street or attach a map showing project site (preferably a U.S.G.S. 15′ or 7 ½′ topographical map identified by quadrangle name):	Vail Dam and Vail Lake are located in unincorporated southwestern Riverside County, east of the City of Temecula, in Southern California (see attached figure).

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Project Description:	Rancho California Water District proposes the Vail Dam Seismic and Hydrologic Remediation Project (Proposed Project) in order to remediate seismic and hydrologic hazards associated with the existing Vail Dam. The Proposed Project includes construction of a straight-axis concrete gravity dam structure immediately downstream of the existing arch dam and partial demolition of the existing dam. In addition, the Project site includes improvements to support construction and operation of the new dam. This would include improvements to access roads, provision for construction staging and material disposal areas, and partial demolition of the existing dam.
Project Applicant (if any):	N/A.
California Environmental Protection Agency Hazardous Waste List (if applicable):	The Project site is not included on any hazardous materials sites pursuant to Government Code Section 65962.5

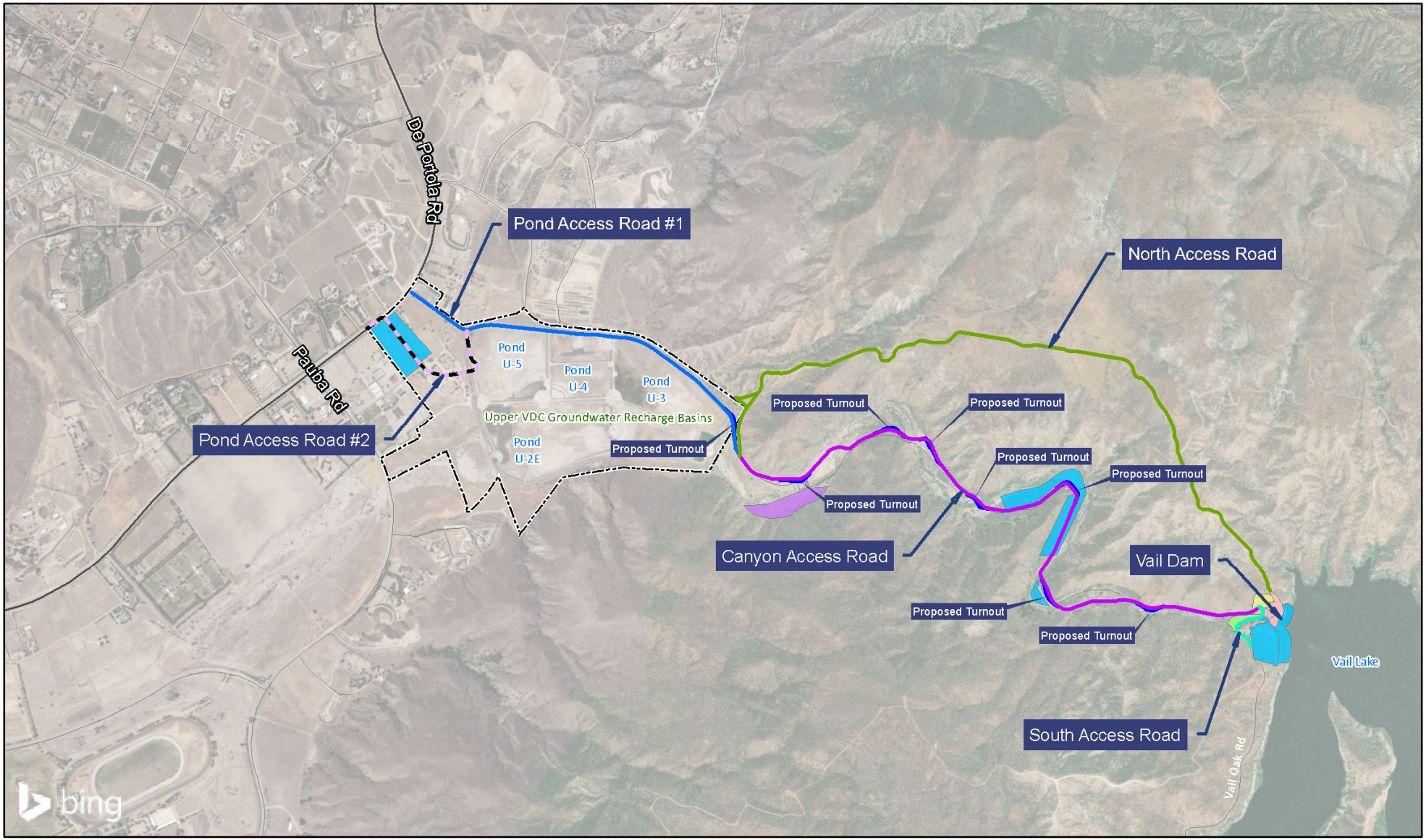
Date: 06/18/2020	Signature:	
	Name:	Jake Wiley
	Title:	Engineering Manager-CIP & Development
	Telephone:	(951) 296-6900

Consulting firm retained to prepare draft EIR (if applicable):

Name:	LSA Associates, Inc.
Address:	20 Executive Park, Suite 200
City/State/Zip:	Irvine, CA 92614
Contact Person:	Nicole West

Reference: California Code of Regulations, Title 14, (CEQA Guidelines) Sections 15082(a), 15103, 15375.

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LEGEND

- Canyon Access Road
- North Access Road
- Pond Access Road #1
- Pond Access Road #2
- South Access Road
- Proposed Truck Turnout
- Property Boundary
- Dam Construction Area
- Disposal Area
- South Access Road Construction Area
- Staging and Laydown Area
- Temporary Construction Area

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SOURCE: Bing Maps (2018); AECOM (1/2020)

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Vail Dam Seismic and Hydrologic Remediation Project

Project Location

Notice of Completion & Environmental Document Transmittal

Mail to: State Clearinghouse, P.O. Box 3044, Sacramento, CA 95812-3044 (916) 445-0613
For Hand Delivery/Street Address: 1400 Tenth Street, Sacramento, CA 95814

SCH #

Project Title: Vail Dam Seismic and Hydrologic Remediation Project

Lead Agency: Rancho California Water District | Contact Person: Jake Wiley, P.E.

Mailing Address: 42135 Winchester Road | Phone: (951) 296-6900

City: Temecula, California | Zip: 92590 | County: Riverside

Project Location: County: Riverside | City/Nearest Community: Temecula

Cross Streets: Pauba Road and De Portola Road | Zip Code: 92536

Longitude/Latitude (degrees, minutes and seconds): 33 ° 29 ′ 27.0 ″ N / 116 ° 58 ′ 08.1 ″ W | Total Acres: 1,100 acres

Assessor's Parcel No.: See attachment for APNs & Section/Twp/Range/Base | Section: | Twp.: | Range: | Base:

Within 2 Miles: State Hwy #: SR-79 | Waterways: Vail Lake

Airports: N/A | Railways: N/A | Schools: N/A

Document Type:

CEQA: ■ NOP ☐ Early Cons ☐ Neg Dec ☐ Mit Neg Dec ☐ Draft EIR ☐ Supplement/Subsequent EIR (Prior SCH No.) ☐ Other:

NEPA: ☐ NOI ☐ EA ☐ Draft EIS ☐ FONSI Other: ☐ Joint Document ☐ Final Document ☐ Other:

Governor's Office of Planning & Research
Jun 29 2020
STATE CLEARINGHOUSE

Local Action Type:

☐ General Plan Update ☐ General Plan Amendment ☐ General Plan Element ☐ Community Plan ☐ Specific Plan ☐ Master Plan ☐ Planned Unit Development ☐ Site Plan ☐ Rezone ☐ Prezone ☐ Use Permit ☐ Land Division (Subdivision, etc.) ☐ Annexation ☐ Redevelopment ☐ Coastal Permit ■ Other: Project Approval

Development Type:

☐ Residential: Units | Acres
☐ Office: Sq.ft. | Acres | Employees
☐ Commercial: Sq.ft. | Acres | Employees
☐ Industrial: Sq.ft. | Acres | Employees
☐ Educational:
☐ Recreational:
☐ Water Facilities: Type | MGD
☐ Transportation: Type
☐ Mining: Mineral
☐ Power: Type | MW
☐ Waste Treatment: Type | MGD
☐ Hazardous Waste: Type
■ Other: Dam Demolition and New Dam Construction

Project Issues Discussed in Document:

■ Aesthetic/Visual ■ Agricultural Land ■ Air Quality ■ Archeological/Historical ■ Biological Resources ☐ Coastal Zone ■ Drainage/Absorption ☐ Economic/Jobs
☐ Fiscal ■ Flood Plain/Flooding ■ Forest Land/Fire Hazard ■ Geologic/Seismic ■ Minerals ■ Noise ■ Population/Housing Balance ■ Public Services/Facilities
■ Recreation/Parks ■ Schools/Universities ■ Septic Systems ■ Sewer Capacity ■ Soil Erosion/Compaction/Grading ■ Solid Waste ■ Toxic/Hazardous ■ Traffic/Circulation
■ Vegetation ■ Water Quality ■ Water Supply/Groundwater ■ Wetland/Riparian ■ Growth Inducement ■ Land Use ■ Cumulative Effects ☐ Other:

Present Land Use/Zoning/General Plan Designation:

See attachment.

Project Description: *(please use a separate page if necessary)*

Rancho California Water District proposes the Vail Dam Seismic and Hydrologic Remediation Project (Proposed Project) in order to remediate seismic and hydrologic hazards associated with the existing Vail Dam. The Proposed Project includes construction of a straight-axis concrete gravity dam structure immediately downstream of the existing arch dam and partial demolition of the existing dam. In addition, the Project site includes improvements to support construction and operation of the new dam. This would include improvements to access roads, provision for construction staging and material disposal areas, and partial demolition of the existing dam.

Note: The State Clearinghouse will assign identification numbers for all new projects. If a SCH number already exists for a project (e.g. Notice of Preparation or previous draft document) please fill in.

Reviewing Agencies Checklist

Lead Agencies may recommend State Clearinghouse distribution by marking agencies below with and "X".
If you have already sent your document to the agency please denote that with an "S".

X	Air Resources Board	S	Office of Historic Preservation
	Boating & Waterways, Department of		Office of Public School Construction
	California Emergency Management Agency	X	Parks & Recreation, Department of
	California Highway Patrol		Pesticide Regulation, Department of
S	Caltrans District # 8	X	Public Utilities Commission
	Caltrans Division of Aeronautics	S	Regional WQCB # 9
X	Caltrans Planning	X	Resources Agency
	Central Valley Flood Protection Board		Resources Recycling and Recovery, Department of
	Coachella Valley Mtns. Conservancy		S.F. Bay Conservation & Development Comm.
	Coastal Commission		San Gabriel & Lower L.A. Rivers & Mtns. Conservancy
	Colorado River Board		San Joaquin River Conservancy
X	Conservation, Department of		Santa Monica Mtns. Conservancy
	Corrections, Department of		State Lands Commission
	Delta Protection Commission		SWRCB: Clean Water Grants
	Education, Department of	X	SWRCB: Water Quality
	Energy Commission		SWRCB: Water Rights
S	Fish & Game Region # 6		Tahoe Regional Planning Agency
	Food & Agriculture, Department of	X	Toxic Substances Control, Department of
	Forestry and Fire Protection, Department of	S	Water Resources, Department of
	General Services, Department of		
X	Health Services, Department of		Other:
	Housing & Community Development		Other:
S	Native American Heritage Commission		

Local Public Review Period (to be filled in by lead agency)

Starting Date June 29, 2020 Ending Date July 28, 2020

Lead Agency (Complete if applicable):

Consulting Firm: LSA Associates, Inc.
Address: 20 Executive Park, Suite 200
City/State/Zip: Irvine, CA 92614
Contact: Nicole West
Phone: (949) 553-0666

Applicant: Rancho California Water District
Address: 42135 Winchester Road
City/State/Zip: Temecula, CA 92590
Phone: (951) 296-6900

Signature of Lead Agency Representative: _____ **Date:** 6/18/2020

Authority cited: Section 21083, Public Resources Code. Reference: Section 21161, Public Resources Code.

Vail Dam Seismic and Hydrologic Remediation Project NOC Attachment

Assessor's Parcel Nos.: 927-150-018, 927-320-045, 927-150-048, 927-150-038, 929-320-039, 927-320-040, 927-320-080

Sections: 3, 4, 5, 6, 9, 10, 11, 14, 15, 16
Township: 8 S
Range: 1 W
Base: San Bernardino

Present Land Use/Zoning/General Plan Designation: The Project site land use designations are: Rural Residential, Open Space Rural, and Water. The Project site is zoned within the Rancho California zoning region, and is zoned as Rural Residential.

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Initial Study

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INITIAL STUDY

RANCHO CALIFORNIA WATER DISTRICT

VAIL DAM SEISMIC AND HYDROLOGIC REMEDIATION PROJECT

PROJECT NO. D1911

RIVERSIDE COUNTY, CALIFORNIA

Rancho Water

(951) 296-6900

Post Office Box 9017
Temecula, California 92589-9017

42135 Winchester Road
Temecula, California 92590

June 2020

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INITIAL STUDY

RANCHO CALIFORNIA WATER DISTRICT

VAIL DAM SEISMIC AND HYDROLOGIC REMEDIATION PROJECT

PROJECT NO. D1911

RIVERSIDE COUNTY, CALIFORNIA

Submitted to:

Rancho California Water District
42135 Winchester Road
Temecula, California 92590

Prepared by:

LSA
703 Palomar Airport Road, Suite 260
Carlsbad, California 92011
(760) 931-5471

Project No. RCW1902

June 2020

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LIST OF ABBREVIATIONS AND ACRONYMS

AAQS	ambient air quality standards
AB	Assembly Bill
ac-ft	acre-feet
AQMP	Air Quality Management Plan
BMPs	Best Management Practices
California Register	California Register of Historical Resources
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
County	County of Riverside
CWA	Clean Water Act
cy	cubic yard(s)
DSOD	(California Department of Water Resources) Division of Safety of Dams
EIR	Environmental Impact Report
FGC	California Fish and Game Code
ft	foot/feet
GHG	greenhouse gas
H:V	horizontal to vertical (ratio)
I-15	Interstate 15
MBTA	Migratory Bird Treaty Act
NCCP/HCP	Natural Communities Conservation Plan/Habitat Conservation Plan
MCE	Maximum Credible Earthquake
MSHCP	Multiple Species Habitat Conservation Plan
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NPDES	National Pollutant Discharge Elimination System
PMF	Probable Maximum Flood
PMP	Probable Maximum Precipitation
PRC	Public Resources Code
Project	Vail Dam Seismic and Hydrologic Remediation Project
RCC	Roller Compacted Concrete
RCWD	Rancho California Water District
RWQCB	Regional Water Quality Control Board
SB	Senate Bill
SCAQMD	South Coast Air Quality Management District
SCE	Southern California Edison
SHPO	State Historic Preservation Officer
SR-79	State Route 79
SWPPP	Storm Water Pollution Prevention Plan
USACE	United States Army Corps of Engineers
USC	United States Code
USFWS	United States Fish and Wildlife Service
VDC	Valle De Los Caballos
VMT	vehicle miles traveled
WQMP	Water Quality Management Plan
WRC RCA	Western Riverside County Regional Conservation Authority

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1.0 INTRODUCTION

In accordance with the California Environmental Quality Act (CEQA), the *State CEQA Guidelines*, and Rancho California Water District (RCWD)'s *CEQA Guidelines 2019: Local Guidelines for Implementing the California Environmental Quality Act*, this Initial Study has been prepared for the proposed Vail Lake Seismic and Hydrologic Remediation Project (Project) in unincorporated Riverside County. Pursuant to Section 15063(a) of the *State CEQA Guidelines*, RCWD is required to undertake the preparation of an Initial Study to determine whether the proposed action will have a significant effect on the environment. The purposes of this Initial Study are to: (1) identify potential environmental impacts, (2) provide the Lead Agency with information to use as the basis for deciding whether to prepare an Environmental Impact Report (EIR) or Negative Declaration, (3) enable the Lead Agency to modify the Project (through mitigation of adverse impacts), (4) facilitate assessment of potential environmental impacts early in the design of the Project, and (5) provide documentation for the potential finding that the Project will not have a significant effect on the environment or can be mitigated to a level of insignificance (*State CEQA Guidelines,* Section 15063[c]). This Initial Study is also an informational document providing an environmental basis for subsequent discretionary actions that could be required from other Responsible Agencies.

This Initial Study evaluates the potential environmental impacts that may result from development of the Project. Consistent with *State CEQA Guidelines* Section 15050, RCWD is the Lead Agency under CEQA, and it is responsible for adoption or certification of the environmental document and approval of the Project.

1.1 PROJECT INFORMATION

Project Title:

Vail Dam Seismic and Hydrologic Remediation Project (Project No. D1911)

Lead Agency:

Rancho California Water District
42135 Winchester Road
Temecula, California 92590

Contact Person:

Jake Wiley, P.E.
Rancho California Water District
42135 Winchester Road
Temecula, California 92590
(951) 296-6900, ext. 6980
wileyj@ranchowater.com

1.2 PROJECT DESCRIPTION

1.2.1 Regional Location and Setting

Vail Dam and Vail Lake are located in unincorporated southwestern Riverside County, east of the City of Temecula, in Southern California (see Figures 1-1 and 1-2). Vail Dam spans Temecula Creek, a northwesterly draining tributary of the Santa Margarita River that drains the north side of Palomar Mountain. The watershed for Vail Lake is approximately 318 square miles. Vail Lake is a reservoir fed by Temecula Creek, Wilson Creek, Kolb Creek, and Arroyo Seco.

RCWD acquired approximately 7,700 acres of the Vail and Sundance Ranch properties surrounding Vail Lake in 2014 (RCWD 2016). Including Vail Lake, RCWD land holdings total 8,444 acres in the vicinity of Vail Lake; this area is referred to as the Vail Property in the Property Guidance Document prepared by RCWD in 2016.[1] The Vail Property is located approximately 3 miles east of the City limits of Temecula and approximately 7 miles east of Interstate 15 (I-15). State Route 79 (SR-79) South traverses the southern portion of the property.

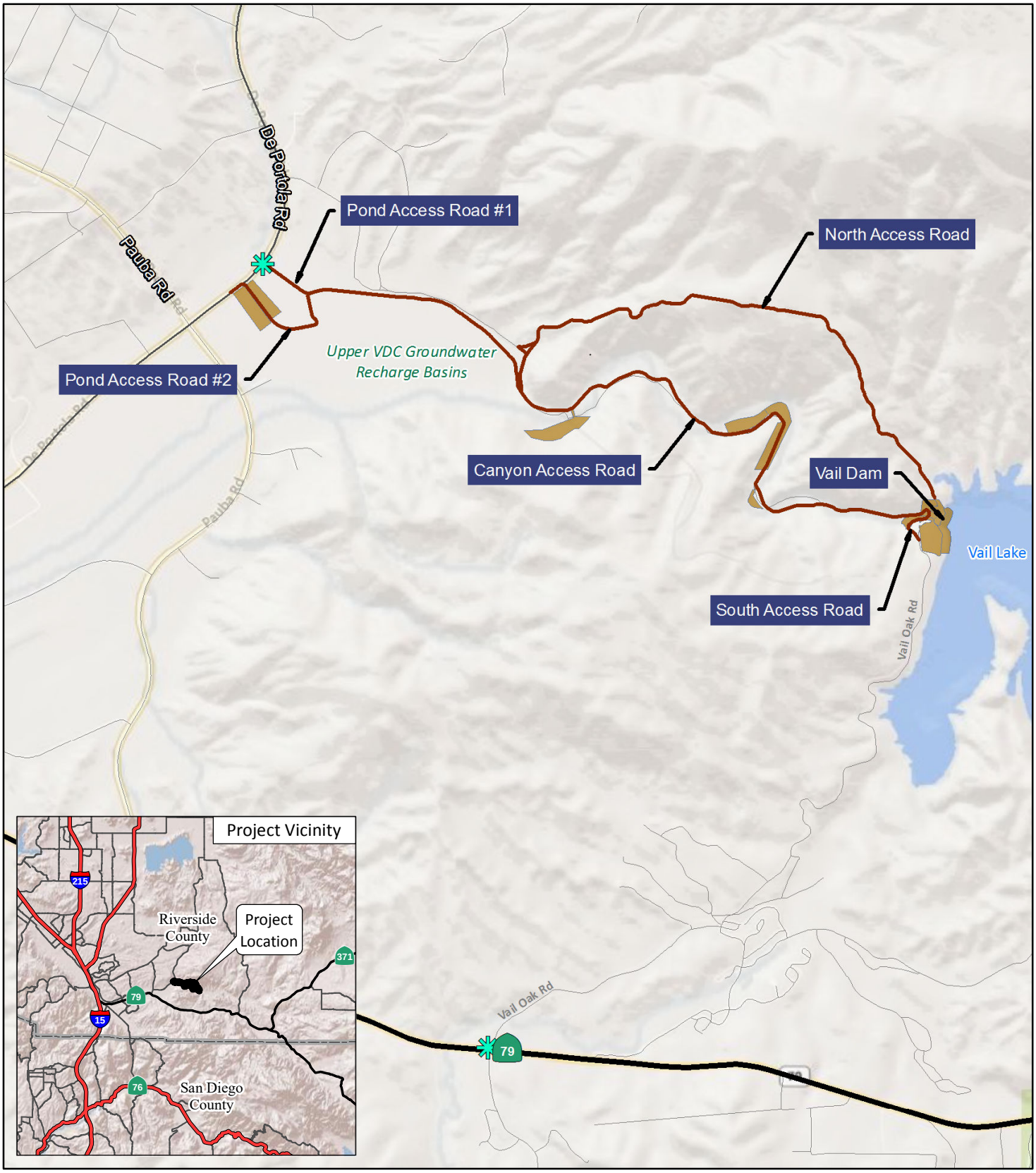
In addition to the reservoir, the terrain includes nearly flat stream valleys, step-like alluvial fan and terrace deposits, canyons, steep-sided river gorges, and moderate-to-steep mountain slopes. The topography slopes in all directions from various peaks and canyons in the vicinity of the reservoir. Vail (Oak) Mountain is located on the western portion of the property, and the area generally separates the Lancaster and Aguanga Valleys on the east from the Pauba and Temecula Valleys on the west.

Vegetation and wildlife are diverse in the area, with scrub communities (inland sage scrub, chamise chaparral, and alluvial fan scrub) dominant. Woodland vegetation is limited but present, including both oak and riparian woodland communities. Native and non-native grasslands occur, along with freshwater marsh and semi-aquatic plant communities. The area supports several rare, threatened, and endangered species.

Land uses on the RCWD property include the following (RCWD 2016):

- The Vail Lake Village and RV Resort, which contains campsites, numerous associated buildings, maintenance facilities, sports courts, pools, boat and RV storage, and electrical, water, and sewer facilities;
- The Vail Lake Marina facilities, including associated buildings, boat launch, fields, RV and boat storage, and similar facilities (the boat launch is presently closed due to low lake levels);
- Numerous hiking, equestrian, and mountain biking trails located within the property; and
- Vail Dam facilities including pipelines and other appurtenances.

[1] Rancho California Water District. (RCWD). 2016. *Vail Property and Sundance Ranch Property, Final Guidance Document* (Property Guidance Document). Volume I, February 2016.



LSA

LEGEND

- Project Feature Access Roads
- Project Feature Areas
- Site Access Point

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FIGURE 1-1

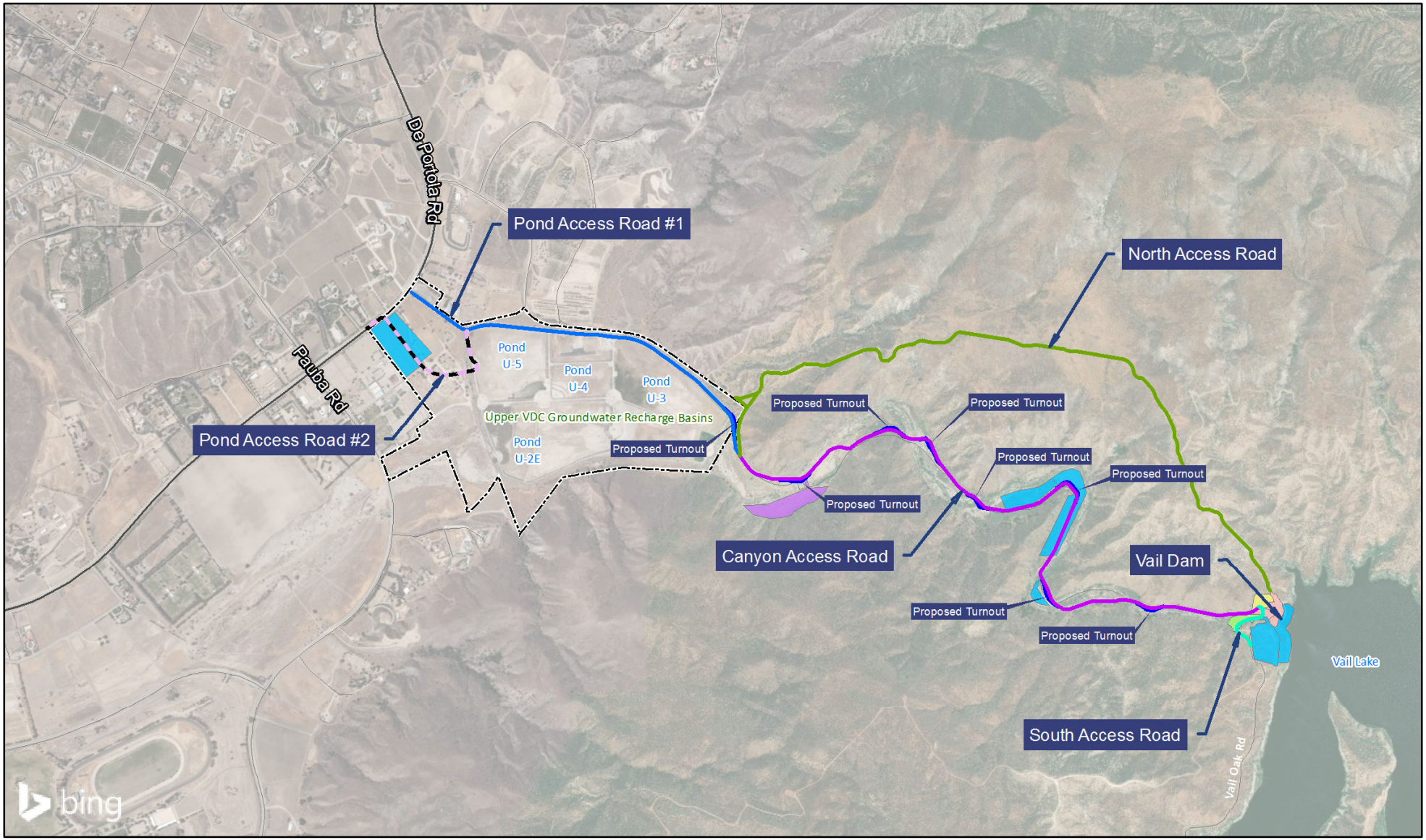
Vail Dam Seismic and Hydrologic Remediation Project

Project Vicinity

SOURCE: Bing Maps (2018); AECOM (1/2020)

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LSA

LEGEND

- Canyon Access Road
- North Access Road
- Pond Access Road #1
- Pond Access Road #2
- South Access Road
- Proposed Truck Turnout
- Property Boundary
- Dam Construction Area
- Disposal Area
- South Access Road Construction Area
- Staging and Laydown Area
- Temporary Construction Area

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FEET

SOURCE: Bing Maps (2018); AECOM (1/2020)

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FIGURE 1-2

Vail Dam Seismic and Hydrologic Remediation Project

Project Location

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Land uses and land use designations surrounding Vail Lake can be characterized as follows (see Figure 1-3).

- To the north, the area generally consists of undeveloped property with a County of Riverside (County) land use designation of rural mountainous (10-acre minimum lot size) or Bureau of Land Management conservation property with a County land use designation of open space – conservation.

- To the west (beyond the canyon below Vail Dam), the area generally consists of developed ranch property within the Valle De Los Caballos (VDC) Policy Area, with a County land use designation of rural residential (5-acre minimum), undeveloped property with a land use designation of agricultural, and RCWD's Upper VDC Groundwater Recharge Basins.

- To the south, the area consists primarily of recreational/campground uses, Cleveland National Forest, a variety of ranch and agricultural properties, and vacant undeveloped properties. The County land use designations for this area are rural residential (5-acre minimum), rural mountainous (10-acre minimum), open-space conservation, open-space habitat, and open-space recreation.

- To the east, the area generally consists of developed property associated with the Sundance Meadows private membership campground with a County land use designation of rural residential (5-acre minimum) or vacant undeveloped property with a land use designation of rural mountainous (10-acre minimum).

1.2.2 Vail Dam Construction History

Vail Lake was created through the construction of the existing Vail Dam by the Vail Company in 1948 and 1949, in order to store local runoff for the purpose of irrigation and water supply. Vail Dam and Vail Lake were acquired by RCWD in 1978 and have been used since that time for water supply and replenishment of RCWD's groundwater basins.

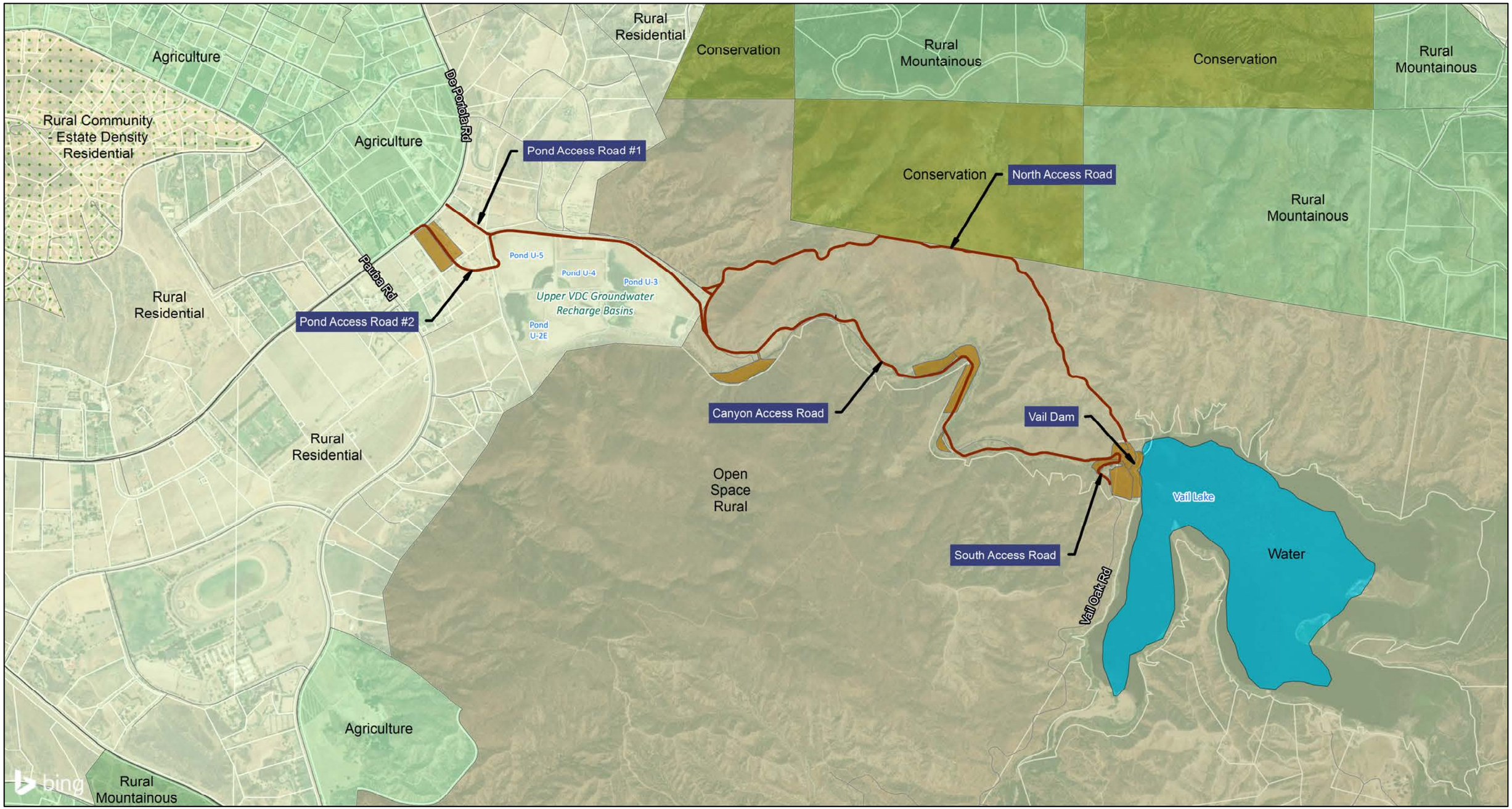
Since initial construction of Vail Dam, modifications have included the following:

- In the 1980s, the training wall near the left[2] abutment gravity section was extended and raised to address erosion concerns during spill events.

- In 1987, modifications to the outlet works to prevent cavitation in the outlet pipe were completed.

[2] Left or right side refers to the view when facing downstream.

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LSA

LEGEND

- Project Feature Access Roads
- Project Feature Areas

Surrounding Land Use

- Rural Community - Estate Density Residential
- Rural Residential
- Rural Mountainous
- Agriculture
- Conservation
- Open Space Rural
- Water

0 850 1700
FEET

FIGURE 1-3

Vail Dam Seismic and Hydrologic Remediation Project

Surrounding Land Use

SOURCE: Bing Maps (2018); AECOM (1/2020); Riverside County Transportation and Land Use Management Agency (2012)

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- In 2007, rehabilitation of the outlet works was completed. The repairs included replacement of the intake gates and associated trash racks, including the gate operators, stems, and stem guides. The rehabilitation also included replacement of portions of the conduit from Intake No. 8 pipe, and replacement of the 24-inch discharge conduits downstream of the dam, as well as replacement of several conduit connections.

- In 2009, a new transmission main pipe was constructed that connects Vail Dam to the Upper VDC percolation ponds located downstream of the dam at the mouth of the canyon.

1.2.3 Rancho California Water District

RCWD's service area is located in southwestern Riverside County and includes the City of Temecula, portions of the City of Murrieta, and unincorporated areas of the County. RCWD has two divisions: the Rancho Division and the Santa Rosa Division. Vail Lake is located in the Rancho Division. As of November 2019, RCWD's current service area represents 100,000 acres, and RCWD has 970 miles of water mains, 39 storage reservoirs, five storage reservoirs (recycled water), five wet weather storage ponds (recycled water), one surface reservoir (Vail Lake), 48 groundwater wells, and 45,000 service connections (RCWD 2019). More than 150,000 people are served by RCWD.

1.2.4 Existing Conditions

1.2.4.1 Vail Dam

Vail Dam is a concrete arch dam spanning concrete and rock abutments, approximately 120 feet (ft) high in the middle. The dam's maximum height is 152 ft from the dam crest to the lowest point in the foundation, with a 3.5 ft high concrete parapet wall extending above the upstream dam crest. The crest length, including the right and left abutment concrete gravity blocks, is 790 ft. The dam thickness varies from a maximum of 15 ft to a minimum of 4.5 ft, and is thicker in the lower portion and thinner closer to the crest.

The dam has eight outlets, including a low-level outlet. An at-grade meter vault is located approximately 100 ft downstream, and a stream release valve building is located approximately 200 ft downstream of the dam.

The spillway[3] is located beyond the left abutment and connects to the left abutment[4] gravity block at a right angle. The spillway is comprised of a 119 ft long ogee[5] weir[6], a 343 ft long flat-crested weir, and a 65 ft long concrete overpour weir. A concrete pier separates the flat-crested weir from the overpour weir. The flat-crested weir includes a 5 ft wide concrete sill along its length. The concrete overpour weir is approximately 20 ft high and was constructed across a saddle in the ridge line. Figure 1-4 illustrates the existing arch dam and spillway.

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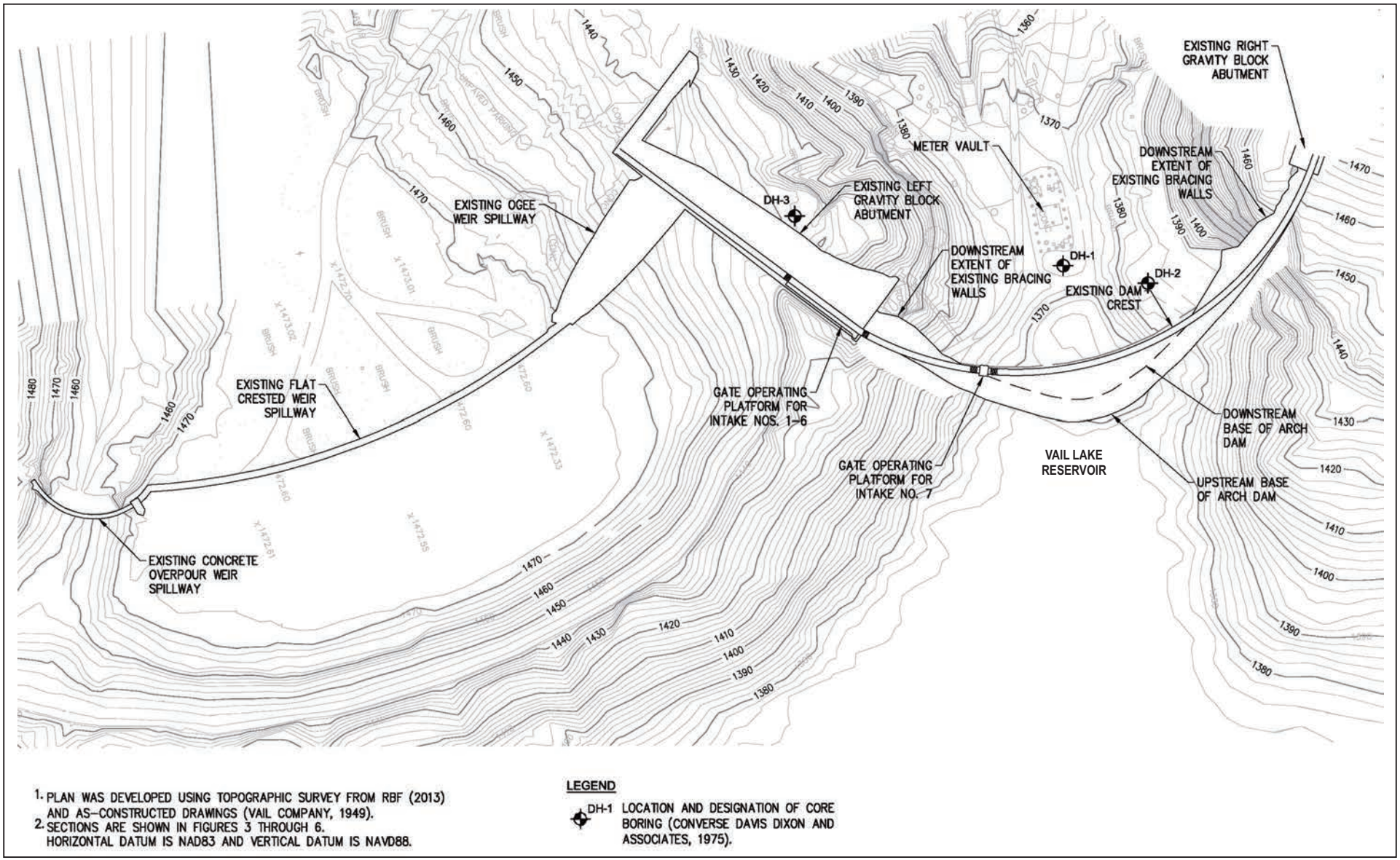
3 A spillway is a structure used to provide the controlled release of flows from a dam or levee into a downstream area.

4 Abutment refers to the substructure at each end of the dam.

5 Ogee refers to the weir shape. An ogee is a curve shape similar to the letter S, consisting of two arcs that curve in opposite directions.

6 A weir is a dam across the width of a river or stream that raises the water level or diverts its flow.

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FIGURE 1-4

* For further information, refer to Figure 2 in the Seismic Structural Analyses - Phase 3.1 Vail Dam (DSOD Dam No. 2028) by URS Corporation (December 2015)

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SOURCE: URS 2015

Vail Dam Seismic and Hydrologic Remediation Project

Existing Vail Dam and Spillway

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Access to the dam is currently available from De Portola Road via the Upper VDC Pond Access Road, and from that point, along the Canyon Access Road or North Access Road, or from SR-79 south via Vail Oak Road and the South Access Road (refer to Figure 1-1).

1.2.4.2 Reservoir

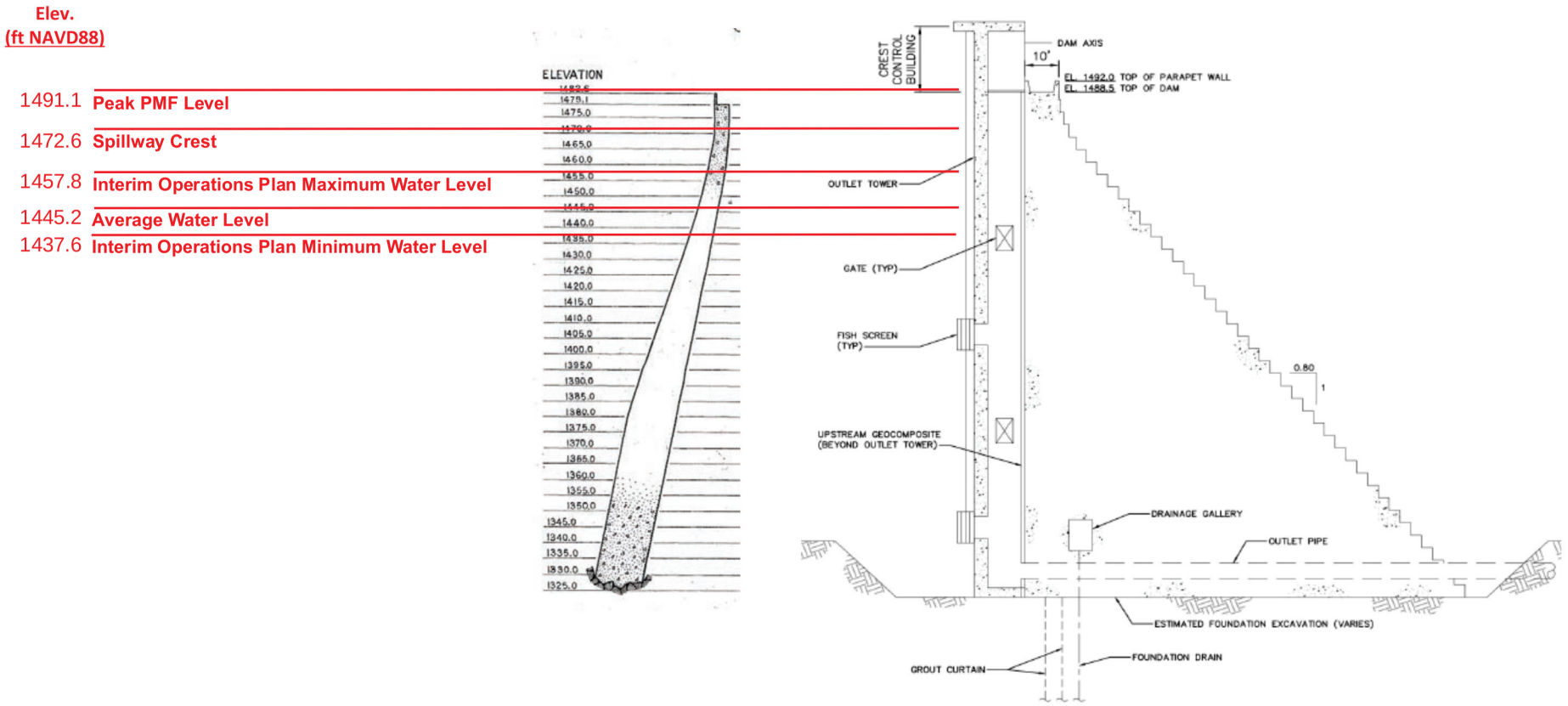
Vail Lake impounds up to 42,680 acre-feet (ac-ft) of water with the reservoir at the spillway crest. The reservoir is currently used primarily for water supply but historically has been utilized for recreation also. As noted previously, the Vail Lake Village and RV Resort, Vail Lake Marina, and numerous trails are the primary recreational resources. The reservoir and surrounding areas provide vital upland and riparian habitats for plants and wildlife and include Core and Linkage areas identified in the *Western Riverside County Multiple Species Habitat Conservation Plan* (Riverside County Transportation and Land Management Agency, 2003). The reservoir has a 318-square-mile drainage area, which rapidly fills the reservoir in wet years. Water released from Vail Lake is typically re-stored in the Pauba Valley groundwater basin via the Upper VDC Recharge Basins.

The spillway crest of Vail Dam is located at 1,472.6 ft NAVD88.[7] In 1966, Vail Dam was approved by the California Department of Water Resources Division of Safety of Dams (DSOD) to impound water to an elevation of 1,470.0 ft NAVD88. Prior to RCWD acquiring the land surrounding Vail Lake in 1978, RCWD had an agreement with the surrounding land owners to restrict the reservoir level to at least a minimum level of 1,437 ft for recreational use. Figure 1-5 shows both the existing and the proposed dam and spillway with elevations indicating water levels under the various scenarios; Figure 1-6 shows the aerial extent of Vail Lake at different water levels.

As discussed in the *Interim Operation Restriction Plan* (URS 2014), DSOD restricts the maximum reservoir elevation until the hydrologic and seismic deficiencies are remediated. In June 2015, DSOD established an interim restriction level of 1,457.6 ft NAVD88, which is 15 ft below the spillway crest. Although DSOD typically restricts the highest level at which a reservoir can operate with a deficient dam, additional studies conducted by DSOD also indicated that lower reservoir levels exacerbate the seismically induced stresses on Vail Dam. Therefore, the *Interim Operation Restriction Plan* also included a restriction for the lowest level at which the reservoir should operate, 1,437.6 ft NAVD88. The average water level from 1978 (the year during which RCWD took ownership of Vail Dam) through May 2020 has been 1,445.1 ft NAVD88 as is indicated in Figure 1-7. RCWD is required to balance operating water demands to meet the water restriction level. The operating level of the reservoir is dependent on a variety of factors, including restrictions on pumping into the reservoir to prevent the introduction of quagga mussel, requirements to recharge groundwater to reduce evaporation of stored water, mandated releases between May and October to maintain water flow in the creek, and the amount of precipitation.

[7] NAVD88 = North American Vertical Datum of 1988

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FIGURE 1-5

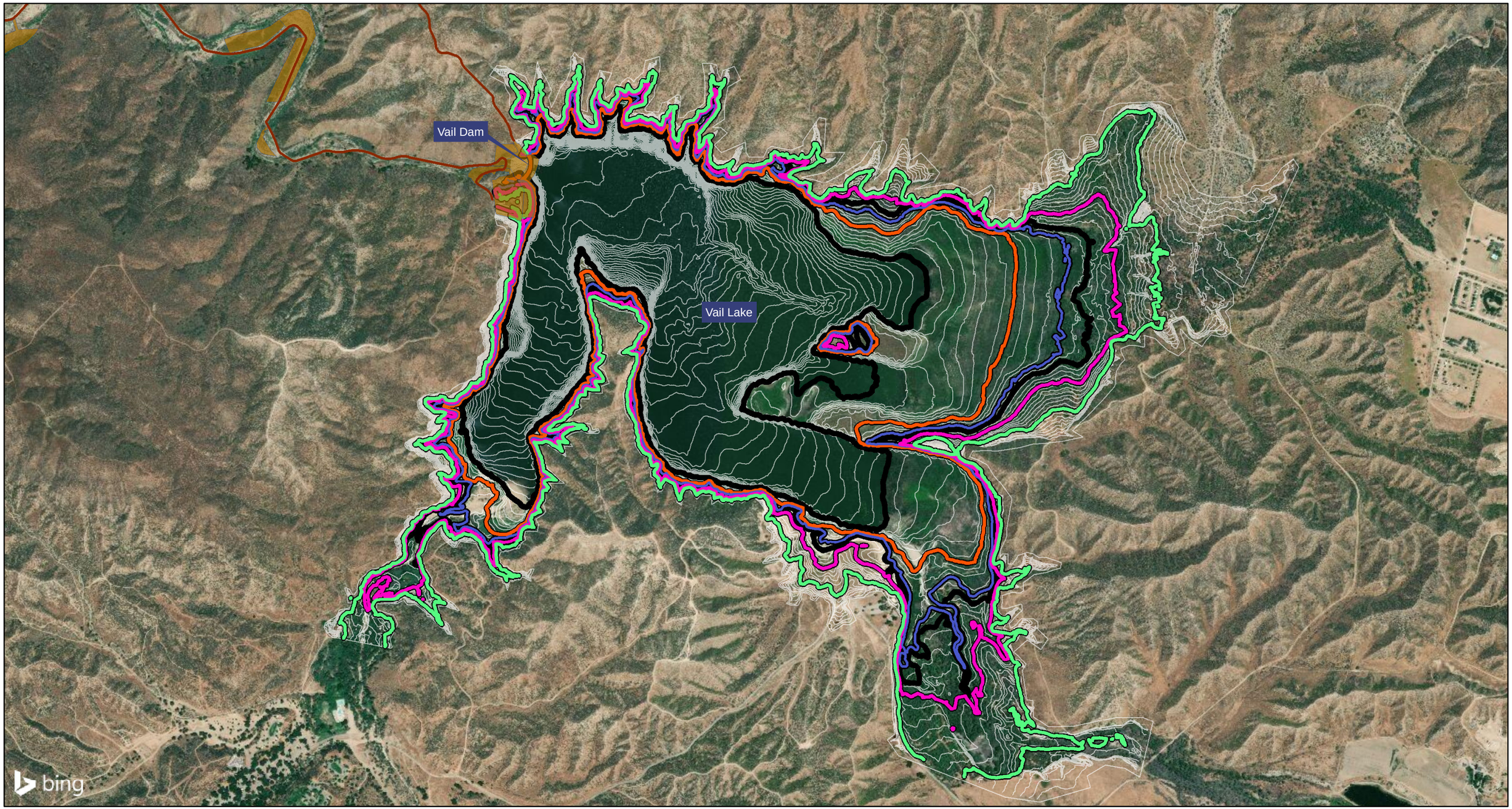
Vail Dam Seismic and Hydrologic Remediation Project

Existing and Proposed Dam Cross Section with Elevation

SOURCE: AECOM (2019)

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LEGEND

- Project Feature Access Roads
- Project Feature Areas
- Spillway Crest (1472.6' NAVD88)
- Interim Operations Plan Maximum Water Level (1457.6' NAVD88)
- Average Historic Water Level 1978-2020 (1445.1' NAVD88)
- Interim Operations Plan Minimum Water Level (1437.6' NAVD88)

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SOURCE: Bing (2018); AECOM (10/2019)

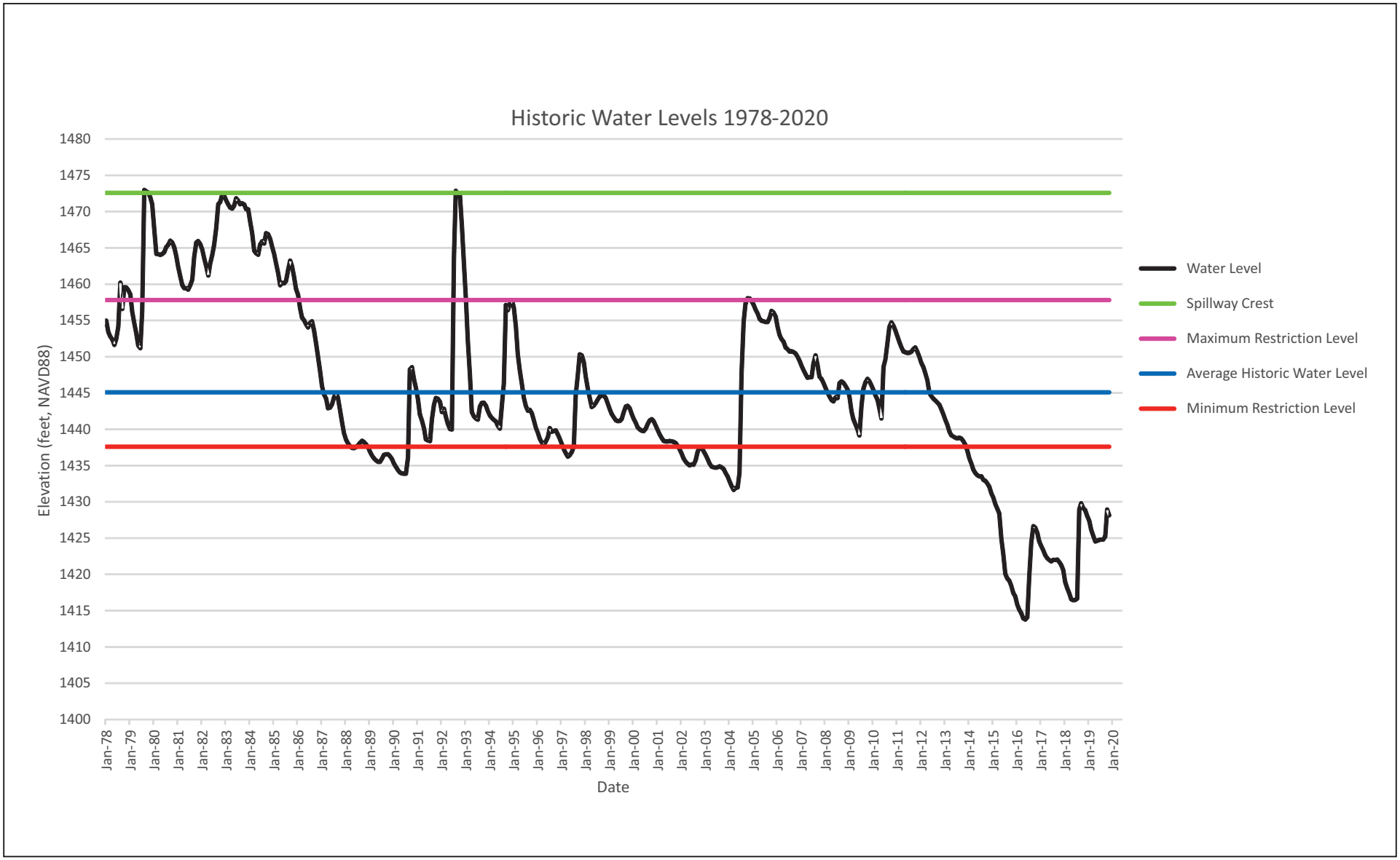
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FIGURE 1-6

Vail Dam Seismic and Hydrologic Remediation Project

Vail Lake Inundation Area

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FIGURE 1-7

Vail Dam Seismic and Hydrologic Remediation Project

Vail Lake Historic Water Levels

SOURCE: USGS

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1.2.4.3 Seismic and Hydrologic Deficiencies

California Department of Water Resources DSOD performed seismic stability and hydrologic analyses to evaluate potential hazards to the safety of Vail Dam and identified several deficiencies. RCWD conducted seismic and hydrologic analyses and flood routing studies for the dam and reservoir in 2014, 2015, and 2016 to evaluate these concerns.

Seismic Evaluations. DSOD conducted independent seismic stability analyses of Vail Dam and issued a *Memorandum of Design Review, Seismic Evaluation of Vail Dam* in 2012. DSOD determined at that time that the dam is seismically deficient in its current state. RCWD conducted dynamic seismic analyses of the existing dam, which indicate that the stresses induced by strong ground shaking during an earthquake would exceed the dam's allowable tensile strengths on the downstream face of the arch dam. The extent and duration of the overstress would be such that a failure of the dam could occur during the Maximum Credible Earthquake (MCE). The analyses also indicate that sliding instabilities exist at the base of some of the dam blocks (URS 2016).

Hydrologic Evaluations. DSOD performed the hydrologic analysis of Vail Dam and issued its Memorandum of Hydrologic Review (2012), mentioned above, which concluded that the dam would overtop by 3.4 ft during the Probable Maximum Flood (PMF). The DSOD memorandum recommended that RCWD should take measures to address erosion that would result from overtopping the dam, or prevent overtopping during the PMF altogether. RCWD conducted an independent hydrologic analysis to calculate the Probable Maximum Precipitation (PMP) and PMF to verify whether Vail Dam would overtop during the PMF. It was determined in URS Corporations' 2013 *Hydrologic Report* that the General Storm PMF would overtop the Vail Dam parapet wall by 4.0 ft.

Emergency Drawdown Analysis. RCWD completed an emergency drawdown analysis to determine whether the Vail Dam outlet system is capable of lowering the maximum storage depth of the reservoir by 10 percent within 7 days and draining the full contents of the reservoir within 90 days as required by DSOD. The results of the analysis (URS 2013) showed that the existing outlet system is able to meet both criteria at a reduced level but does not meet both criteria at the maximum normal operating level (1,457.6 ft).

1.2.5 Project Objectives

The project is intended to achieve the following primary objectives:

1. Ensure that Vail Dam will pass the PMF through the spillway without overtopping.

2. Ensure that Vail Dam will withstand the MCE without resulting in catastrophic dam failure.

3. Maintain the current capacity of Vail Lake to ensure adequate water supply and maintain reliability throughout RCWD's service area.

4. Utilize RCWD resources in a cost-effective and responsible manner.

5. Maintain a locally based and cost-effective water supply that continues to support local agriculture.

6. Provide a climate change buffer with both the ability to capture less frequent, but more intense, storms and act as a buffer against drought conditions.

7. Provide flood control for downstream Temecula Creek.

1.2.6 Proposed Project

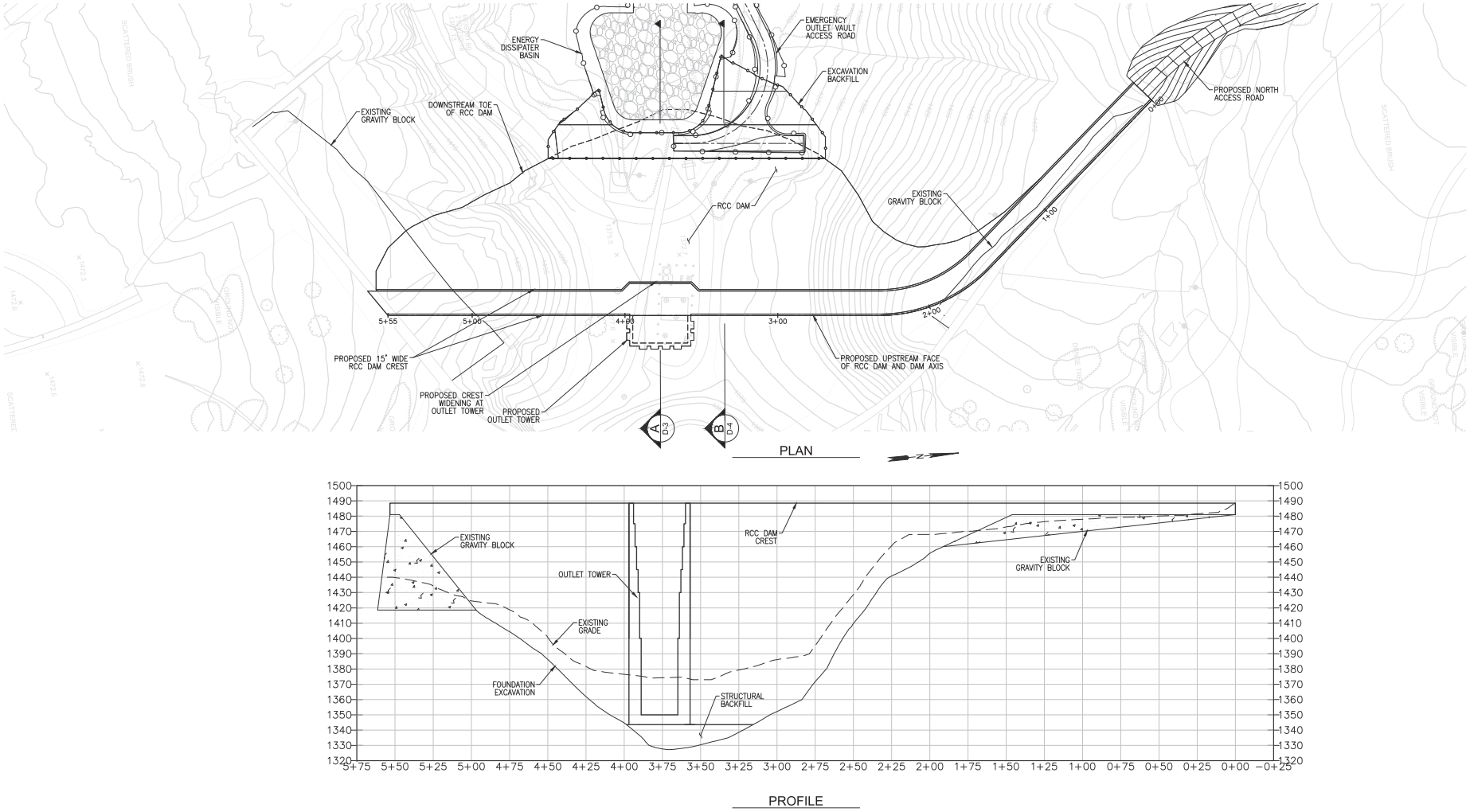
The Proposed Action (Proposed Project) includes construction of a straight-axis concrete gravity dam structure immediately downstream of the existing arch dam. The new dam would connect to the existing abutments. The parapet wall of the new gravity dam would extend to an elevation of 1,492.0 ft NAVD88, and the existing gravity blocks and parapet walls along the existing abutments would also be raised to this elevation. A downstream parapet wall would be constructed to serve primarily as a guardrail for vehicles traversing the crest. The downstream face of the dam would be stepped concrete. The new dam would include new outlet works that would be designed to meet the emergency reservoir drawdown requirements. Figure 1-8 shows the proposed gravity dam plan and profile, and Figure 1-9 shows a cross-section of the proposed gravity dam.

Construction materials and methods used for the Proposed Project would take into account local seismic activity. The added straight-axis concrete gravity structure would be constructed of Roller Compacted Concrete (RCC), which would be vertical at the upstream face of the structure and at a slope of approximately 0.8 horizontal to 1 vertical (H:V), on the downstream side. The downstream face would be constructed using 4 ft high lifts and the crest would be 10 ft wide. These improvements would protect against catastrophic dam failure during an MCE. With this alternative, the reservoir capacity would remain at its current capacity of 42,860 ac-ft.

The *Preliminary Design Report (30% Design) Vail Dam Seismic and Hydrologic Remediation Project* (Preliminary Design Report) (AECOM 2019) provides the basis of design for the dam and appurtenant facilities for the Proposed Action. It includes detailed descriptions of the proposed dam configuration; inlet and outlet facilities; modifications required to existing facilities; the dam foundation; seepage control; RCC mix design and placement; electrical, mechanical, and instrumentation requirements of the new dam; site development needs; and construction methods. Appendix A of the Preliminary Design Report consists of the 30% Design Plans. The Proposed Project elements are presented below at a summary level appropriate for CEQA analysis; refer to the Preliminary Design Report and 30% Design Plans for specific details.

1.2.6.1 Dam Layout

The new gravity dam would be constructed immediately downstream of the existing arch dam and abut the existing gravity abutments. The new gravity dam would be 6.8 ft higher than the original dam and route the PMF entirely through the existing spillway system. A 3.5 ft high parapet wall would be located on both sides of the crest. Reservoir water would not normally be against the upstream parapet wall, but the parapet wall would prevent overtopping of the dam during the PMF.



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* For further information, refer to Sheet D-1 in the Vail Dam Seismic and Hydrologic Remediation Project 30% Design Submittal by AECOM (July 2019)

FIGURE 1-8

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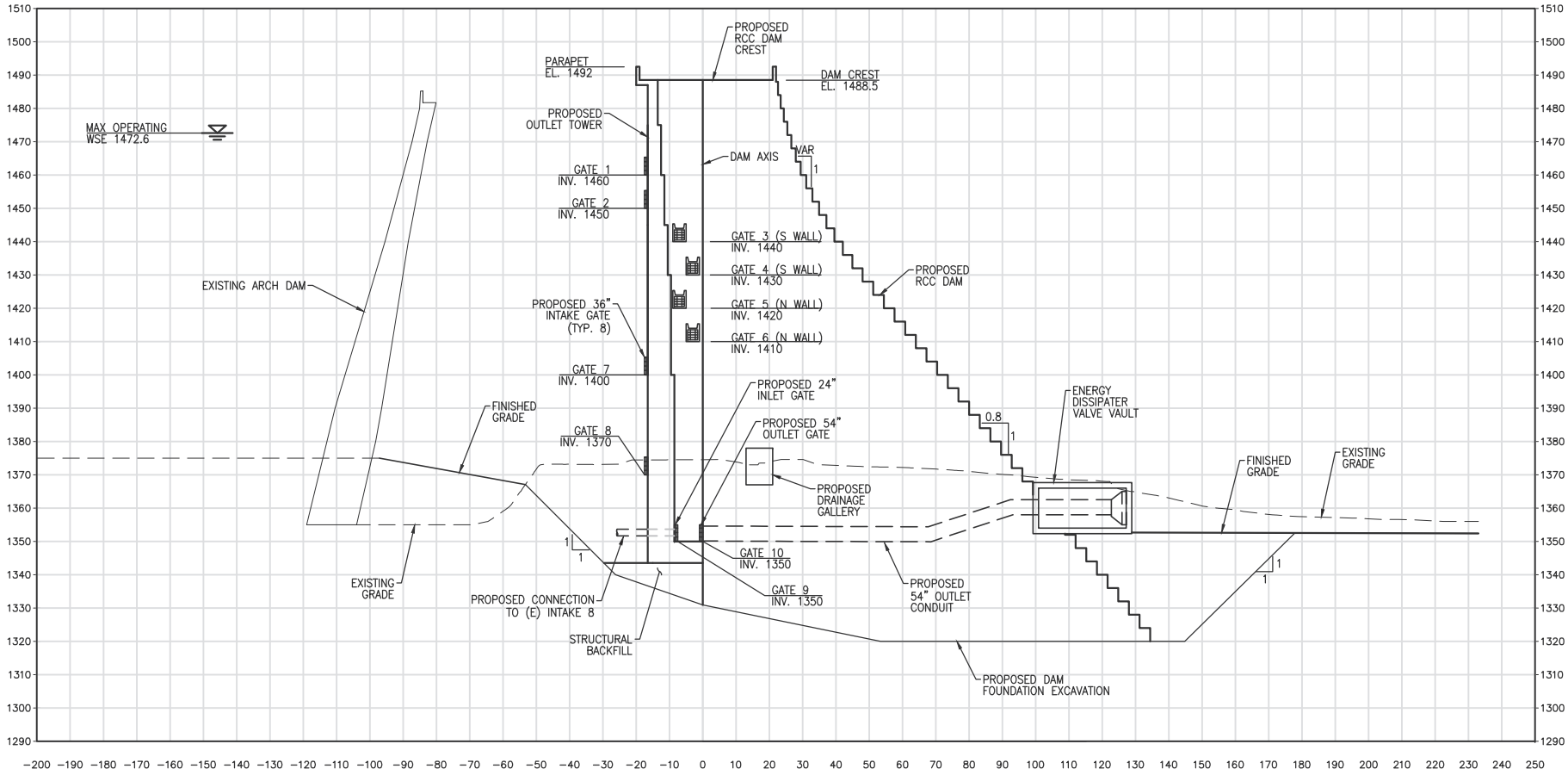
Vail Dam Seismic and Hydrologic Remediation Project

Proposed Gravity Dam Plan and Profile

SOURCE: AECOM 2019

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* For further information, refer to Sheet D-3 in the Vail Dam Seismic and Hydrologic Remediation Project 30% Design Submittal by AECOM (July 2019)

FIGURE 1-9

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SOURCE: AECOM 2019

Vail Dam Seismic and Hydrologic Remediation Project

Proposed Gravity Dam Section

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The width of the dam crest (between parapet walls) would be 15 ft to 20 ft. The crest width would allow vehicular access for construction and maintenance of the dam structure. Vehicular access would be provided by wrapping the dam around the existing right gravity abutment and providing access from the North Access Road. The existing left gravity abutment downstream of the new dam would also need to be raised.

The upstream face of the new gravity dam would be vertical. The downstream face of the dam would generally be inclined at 0.8:1 H:V, extending from the upstream edge at the crest elevation down to the downstream toe. This inclination would be steeper in the upper part of the dam. The downstream face would be formed using steps with vertical faces of 4 ft.

1.2.6.2 Inlet/Outlet Facilities

As stated previously, the existing arch dam has eight outlets, including a low-level outlet. A reinforced concrete outlet tower would be constructed on the upstream side of the new dam. The tower would have nine intake gates and one outlet gate. The new facilities would retain RCWD's capability to store imported water in the reservoir by filling through the existing 48-inch diameter transmission pipeline that comes up the canyon from the Upper VDC Recharge Basins. The new outlet facilities would also have the capability for emergency releases that meet regulatory requirements.

Downstream control facilities would provide for releases to Temecula Creek and valves and meters would control and measure reservoir inflows and outflows. These facilities include an energy dissipater valve vault, an energy dissipater stilling basin and outlet channel for the creek releases, and a meter vault to measure reservoir inflows and outflows.

1.2.6.3 Modifications to Existing Facilities

Relocation of Pipelines. There are a number of pipelines that currently service the existing dam that cross the footprint of the new dam foundation excavation. The water pipelines would be replaced with a temporary single 60-inch diameter pipeline that would connect to energy dissipater valves temporarily located downstream of the dam foundation excavation.

Existing Dam Demolition. Portions of the existing arch dam would be partially demolished to allow for hydraulic connection of the reservoir with the new outlet tower. As shown in Figure 1-10, the five upper blocks of the existing dam would be removed. A berm would be constructed upstream of the existing dam to support a crane, which would be used for demolition of the existing dam.

Demolition of the existing gravity abutments would also occur where the new dam contacts those abutments. This would consist of hydroblasting and removing 2–3 inches of concrete on the sloping downstream faces of the abutments and removing the upper 6 inches of the crests of both the right and left gravity abutments.

Spillway Modifications. The existing spillway would be used as the spillway for the new gravity dam. Grouted riprap from the dam foundation excavation or dam demolition concrete would be utilized to armor the area below the ogee and overpour weirs.

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PHOTOGRAPH OF ARCH DAM DOWNSTREAM FACE
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GENERAL NOTES

1. REMOVE THE UPPER PORTIONS OF THE EXISTING ARCH DAM BLOCKS AS INDICATED IN THE TABLE HEREON.
2. SEE AS-BUILT ARCH DAM DRAWINGS FOR THE LOCATION OF THE JOINTS BETWEEN BLOCKS.
3. SEE SHEET X-4 FOR JOINT DETAILS AND ADDITIONAL INFORMATION.
4. SEE SHEET G-4 FOR AVAILABLE ACCESS AND STAGING AREAS.

DEMOLITION ELEVATIONS	
BLOCK	DEMOLITION REQUIREMENTS
A	PROTECT–IN–PLACE
B	PROTECT–IN–PACE
C	REMOVE TO EL. 1455'
D	REMOVE TO EL. 1425'
E	REMOVE TO EL. 1410'
F	REMOVE TO EL. 1425'
G	REMOVE TO EL. 1455'
H	PROTECT–IN–PLACE

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- Portion of Dam to be Demolished

* For further information, refer to Sheet X-5 in the Vail Dam Seismic and Hydrologic Remediation Project 30% Design Submittal by AECOM (July 2019)

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SOURCE: AECOM 2019

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FIGURE 1-10

Vail Dam Seismic and Hydrologic Remediation Project

Existing Dam Partial Demolition

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1.2.6.4 Dam Foundation

Preparation of the new gravity dam foundation includes excavation to slightly weathered or fresh rock and then treatment of the excavated surface. Shallow consolidation grouting of the rock would increase the stiffness of the foundation. Dewatering of the excavation would also be required.

1.2.6.5 Seepage Control

Seepage through the dam foundation would be controlled by foundation grouting, which would include a grout curtain, possibly stitch grouting, and foundation drains. Seepage through the dam would be controlled by the upstream facing of the dam, the internal dam drains, and water stops at the concrete joints.

1.2.6.6 RCC Mix Design

Prior to dam construction, the RCC mix, which is comprised of aggregate, cement, and fly ash, would be designed and tested. A concrete batch plant would be located at the staging area near De Portola Road (see Figure 1-11). The objective of the RCC mix design is to develop an efficient mix that does not segregate, is easy to compact, and provides engineering properties that are consistent with the design loading.

It is currently estimated that dam construction would require approximately 81,600 cubic yards (cy) of RCC, which would require approximately 147,000 tons of aggregate that would need to be imported and stored on site prior to use. However, this volume would increase if additional foundation excavation is required to enhance the seismic response of the dam. Refer to Figure 1-8 for the location of the aggregate storage areas. Potential quarries for aggregate include a quarry located in the community of Fallbrook east of I-15 along SR-76, approximately 25 miles from the Project site, as well as a quarry located in the City of Corona. Concrete and cement would also be imported from the City of Victorville. Fly ash, a byproduct of coal power generation, would be imported from out of state, likely from Arizona.

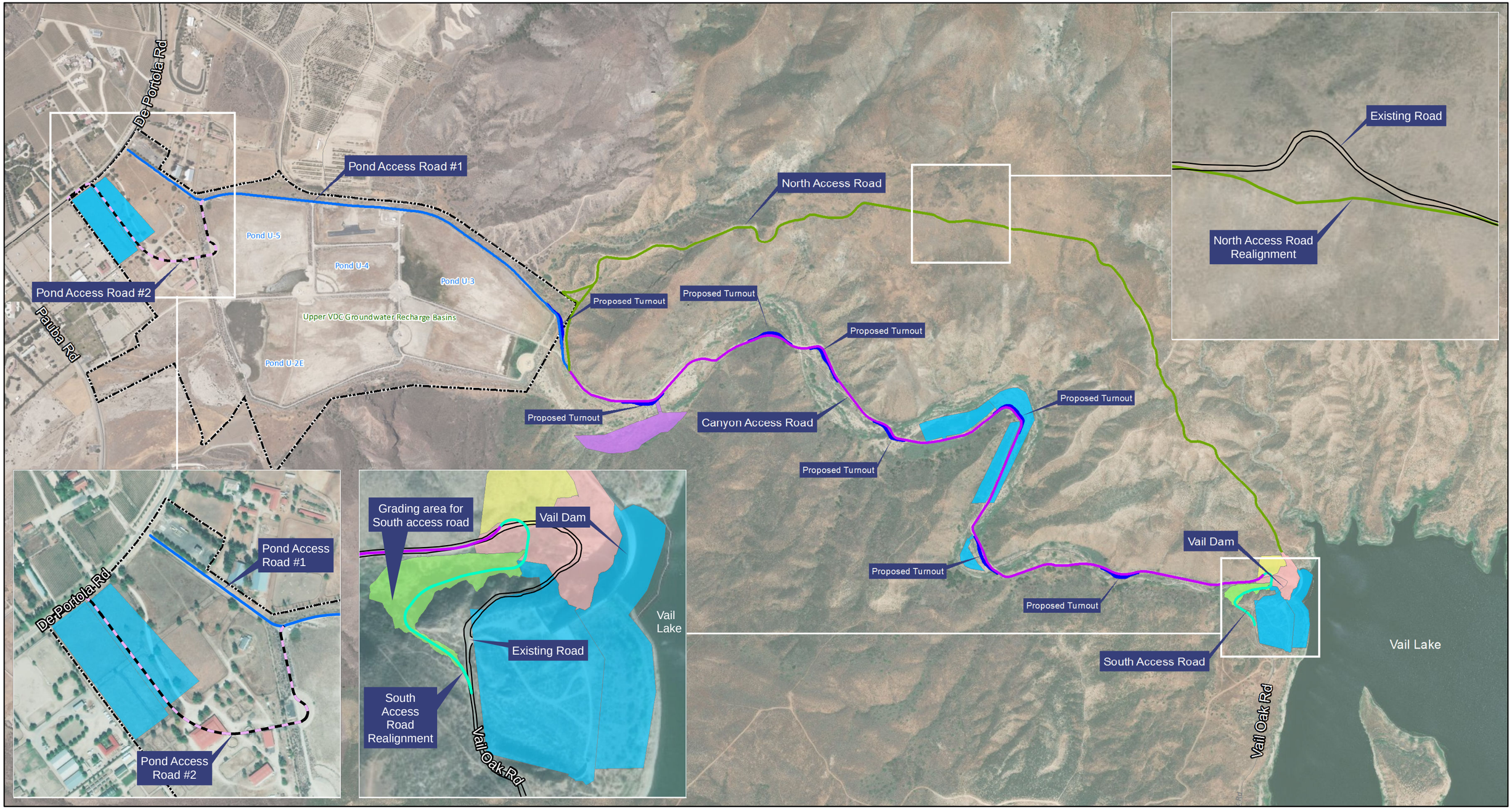
1.2.6.7 Electrical, Mechanical, and Instrumentation for the Dam

The existing dam facilities have overhead electrical service provided by Southern California Edison (SCE). The existing overhead service would need to be rerouted to accommodate the footprint of the new dam and outlet works facilities. New power poles would be provided to route the existing service up the downstream side of the right abutment to the new Dam Control Building. All new electrical utility facilities would be designed per SCE standards. Power is used for lighting, security cameras, gate actuators, trash rack hoists, and monitoring and control systems.

1.2.6.8 Site Development

The Project site would need to be further developed to support construction and operation of the new dam. This would include improvements to access roads, provision for construction staging and material disposal areas, and partial demolition of the existing dam.

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LEGEND

- Canyon Access Road
- North Access Road
- Pond Access Road #1
- Pond Access Road #2
- South Access Road
- Proposed Truck Turnout
- Property Boundary
- Dam Construction Area
- Disposal Area
- South Access Road Construction Area
- Staging and Laydown Area
- Temporary Construction Area

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SOURCE: Bing Maps (2018); AECOM (1/2020)

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FIGURE 1-11

Vail Dam Seismic and Hydrologic Remediation Project

Staging and Disposal Areas and Access Roads

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Construction Access Roads. Improvements would be required to existing access roads to accommodate construction traffic. These include Pond Access Road #1, the access road from De Portola Road (an existing, paved road) to the mouth of the canyon, the North Access Road, the Canyon Access Road, and the South Access Road (which connects to SR-79 South) (see Figure 1-11). Pond Access Road #2 is a proposed alternate access point from De Portola Road, connecting to Pond Access Road #1 at the edge of the Upper VDC Recharge Basins.

North Access Road. There is an existing unimproved North Access Road that traverses approximately 2 miles from the northeast corner of the Upper VDC percolation ponds to the right abutment of the existing dam. This access road would be improved to provide vehicular access to the crest of the new dam (Figure 1-11). The North Access Road would be the primary access route to the new dam. Vehicular access is not feasible from the left abutment due to the height of the existing left gravity abutment.

The improvements would include gravel surfacing and improvement of drainage. Material from excavation of the dam foundation may be reused to improve the North Access Road. The road would remain a single lane road. Realignment would be needed where the road is outside of the property boundary and where excavation through a rock knob would be required.

Canyon Access Road. The existing unpaved access road through the canyon below the dam is approximately 2 miles long and is currently a single lane bound on both sides by vegetation with limited sight lines (Figure 1-11)**.** This access road would need to be widened to two lanes (25 ft total width) for construction traffic, with several turnouts to allow vehicles to pass. Widening would be accomplished through removal of the existing vegetation on both sides of the current roadway (no physical widening would be required). This widening would be only for the purpose of construction, and the access road would be revegetated and restored to a single lane after construction of the dam is complete. Other improvements to the Canyon Access Road would include gravel surfacing. The existing five Arizona type crossings of the creek would remain; however, temporary culverts may be required during construction at the five Arizona crossings to provide construction vehicle crossings.

Pond Access Roads. Initially, site access will be provided via an existing unpaved access road and along the north side of the Upper VDC recharge basins (Pond Access Road #1) (refer to Figure 1-11). Pond Access Road #2 is a short segment that would connect Pond Access Road #1 to De Portola Road, and would be constructed within property owned by RCWD, south of the future Upper VDC Regional Pump Station and Chlorine Contact Tank Project (RCWD Project No. D1903), avoiding conflict with that project. Pond Access Road #2 would provide for two-way traffic (25 ft total width), and include gravel surfacing and would also provide access to one of the construction staging areas. Once Pond Access Road #2 has been completed, the majority of construction access for the Project area would be provided along that route. The existing access for Pond Access Road #1 at De Portola Road would provide a secondary access point when required.

South Access Road. The current South Access Road would need to be relocated as it is within the footprint of the foundation excavation of the new dam. A new roadway embankment will be constructed along the north facing slope of the canyon, approximately 150 ft downstream of the existing access road. The alignment of the new South Access Road is shown on Figure 1-11. This

location was selected to provide access from the spillway area and to provide an area immediately downstream of the new dam for construction staging.

It is anticipated that the South Access Road embankment would be constructed using materials excavated from the new dam foundation. This road would also have gravel surfacing and drainage improvements. The South Access Road would be inundated whenever the reservoir spills; therefore, during operation, major erosion would need to be repaired on this road after spill events.

Construction Staging and Disposal Areas. The site development would include staging areas to support construction and demolition activities. Material disposal areas are also planned for placement of excess foundation excavation spoils.

Staging Areas. Limited area is available immediately adjacent to the proposed dam and downstream due to the narrow width of this portion of the canyon. Therefore, staging areas have been identified in various locations, including the relatively level area downstream of the spillway, wider portions of the canyon downstream of the dam, and within a vacant portion of RCWD's property adjacent to De Portola Road. The proposed staging areas are shown on Figure 1-11**.** Staging areas include aggregate stockpile areas, laydown areas, and access and staging areas. It is anticipated that the contractor would determine the optimal locations within the staging areas for each activity. Staging areas would be required to provide the following:

1. **RCC Mix Plant Area:** This area will contain a portable concrete mix plant with silos of cement and fly ash and stockpiles of aggregate in 3 to 4 sizes. This mix plant area is anticipated to require the larger of the staging areas and would likely be located near De Portola Road, as all materials will be brought in from off-site locations. The RCC would be hauled from the mix plant to the dam site with off-road trucks.

2. **Foundation Grout Mix Plant:** This area will contain a small mix plant for the grout used in the foundation grouting. This grout mix plant will be located adjacent to the dam site.

3. **Crushing Plant:** This area will contain a portable rock crushing plant for crushing materials excavated from the dam foundation. Because of the limited space available adjacent to the dam, it is likely that the crushing plant will be located in a mid-canyon area.

4. **Contractor Trailers:** Both the contractor's and engineer's field offices will be located within staging areas.

5. **Laydown Areas:** These areas will provide material laydown/storage areas and space for activities such as fabricating rebar and assembling concrete forms, etc.

Disposal Areas. As discussed previously, approximately 58,400 cy of materials (including the previous foundation spoils, alluvium, fill, and moderately weathered rock) would be generated for excavation for the dam foundation. Most of this material would be used to grade the new alignment of the South Access Road, and a limited quantity of the less weathered rock would be used as riprap for spillway armoring. The balance of the excavation materials would require

removal from the dam area and subsequent disposal. RCWD currently plans to keep the excess materials on its property for possible future re-use. Disposal areas have been identified near the mouth of the canyon as shown on Figure 1-11. Off-site disposal, if needed, would be at a nearby licensed landfill. Prior to revegetation, the disposal materials may need to be buried under soil in order to allow for plant establishment.

1.2.6.9 Construction Schedule

Construction of the new dam is anticipated to be initiated in the fall of 2022 and completed in the spring of 2025. It is anticipated that the new dam and outlet works would be substantially complete in approximately 23 months. The existing dam would then be partially demolished after completion of the tower, and it is expected that construction would be complete in approximately 29 months (AECOM 2019).

1.2.6.10 Haul Routes

Materials and equipment will be brought to the site from contractor offices and yards and from one or more offsite aggregate quarries. In addition, fly ash will be imported from offsite. As the contractor, quarry, and fly ash source have not been selected, the exact haul routes are not known. However, it is anticipated that the fly ash would be obtained from Arizona and transported via rail to either Fontana or National City, California, and then delivered to the Project site via truck. From Interstate 15 or other areas west of the site, materials and equipment would likely travel on Temecula Parkway/SR 79 South, head north on Anza Road, and then west on De Portola Road to Pond Access Road #1 or Pond Access Road #2. Materials and equipment may also travel from Interstate 15 to Rancho California Road, then south on Anza Road and west on De Portola Road to Pond Access Road #1 or Pond Access Road #2. Materials and equipment going to the South Access Road would remain on Temecula Parkway/SR 79 South and turn north on Vail Oak Road, which connects to the South Access Road. Materials and equipment coming from east or southeast of the project site (or the eastern portion of northern San Diego County) could access SR 79 from SR 76.

1.2.6.11 Construction Equipment

A variety of vehicles and equipment would be used during the project. Equipment used would differ by project phase, with the most intensive use occurring during RCC placement. Table 2.A presents a summary of the anticipated use of equipment and vehicles prepared in support of the Preliminary Design Report.

Table 1.A: Summary of Anticipated Construction Equipment

Equipment Description	Estimated Operating Hours[1]	Total Estimated Legal Load Highway Trips[2]
Excavator	3,280	
Front End Loader	8,320	
Tractor with Bulldozer	3,640	
Motor Grader	2,600	
Compactor	2,160	
Truck Articulated Off Highway	10,360	
Truck Trailer for Equipment/Materials[3]	3,680	920

Table 1.A: Summary of Anticipated Construction Equipment

Equipment Description	Estimated Operating Hours[1]	Total Estimated Legal Load Highway Trips[2]
Truck Trailer for Aggregates[4,5]	17,040	14,816
Truck Trailer for Cement or Flyash[6]	2,160	1,600
Truck Water	6,040	
Truck Service	8,080	
Truck Ready Mix Concrete[7]	1,364	682
Rock Drills	5,040	
Generator Sets	4,000	
Crane	5,800	
Crush and Screen Plant[8]	720	
Concrete Batch Plant	1,080	
Grout Mix and Pump	2,240	
Chipper	560	
Pickup	17,920	
TOTALS		**18,018**

Source: AECOM
Notes:

1. Estimated 40 hours/week except for RCC Placement where 90 hours/week was assumed.
2. Highway trips include inbound and outbound trips (e.g., one truck load requires two trips).
3. Highway trips estimated to bring in equipment and materials at 8 hours/load.
4. Highway trips are estimated assuming truck load of 13 cubic yards for 5,300 cubic yards of road aggregates.
5. Highway trips are estimated assuming truck load of 21 tons for 147,000 tons of RCC aggregates.
6. Highway trips are estimated assuming truck load of 20 tons for 16,000 tons of cement and flyash.
7. Highway trips are estimated assuming 8 cubic yard ready mix trucks and concrete quantities in 30% ordinary Portland cement based concrete (OPCC).

1.2.6.12 Vail Lake Water Storage

The replacement dam would be constructed so the resultant storage capacity and maximum reservoir level would be equal to the capacity and elevation prior to the water level restriction. Currently, water levels are restricted to between a high of 1,457.6 ft NAVD88 (15 ft below the spillway crest) and a low of 1,437.6 ft NAVD88. Remediation of seismic and hydrologic hazards at Vail Dam would allow for the removal of the water level restrictions. Specifically, the reservoir water level could be increased up to the spillway elevation (1,472.6 ft NAVD88). However, RCWD would not manually fill the reservoir to more than 1,457.6 ft NAVD88 (15 ft below the spillway crest) to allow capacity for rainfall inflow.

As stated previously, the operating level of the reservoir is dependent on a variety of factors, including restrictions on pumping into the reservoir to prevent introduction of quagga mussel, requirements to recharge groundwater to reduce evaporation of stored water, and the amount of precipitation. As such, the reservoir would continue to be subject to semiregular fluctuations in water level. Figure 1-7 depicts the location of the reservoir margin when the water is at the spillway elevation.

1.2.7 Required Permits and Approvals

The dam construction would require approvals from local agencies and from federal, State, and local regulatory agencies.

Additionally, Project improvements would affect resources subject to the jurisdiction of the U.S. Army Corps of Engineers (USACE), the California Department of Fish and Wildlife (CDFW), and the Regional Water Quality Control Board (RWQCB), and have the potential to affect threatened or endangered species and historic resources. Table 1.B indicates the anticipated permits and authorizations required for this Project.

Table 1.B: Anticipated Permits and Authorizations

Agency	Permit/Authorization
U.S. Army Corps of Engineers (USACE)	● CWA 404 Individual Permit ● Rivers and Harbors Act Section 10 Permit
California Department of Fish and Wildlife (CDFW)	● FGC Section 1600 Lake or Streambed Alteration Agreement
Regional Water Quality Control Board (RWQCB)	● CWA 401 Water Quality Certification ● Waste Discharge Requirements **[TBD]**
State Water Resources Control Board	● Construction General Permit
Western Riverside County Regional Conservation Authority (WRC RCA)	● Certificate of Inclusion and Incidental Take Statement
State Historic Preservation Officer (SHPO)	● NHPA Section 106 Consultation
California Department of Water Resources, Division of Safety of Dams	● Approval of Plans and Specifications for the Construction or Enlargement of a Dam and Reservoir
County of Riverside	● Encroachment Permit for new driveway off DePortola Road

CWA = Clean Water Act
FGC = California Fish and Game Code
NHPA = National Historic Preservation Act

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2.0 ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED

The environmental factors checked below would be potentially affected by this Project, involving at least one impact that is a "Potentially Significant Impact" as indicated by the checklist in Chapter 3.0.

☐ Aesthetics	☐ Agriculture and Forestry Resources	☒ Air Quality
☒ Biological Resources	☒ Cultural Resources	☒ Energy
☒ Geology/Soils	☒ Greenhouse Gas Emissions	☒ Hazards & Hazardous Materials
☒ Hydrology/Water Quality	☒ Land Use/Planning	☐ Mineral Resources
☒ Noise	☐ Population/Housing	☒ Public Services
☒ Recreation	☒ Transportation	☒ Tribal Cultural Resources
☒ Utilities/Service Systems	☒ Wildfire	☒ Mandatory Findings of Significance

2.1 DETERMINATION

On the basis of this initial evaluation:

☐ I find that the Proposed Project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

☐ I find that although the Proposed Project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.

☒ I find that the Proposed Project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

☐ I find that the Proposed Project MAY have a "Potentially Significant Impact" or "Potentially Significant Unless Mitigated" impact on the environment, but at least one effect (1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and (2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.

☐ I find that although the Proposed Project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier ENVIRONMENTAL IMPACT REPORT or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier ENVIRONMENTAL IMPACT REPORT or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the Proposed Project, nothing further is required.

Signature  June 18, 2020
Date

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3.0 EVALUATION OF ENVIRONMENTAL IMPACTS

1. A brief explanation is required for all answers except "No Impact" answers that are adequately supported by the information sources a Lead Agency cites in the parentheses following each question. A "No Impact" answer is adequately supported if the referenced information sources show that the impact simply does not apply to projects like the one involved (e.g., the project falls outside a fault rupture zone). A "No Impact" answer should be explained where it is based on project-specific factors as well as general standards (e.g., the project will not expose sensitive receptors to pollutants, based on a project-specific screening analysis).

2. All answers must take account of the whole action involved, including off-site as well as on-site, cumulative as well as project-level, indirect as well as direct, and construction as well as operational impacts.

3. Once the Lead Agency has determined that a particular physical impact may occur, then the checklist answers must indicate whether the impact is potentially significant, less than significant with mitigation, or less than significant. "Potentially Significant Impact" is appropriate if there is substantial evidence that an effect is significant. If there are one or more "Potentially Significant Impact" entries when the determination is made, an EIR is required.

4. "Negative Declaration: Less Than Significant With Mitigation Incorporated" applies where the incorporation of mitigation measures has reduced an effect from "Potentially Significant Impact" to a "Less than Significant Impact." The Lead Agency must describe the mitigation measures, and briefly explain how they reduce the effect to a less than significant level (mitigation measures from Section XVII, "Earlier Analyses," may be cross-referenced).

5. Earlier analyses may be used where, pursuant to the tiering, program EIR, or other CEQA process, an effect has been adequately analyzed in an earlier EIR or negative declaration. Section 15063(c)(3)(D). In this case, a brief discussion should identify the following:

    a. **Earlier Analyses Used.** Identify and state where they are available for review.

    b. **Impacts Adequately Addressed.** Identify which effects from the above checklist were within the scope of and adequately analyzed in an earlier document pursuant to applicable legal standards, and state whether such effects were addressed by mitigation measures based on the earlier analysis.

    c. **Mitigation Measures.** For effects that are "Less than Significant with Mitigation Measures Incorporated," describe the mitigation measures which were incorporated or refined from the earlier document and the extent to which they address site-specific conditions for the project.

6. Lead agencies are encouraged to incorporate into the checklist references to information sources for potential impacts (e.g., general plans, zoning ordinances). Reference to a

previously prepared or outside document should, where appropriate, include a reference to the page or pages where the statement is substantiated.

7. Supporting Information Sources. A source list should be attached, and other sources used or individuals contacted should be cited in the discussion.

8. This is only a suggested form, and lead agencies are free to use different formats; however, lead agencies should normally address the questions from this checklist that are relevant to a project's environmental effects in whatever format is selected.

9. The explanation of each issue should identify:

    a. the significance criteria or threshold, if any, used to evaluate each question; and

    b. the mitigation measure identified, if any, to reduce the impact to less than significant.

3.1 AESTHETICS

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Except as provided in Public Resources Code Section 21099, would the project:				
a. Have a substantial adverse effect on a scenic vista?	☐	☐	☒	☐
b. Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☐	☒
c. In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?	☐	☐	☒	☐
d. Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☐	☒	☐

a. Would the project have a substantial adverse effect on a scenic vista?

Less Than Significant Impact. The Proposed Project consists of constructing a gravity dam downstream of the existing arch dam. Public views of Vail Dam include the abutments and parapet walls and portions of the dam that are above the current water level that are visible along the edges of Vail Lake and the recreational trails surrounding Vail Lake. The Proposed Project would replace an existing dam and would not impede or obstruct existing views from Vail Lake or the surrounding recreational trails. The faces of both the existing arch dam and the proposed gravity dam would be primarily visible from the canyon below the dam, which is not accessible to the public. The area surrounding the Project site is undeveloped, and the face of the existing dam is not visible from residential or commercial areas. Therefore, the proposed gravity dam would not result in a substantial change to a scenic vista.

Remediation of seismic and hydrologic hazards would allow RCWD to increase the reservoir level up to the spillway elevation (1,472.6 ft NAVD88). Vail Lake is used for recreational purposes and is visible from public areas. The increase in lake water levels would have the potential to inundate features along the existing lake margins; however, this would not substantially degrade the scenic quality of public views as the overall scene would remain the same: a lake surrounded primarily by open space areas, with some recreational amenities. Therefore, the Proposed Project would not result in a significant adverse impact on a scenic vista. **This topic will not be analyzed further in the EIR unless new information identifying it as a potentially significant impact is presented during the scoping process.**

b. Would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?

No Impact. The Project area is neither located within nor visible from a State Scenic Highway. The nearest highways are State Route 79 (SR-79) and Interstate 15 (I-15), which are not eligible or

designated State scenic highways. The Riverside County General Plan identifies SR-79 as an Eligible County Scenic Highway; however, the Project area is not visible from SR-79, and the proposed Project would have no impacts to scenic resources along SR-79. Therefore, no significant impacts to scenic resources would occur, and no mitigation is required. **This topic will not be analyzed further in the EIR unless new information identifying it as a potentially significant impact is presented during the scoping process.**

c. In non-urbanized areas, would the project substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from a publicly accessible vantage point.) If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?

Less Than Significant Impact. The Project is located within a non-urbanized area. As noted in Response 3.1.a, above, the dam would have extremely limited visibility from public areas and would not result in a substantial change to the visual character of the area. The change in lake water levels has the potential to inundate features along the existing lake margin; however, this would not substantially degrade the character or quality of public views as the overall visual character and quality of public views would remain the same. The Project would not introduce obstructions to the view or result in the construction of substantially different or incompatible elements that would contrast with the existing features. Therefore, impacts associated with degradation of the existing visual character or quality of public views would be less than significant. **This topic will not be analyzed further in the EIR unless new information identifying it as a potentially significant impact is presented during the scoping process.**

d. Would the project create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?

Less Than Significant Impact. Similar to existing conditions, the Project would include security lighting as appropriate at the dam facilities. The Project site is located within Zone A of the Mount Palomar Lighting Zone (areas within 0 to 15 miles of the Palomar Observatory). Security lighting would be selected and installed in accordance with County of Riverside Ordinance No. 655 "Regulating Light Pollution" regulations applicable to Zone A. Security lighting would be directed downward and/or would be appropriately shielded and would not result in visible glare in the surrounding areas. Security lighting would be similar to existing conditions and would therefore not be anticipated to affect wildlife. Therefore, the Proposed Project would not result in a significant impact related to light and glare. **This topic will not be analyzed further in the EIR unless new information identifying it as a potentially significant impact is presented during the scoping process.**

3.2 AGRICULTURE AND FORESTRY RESOURCES

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a. Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☒
b. Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☒
c. Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?	☐	☐	☐	☒
d. Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒
e. Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☐	☒

a. Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?

No Impact. There is no designated Farmland on the Project site; however, Farmland of Local Importance and Grazing Lands are designated to the east of Vail Lake. The Project would not result in land use changes on or off the Project site. Designated farmland and grazing lands east of Vail Lake would not be affected by the construction of the gravity dam or the potential increase in lake levels. As a result, no significant impacts would occur, and no mitigation is required. **This topic will not be analyzed further in the EIR unless new information identifying it as a potentially significant impact is presented during the scoping process.**

b. Would the project conflict with existing zoning for agricultural use, or a Williamson Act contract?

No Impact. The Project is not located within an area zoned for agricultural use or subject to a Williamson Act contract.[8] The Project would not affect off-site agricultural land use. As a result, no significant impacts would occur, and no mitigation is required. **This topic will not be analyzed further in the EIR unless new information identifying it as a potentially significant impact is presented during the scoping process.**

[8] Riverside County Information Technology (RCIT). Map My County 8.1. Website: https://gis.countyof riverside. us/ Html5Viewer/?viewer=MMC_Public (accessed December 13, 2019).

c. Would the project conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?

No Impact. The Project is not located within an area zoned as forest land, timberland, or Timberland Production areas, according to County of Riverside zoning or General Plan Land Use designations. The Project would not affect off-site forest land use. As a result, no significant impacts would occur, and no mitigation is required. **This topic will not be analyzed further in the EIR unless new information identifying it as a potentially significant impact is presented during the scoping process.**

d. Would the project result in the loss of forest land or conversion of forest land to non-forest use?

No Impact. No forest or timberland exists at the Project site or in the surrounding area. Increases in lake water levels have the potential to affect vegetation along the reservoir margins; however, these areas do not include forest lands. Therefore, the Project would not result in the loss of forest land or the conversion of forest land to non-forest use. As a result, no significant impacts would occur, and no mitigation is required. **This topic will not be analyzed further in the EIR unless new information identifying it as a potentially significant impact is presented during the scoping process.**

e. Would the project involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?

No Impact. The Project would not involve changes to the existing environment that would otherwise affect Farmland or forest land. The Project has the potential to improve water supply quality and reliability, which would be a benefit to agricultural lands within RCWD's service area. As a result, no significant impacts would occur, and no mitigation is required. **This topic will not be analyzed further in the EIR unless new information identifying it as a potentially significant impact is presented during the scoping process.**

3.3 AIR QUALITY

Where available, the significance criteria established by the applicable air quality management district or air pollution control district may be relied upon to make the following determinations.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a. Conflict with or obstruct implementation of the applicable air quality plan?	☒	☐	☐	☐
b. Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?	☒	☐	☐	☐
c. Expose sensitive receptors to substantial pollutant concentrations?	☒	☐	☐	☐
d. Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?	☐	☐	☒	☐

a. Would the project conflict with or obstruct implementation of the applicable air quality plan?

Potentially Significant Impact. An Air Quality Management Plan (AQMP) describes air pollution control strategies to be undertaken by a city or county in a region classified as a nonattainment area to meet the requirements of the federal Clean Air Act. The main purpose of an AQMP is to bring an area into compliance with the requirements of federal and State ambient air quality standards (AAQS). For a project to be consistent with the AQMP adopted by the South Coast Air Quality Management District (SCAQMD), the pollutants emitted from project operation should not exceed the SCAQMD daily threshold or cause a significant impact on air quality, or the project must already have been included in the AQMP projection. Because the AQMP is based on local General Plans, projects that are deemed consistent with a specific General Plan are usually found to be consistent with the AQMP.

Implementation of the Proposed Project would include demolition of portions of the existing dam, extensive site preparation and construction of a new gravity dam, transportation of materials from an off-site quarry, and improvements to access roads. The Project would result in short-term construction emissions of pollutants as a result of the use of heavy equipment and construction-related traffic. Long-term emissions are anticipated to be similar to existing conditions, as the frequency and nature of dam operation and maintenance activities would not substantially change. Additional analysis is needed to determine whether the Project would exceed the SCAQMD daily thresholds or cause a significant impact on air quality. **This topic will be analyzed in the EIR, and mitigation, if needed, will be developed and included in the EIR to address potentially significant adverse Project effects related to consistency with the AQMP.**

b. Would the project result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?

Potentially Significant Impact. Refer to Response 3.3.a, above. The South Coast Air Basin is designated as non-attainment for the pollutants ozone and particulate matter. The Project would result in short-term construction emissions and long-term operational emissions. As part of the Project, an Air Quality and Greenhouse Gas (GHG) Emissions Assessment will be conducted to assess potentially significant adverse impacts for short- and long-term, project-related air quality effects. The findings of the air quality analysis and recommended mitigation will be described in the EIR. **This topic will be analyzed in the EIR, and mitigation will be included in the EIR, if necessary, to address potentially significant adverse impacts for short- and/or long-term, project-related air quality effects.**

c. Would the project expose sensitive receptors to substantial pollutant concentrations?

Potentially Significant Impact. Refer to Response 3.3.a, above. Sensitive receptors are persons defined as more sensitive to the potential unhealthful effects of air emissions. Sensitive receptors can include children and the elderly. The Project site is surrounded primarily by open space, and no nearby sensitive receptors have been identified; however, haul routes may be located within commercial and residential areas. Project construction, and in particular, the truck trips associated with importing aggregate material from the off-site quarry, could expose sensitive receptors along the haul routes to project-related air emissions. Additionally, the access roads are in the vicinity of several horse ranches near De Portola Road. Construction vehicles driving on the access roads would generate dust and other emissions. Evaluation of project-related emissions will be conducted in the Air Quality and GHG Emissions Assessment to assess whether the Project would result expose sensitive receptors to substantial pollutant concentrations. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects related to exposure of sensitive receptors to substantial pollutant concentrations.**

d. Would the project result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?

Less Than Significant Impact. According to the SCAQMD *CEQA Air Quality Handbook* (1993, currently being revised), land uses associated with odor complaints typically include agricultural uses, wastewater treatment plants, food processing plants, chemical plants, composting, refineries, landfills, dairies, and fiberglass molding. Objectionable odors may be generated during the operation of diesel-powered construction equipment and/or asphalt paving during Project construction; however, these would not affect a substantial number of people due to the remote location of Vail Dam. Those odors would be temporary, would not result in long-term odor impacts, and would not affect a substantial number of people. The proposed uses associated with the Project are not anticipated to generate objectionable odors during operation. Therefore, the Project would not result in permanent impacts related to odors on nearby sensitive receptors (e.g., residential uses). Impacts related to odors would be less than significant, and no mitigation is required. **This topic will not be analyzed further in the EIR unless new information identifying it as a potentially significant impact is presented during the scoping process.**

3.4 BIOLOGICAL RESOURCES

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☒	☐	☐	☐
b. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☒	☐	☐	☐
c. Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☒	☐	☐	☐
d. Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☒	☐	☐	☐
e. Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☒	☐	☐	☐
f. Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☒	☐	☐	☐

a. Would the project have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?

Potentially Significant Impact. The Project is located within an area that supports sensitive species and habitat. Some of the habitat within and adjacent to the Project site includes mitigation areas for prior projects, such as the Vail Lake Transmission Main and Pump Station Project. Construction of the new gravity dam, including within the dam footprint, along access roads, and within staging and disposal areas, would result in the direct loss of habitat through permanent and temporary impacts. Indirect impacts from construction activities such as increased noise, dust, and air emissions would also occur in habitat adjacent to access roads, staging and disposal areas, and the Project site. The changes in lake water levels would result in habitat modifications including inundation of areas currently along the reservoir margins and changes to adjacent upland habitat from a potentially higher water table. Therefore, Project construction and operation could have potentially significant impacts either directly or through habitat modification to species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California

Department of Fish and Wildlife (CDFW) or the United States Fish and Wildlife Service (USFWS). Therefore, the improvements associated with the Project could significantly affect sensitive biological resources. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse impacts to species identified as a candidate, sensitive, or special-status species.**

b. Would the project have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?

Potentially Significant Impact. Refer to Response 3.4.a, above. Project construction would result in the permanent loss of riparian habitat and sensitive natural communities, including portions of mitigation areas for previous projects, within and adjacent to the dam footprint and temporary impacts within staging and disposal areas and along access roads. Additional impacts may occur to habitat surrounding Vail Lake as a result of inundation from changes in lake water levels. Project construction and operation could have potentially significant impacts on riparian habitat or other sensitive natural communities identified in local or regional plans, policies, or regulations or by the CDFW or USFWS. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse impacts to riparian habitat or other sensitive natural communities.**

c. Would the project have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?

Potentially Significant Impact. Refer to Response 3.4.a, above. Project construction would result in the loss of federally protected wetlands within and adjacent to the dam footprint and temporary impacts within staging and disposal areas and along access roads. Additional impacts may occur to habitat surrounding Vail Lake as a result of inundation from the changes in lake water levels. Project construction and operation could have potentially significant impacts on federally protected wetlands and waters of the United States as defined by Section 404 of the Clean Water Act. Therefore, the improvements associated with the Project could potentially affect wetlands. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse impacts to federally protected wetlands.**

d. Would the project interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?

Potentially Significant Impact. Refer to Response 3.4.a, above. The Project would not result in long-term impediments to wildlife movement. The movement of fish and amphibian species would be similar to existing conditions following construction of the gravity dam. Construction activities may temporarily affect movement of local wildlife; however, as the area is surrounded by open space, these impacts are not anticipated to be significant.

Areas within and surrounding Vail Lake and downstream of the dam provide habitat for breeding wildlife, including native birds, mammals, amphibians, fish, reptiles, and invertebrates. The Project would permanently impact areas within the dam footprint, and construction activities (including temporary construction areas) would have the potential to disrupt breeding wildlife. Nesting birds are protected under the federal Migratory Bird Treaty Act (MBTA) (Title 33, United States Code [USC], Section 703 et seq.; see also Title 50, Code of Federal Regulations [CFR], Part 10) and Section 3503 of the California Fish and Game Code. Implementation of the Project would be subject to the provisions of these regulations that prohibit disturbing or destroying active nests. Regardless, the improvements associated with the Project would potentially affect sensitive biological resources. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse impacts to movement of native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors.**

e. Would the project conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?

Potentially Significant Impact. The Project is located within areas identified for conservation under the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP), and has the potential to result in the loss of mature trees and vegetation. Therefore, the Project may conflict with a plan, policy, or ordinance relating to the protection of biological resources. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse impacts as a result of the Project's conflict with a plan, policy, or ordinance relating to the protection of biological resources.**

f. Would the project conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?

Potentially Significant Impact. Refer to Responses 3.4.a and 3.4.b, above. Impacts to sensitive species, habitat, and riparian areas may conflict with the provisions of the MSHCP. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse impacts as a result of any potential conflicts with the adopted Natural Communities Conservation Plan/Habitat Conservation Plan (NCCP/HCP).**

3.5 CULTURAL RESOURCES

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a. Cause a substantial adverse change in the significance of a historical resource pursuant to §15064.5?	☒	☐	☐	☐
b. Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	☒	☐	☐	☐
c. Disturb any human remains, including those interred outside of dedicated cemeteries?	☒	☐	☐	☐

a. Would the project cause a substantial adverse change in the significance of a historical resource pursuant to §15064.5?

Potentially Significant Impact. CEQA defines a "historical resource" as a resource that meets one or more of the following criteria: (1) is listed in, or determined eligible for listing in, the California Register of Historical Resources (California Register); (2) is listed in a local register of historical resources as defined in Public Resources Code (PRC) Section 5020.1(k); (3) is identified as significant in a historical resource survey meeting the requirements of PRC Section 5024.1(g); or (4) is determined to be a historical resource by a project's Lead Agency (PRC Section 21084.1 and *State CEQA Guidelines* Section 15064.5[a]). The Project has the potential to affect resources as a result of ground-disturbing construction activities associated with the gravity dam and access road improvements, demolition of portions of the existing dam, and inundation of areas surrounding Vail Lake as a result of changes in lake water levels. Significant historical resources have the potential to occur within the impact areas. Therefore, the Project has the potential to result in significant impacts related to historic resources. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR to address potentially significant adverse Project impacts related to historical resources.**

b. Would the project cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?

Potentially Significant Impact. Refer to Response 3.5.a, above. Significant archaeological resources have the potential to occur within the impact areas. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR to address potentially significant adverse Project impacts related to archaeological resources.**

c. Would the project disturb any human remains, including those interred outside of dedicated cemeteries?

Potentially Significant Impact. Refer to Response 3.5.a, above. No known human remains are interred on the Project site. In the unlikely event that human remains are encountered during Project grading, the proper authorities would be notified and standard procedures for the respectful handling of human remains during the earthmoving activities would be adhered to in compliance with State Health and Safety Code Section 7050.5 and PRC Section 5097.98. **Precautionary mitigation may be included in the EIR to address any potentially significant impacts related to unknown remains that**

might be uncovered at the time of grading. This topic will be addressed in the EIR, and mitigation will be included if necessary.

3.6 ENERGY

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a. Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?	☒	☐	☐	☐
b. Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	☒	☐	☐	☐

a. Would the project result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?

Potentially Significant Impact. Operation of the Project would not result in wasteful, inefficient, or unnecessary consumption of energy resources. Due to the magnitude of construction activities associated with the gravity dam, including the transport of aggregate materials from an off-site quarry, Project construction has the potential to result in inefficient or unnecessary consumption of energy resources. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project impacts related to wasteful, inefficient, or unnecessary consumption of energy resources.**

b. Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?

Potentially Significant Impact. Refer to Response 3.6.a, above. Construction of the Project has the potential to conflict with goals for energy efficiency. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project impacts related to wasteful, inefficient, or unnecessary consumption of energy resources.**

3.7 GEOLOGY AND SOILS

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a. Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury or death involving:				
i. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	☒	☐	☐	☐
ii. Strong seismic ground shaking?	☒	☐	☐	☐
iii. Seismic-related ground failure, including liquefaction?	☒	☐	☐	☐
iv. Landslides?	☒	☐	☐	☐
b. Result in substantial soil erosion or the loss of topsoil?	☒	☐	☐	☐
c. Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	☒	☐	☐	☐
d. Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code, creating substantial direct or indirect risks to life or property?	☒	☐	☐	☐
e. Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	☐	☐	☐	☒
f. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☒	☐	☐	☐

a. Would the project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:

i. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.
ii. Strong seismic ground shaking?
iii. Seismic-related ground failure, including liquefaction?
iv. Landslides?

Potentially Significant Impact. The Project site is in southern California, which is a seismically active region. The Project is located in an area with known earthquake faults, including the Agua Tibia Mountain Fault. Strong seismic ground shaking is possible. Liquefaction hazards within the area range from very low to moderate. The purpose of the Project is the remediation of seismic and hydrologic hazards to Vail Dam; therefore, it is anticipated that it would be beneficial in terms of reducing the risk of loss, injury, or death associated with such risks. Further analysis is needed to determine construction-related risks associated with these factors. **This topic will be analyzed in the EIR, and**

mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project impacts related to earthquake fault zones, strong seismic ground shaking, seismic-related ground failure, and landslide potential.

b. Would the project result in substantial soil erosion or the loss of topsoil?

Potentially Significant Impact. During Project construction, soil on the Project site would be exposed and there would be an increased potential for soil erosion compared to existing conditions. In addition, during a storm event, soil erosion could occur at an accelerated rate. The potential for erosion during Project operations would be minimal because temporary impact areas on the Project site would be stabilized through revegetation or other means, and there would not be areas of exposed/disturbed soil. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project impacts related to erosion during construction.**

c. Would the project be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?

Potentially Significant Impact. Refer to Response 3.7.a, above. While it is anticipated that it would be beneficial in terms of reducing the risk of loss, injury, or death associated with such risks, further analysis is needed to determine the potential for hazards associated with landslide, lateral spreading, subsidence, liquefaction, or collapse. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project impacts related to unstable geologic units.**

d. Would the project be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code, creating substantial direct or indirect risks to life or property?

Potentially Significant Impact. The Project site may contain expansive soils, thereby potentially creating a substantial risk to life or property. While the Project will be designed consistent with the relevant Uniform Building Code and California Building Code seismic standards, the Project could have a potentially significant impact related to expansive soils. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects related to expansive soils.**

e. Would the project have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?

No Impact. The Project would not include the use of septic tanks or alternative methods for disposal of wastewater into subsurface soils. No on-site sewage disposal systems (e.g., septic tanks) are planned. Operation of the dam would not involve wastewater generation; as a result, no alternative waste disposal systems would be constructed as part of the project. Therefore, the Project would not result in any impacts related to septic tanks or alternative wastewater disposal methods. No

mitigation is required. **This topic will not be analyzed further in the EIR unless new information identifying it as a potentially significant impact is presented during the scoping process.**

f. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

Potentially Significant Impact. The paleontological sensitivity for Project site and surrounding areas is designated as low, high, and undetermined.[9] As such, the Project has the potential to affect paleontological resources and geologic features as a result of ground-disturbing construction activities. In addition, several rock outcroppings are located within the area that may be affected during construction. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project impacts related to unique paleontological resources sites and unique geologic features.**

[9] Riverside County Information Technology (RCIT). Map My County 8.1. Website: https://gis.countyofriverside.us/Html5Viewer/?viewer=MMC_Public (accessed December 13, 2019).

3.8 GREENHOUSE GAS EMISSIONS

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a. Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☒	☐	☐	☐
b. Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emission of greenhouse gases?	☒	☐	☐	☐

a. Would the project generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

Potentially Significant Impact. The Project would generate greenhouse gas (GHG) emissions during construction and operation. Greenhouse Gas (GHG) emissions associated with Project construction would consist primarily of emissions from equipment exhaust, particularly related to importing aggregate materials to the Project site from an off-site quarry. Long-term emissions are anticipated to be similar to existing conditions, as the frequency and intensity of dam operation and maintenance activities would not substantially change. An Air Quality and GHG Emissions Assessment will be prepared to address Project effects related to or as a result of GHG emissions, and a discussion of GHGs and their potential effects on global climate change will be included in the EIR. Potential cumulative global climate change impacts associated with the Project will be evaluated. Emissions of carbon dioxide equivalents will be calculated and compared to the area emission levels. If necessary, mitigation measures will be identified to ensure that both short-term and long-term GHG impacts will be reduced to the extent possible. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects related to GHG emissions.**

b. Would the project conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

Potentially Significant Impact. Refer to Response 3.8.a, above. Regulatory requirements on GHG emissions will be identified, and the Project's compliance with applicable plans and policies will be discussed. Emissions of carbon dioxide, a key GHG identified in Assembly Bill (AB) 32, and other major GHGs (e.g., methane and nitrous oxide) from direct and indirect project-related sources will be calculated. The Project's emissions will be evaluated for consistency with the goals and emission projections in SCAQMD's Final 2016 AQMP to determine whether Project emissions will cause or delay the timely attainment of State and federal AAQS, as well as meet the emission reduction goals of AB 32, the California Global Warming Solutions Act of 2006, Senate Bill (SB) 32, and related climate change legislation. Standard requirements for construction activities recommended by SCAQMD will be identified. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects related to conflicts with applicable plans, policies, or regulations adopted for the purpose of reducing GHG emissions.**

3.9 HAZARDS AND HAZARDOUS MATERIALS

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a. Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☒	☐	☐	☐
b. Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☐	☒	☐
c. Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☒
d. Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☒	☐	☐	☐
e. For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?	☐	☐	☐	☒
f. Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☒	☐	☐	☐
g. Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?	☒	☐	☐	☐

a. Would the project create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?

Potentially Significant Impact. The EIR will incorporate and address the conclusions of a Phase I Environmental Site Assessment to evaluate whether hazardous materials or other adverse environmental conditions are present due to past or present uses of the Project site and/or properties in the vicinity of the Project site, including staging and disposal areas. The assessment will identify whether the Project site is located on or within: (1) a former hazardous waste disposal site (and whether the wastes have been removed); (2) a hazardous substance release site identified by the State Department of Health Services; or (3) a site containing one or more pipelines that carry hazardous substances, acutely hazardous substances, or hazardous wastes, except a natural gas line. Potential land use safety and hazard conflicts related to existing land uses in the vicinity of the Project site will also be addressed.

Public or environmental exposure to hazardous materials could occur through improper handling or use of hazardous materials or hazardous wastes, a transportation accident, environmentally unsound disposal methods, fire, explosion, or other emergency. The severity of potential exposure hazards would vary due to factors such as the type of activity being conducted, the concentration and types of hazardous material or waste, and the proximity to sensitive receptors. Given the Project's proximity

and relation to the drinking water supply, potential exposure hazards could be significant. The greatest risk of exposure to hazardous materials associated with the Project would be expected to occur during construction activities. The routine transport, use, or disposal of hazardous materials on the Project site would be similar to existing conditions following construction activities, and would be limited to materials associated with the operation and maintenance of dam facilities and equipment. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects related to hazards to the public or the environment through the routine transport, use, or disposal of hazardous material**.

b. Would the project create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?

Less Than Significant Impact. Refer to Response 3.9.a, above. During construction of the Project, there is potential for the accidental release of hazardous materials, which could adversely affect the public and/or environment. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects related to the accidental release of hazardous materials into the environment.**

c. Would the project emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?

No Impact. Refer to Response 3.9.a, above. Vail Dam and its appurtenant structures are not located within 0.25 mile of an existing or proposed school. Construction areas including access roads and staging and disposal areas are likewise not located within 0.25 mile of an existing or proposed school. The nearest schools are Crowne Elementary School and Tony Tobin Elementary School, which are located over 3 miles to the west of the Project access point from De Portola Road and the staging and disposal areas within the VDC Recharge Basins. As a result, no significant impacts would occur, and no mitigation is required. **This topic will not be analyzed further in the EIR unless new information identifying it as a potentially significant impact is presented during the scoping process.**

d. Would the project be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?

Potentially Significant Impact. Refer to Response 3.9.a, above. The Phase I Environmental Site Assessment will include a records search to determine if any hazardous materials on or near the Project site could pose a potential environmental concern to the surrounding area and to identify any environmental violations associated with activities conducted at the Project site. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects related to hazardous waste sites.**

e. Would the project be located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?

No Impact. The Project is not located within an airport land use plan or within 2 miles of a public airport or public use airport. No impacts are anticipated with respect to the recreational use of the Temecula Valley Flyers Remote Control Airplane Club flying field within the Project area. Therefore, no impacts would result, and no mitigation is required. **This topic will not be covered in the EIR unless related issues not covered here are identified during the scoping process.**

f. Would the project impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?

Potentially Significant Impact. The Project would allow RCWD to increase the amount of water stored in Vail Lake by increasing the reservoir level to the spillway elevation. Updates to the emergency response plan may be required to address the expansion of the potential inundation area in the event of catastrophic dam failure. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects related to adopted emergency response and evacuation plans.**

g. Would the project expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?

Potentially Significant Impact. The Project is located within an area of moderate to very high fire risk, but would not introduce new structures that would be substantially at risk of loss from fire. Project construction activities would use vehicles and machinery that have the potential to spark a fire in the area. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects related to adopted emergency response and evacuation plans.**

3.10 HYDROLOGY AND WATER QUALITY

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a. Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality?	☒	☐	☐	☐
b. Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?	☒	☐	☐	☐
c. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:	☒	☐	☐	☐
i. Result in substantial erosion or siltation on- or off-site;	☒	☐	☐	☐
ii. Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite;	☒	☐	☐	☐
iii. Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or	☒	☐	☐	☐
iv. Impede or redirect flood flows?	☒	☐	☐	☐
d. In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?	☐	☐	☒	☐
e. Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	☒	☐	☐	☐

a. Would the project violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality?

Potentially Significant Impact. Implementation of the Project would include demolition of portions of the existing dam, extensive site preparation and construction of the new gravity dam, transportation of materials from an off-site quarry, and improvements to access roads. The Project site includes Vail Lake and portions of Temecula Creek. As a water provider for the area, RCWD operates and maintains Vail Dam, the Upper VDC Recharge Basins, and Vail Lake with one goal of preserving and improving the quality of surface and groundwater.

Construction of the Project has the potential to introduce additional pollutants into the storm drain system. During construction activities, excavated soil would be exposed, and there would be an increased potential for soil erosion and sedimentation compared to existing conditions. In addition, chemicals, liquid products, petroleum products (e.g., paints, solvents, and fuels), and concrete-related waste may be spilled or leaked and have the potential to be transported via storm runoff into receiving waters. Operation and maintenance of the dam and associated facilities would be similar to existing conditions following construction; therefore, the potential for violation of water quality standards or waste discharge requirements or the degradation of water quality would not appreciably change. The

EIR will evaluate the Project's potential for pollutants of concern in stormwater runoff to result in violation of water quality standards and waste discharge requirements.

Project construction would comply with the requirements of the Construction General Permit, including preparation of a Storm Water Pollution Prevention Plan (SWPPP) and implementation of Construction Best Management Practices (BMPs). A preliminary Water Quality Management Plan (WQMP) will be prepared for the Project, which will detail the operational BMPs to be included in the Project to reduce pollutants of concern in stormwater runoff. Compliance with the applicable permits and the proposed BMPs will be considered in the evaluation of potential water quality impacts in the EIR. **This topic will be analyzed further in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects related to water quality standards and waste discharge requirements.**

b. Would the project substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?

Potentially Significant Impact. The Project would not result in changes to the current groundwater recharge practices of RCWD, nor would it decrease groundwater supply. RCWD manages both Vail Lake surface water and groundwater in the aquifers below the VDC Recharge Basins. However, temporary dewatering of construction areas during site preparation and construction of the gravity dam and related features would be required, which could result in temporary impacts to groundwater recharge. **This topic will be analyzed further in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects related to water quality standards and waste discharge requirements.**

c. Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:

i. Result in substantial erosion or siltation on- or off-site;
ii. Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite;
iii. Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or
iv. Impede or redirect flood flows?

Potentially Significant Impact. The Project would affect the topography and runoff patterns in the vicinity of the gravity dam and the existing arch dam. The Project is the construction of a gravity dam, which is designed to impede and redirect flood flows; this is consistent with existing conditions with the exception that additional water storage would be possible within Vail Lake following construction by increasing lake water levels to the spillway elevation. Project construction includes ground-disturbing activities that would expose the topsoil and could also increase stormwater runoff that could result in downstream erosion and siltation. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects related to changes in drainage patterns and associated erosion and siltation.**

d. In flood hazard, tsunami, or seiche zones, would the project risk release of pollutants due to project inundation?

Less Than Significant Impact. Seiching is a phenomenon that occurs when seismic ground shaking induces standing waves (seiches) inside water retention facilities such as reservoirs and water tanks. Such waves can cause retention structures to fail and subsequent flooding of downstream properties. Vail Lake is a relatively large body of water and has the potential for seiching; however, this has a low likelihood of occurring during construction, and it is not anticipated that substantial pollutant release would occur.

Tsunamis are generated ocean wave trains generally caused by tectonic displacement of the seafloor associated with shallow earthquakes, seafloor landslides, rockfalls, and exploding volcanic islands. The Project is not in a tsunami inundation area. The risk associated with tsunamis, therefore, is not considered a potential hazard or a potentially significant impact, and no mitigation is required.

The Project site includes areas within identified flood hazard zones associated with Vail Lake and Temecula Creek. Flooding downstream of Vail Dam during construction is highly unlikely with the current restrictions on lake water levels and with RCWD's ability to release water to reduce lake water levels and avoid overtopping of the spillway.

Because BMPs would reduce the potential for pollutants to occur on the site, and because any hazardous materials used on site would be properly stored and contained, impacts related to the release of pollutants in the event of inundation from flooding, tsunami, or seiche would be less than significant. No mitigation is required. **This topic will not be analyzed further in the EIR unless new information identifying it as a potential impact is presented during the scoping process.**

e. Would the project conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?

Potentially Significant Impact. Refer to Responses 3.10.a and 3.10.b, above. The project is within the jurisdiction of the San Diego RWQCB. The San Diego RWQCB adopted a Water Quality Control Plan (i.e., Basin Plan) (September 1994, with amendments effective on or before May 2016), which designates beneficial uses for all surface and groundwater within its jurisdiction and establishes the water quality objectives and standards necessary to protect those beneficial uses. The project would comply with the applicable National Pollutant Discharge Elimination System (NPDES) permits and implement construction and operational BMPs to reduce pollutants of concern in stormwater runoff. Compliance with the applicable permits and the proposed BMPs will be considered in the evaluation of potential water quality impacts in the EIR.

The Project supports RCWD's management of surface and groundwater in the area and would not conflict with RCWD's 2014 *Upper Santa Margarita Watershed Integrated Regional Water Quality Management Plan Update*. However, temporary dewatering of construction areas during site preparation and construction of the gravity dam and related features would be required, which could result in temporary impacts to groundwater recharge. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects related to changes in drainage patterns and associated erosion and siltation.**

3.11 LAND USE AND PLANNING

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a. Physically divide an established community?	☐	☐	☐	☒
b. Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?	☒	☐	☐	☐

a. Would the project physically divide an established community?

No Impact. The Project site is located entirely within undeveloped areas. Vail Dam, where the majority of construction would occur, is surrounded by open space and undeveloped areas. Project construction activities within and adjacent to the VDC Recharge Basins would not affect the rural residential community to the west of De Portola Road. As a result, the Project would not result in physical divisions in any established community. No mitigation is required. **This topic will not be analyzed further in the EIR unless new information identifying it as a potentially significant impact is presented during the scoping process.**

b. Would the project cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?

Potentially Significant Impact. Construction of the gravity dam associated with the Project would result in impacts to sensitive habitat and special-status species, which may conflict with the provisions of the MSHCP. Changes to lake water levels may also affect habitats around the reservoir margin. Further analysis is needed to determine consistency with the MSHCP. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects related to consistency with the MSHCP.**

3.12 MINERAL RESOURCES

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a. Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☒	☐
b. Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☒	☐

a. Would the project result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?

Less Than Significant Impact. The Project is the remediation of seismic and hydrologic hazards at the existing Vail Dam through construction of a new gravity dam. The Project will not appreciably change land use or resource availability on the Project site. Construction of the new gravity dam will require approximately 147,000 tons of aggregate that would be imported from an existing off-site quarry, using known mineral resources for dam construction. Quarries with available aggregate materials have already completed environmental analysis and obtained appropriate permits for the extraction of resources. The use of this aggregate for seismic and hydrologic hazard remediation at Vail Dam would benefit the region and residents of the State by reducing the risk of losses and financial impact caused in the event of a catastrophic dam failure at Vail Lake, and would not restrict future use of the quarry sites for further mineral extraction. Therefore, impacts would not be significant. **This topic will not be analyzed further in the EIR unless new information identifying it as a potentially significant impact is presented during the scoping process.**

b. Would the project result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?

Less Than Significant Impact. Refer to Response 3.12.a, above. There are no active quarries on the Project site and the site is not used for mineral extraction. These quarries may include locally-important mineral resource recovery sites; however, they have already completed environmental analysis and obtained appropriate permits for the extraction of resources, and the Project would not restrict future use of the sites for further mineral extraction. Therefore, impacts would not be significant. **This topic will not be analyzed further in the EIR unless new information identifying it as a potentially significant impact is presented during the scoping process.**

3.13 NOISE

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project result in:				
a. Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☒	☐	☐	☐
b. Generation of excessive groundborne vibration or groundborne noise levels?	☒	☐	☐	☐
c. For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒

a. Would the project result in generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

Potentially Significant Impact. Project construction would require the use of heavy machinery, construction equipment, and some blasting on the Project site. Additionally, transporting aggregate material from the off-site quarry would require large trucks to use haul routes through urban and developed areas. The majority of noise-generating activities would occur in remote areas surrounded by open space and undeveloped areas. Additionally, a staging area and access roads are in the vicinity of several horse ranches near De Portola Road. Construction vehicles and the RCC Mix Plant would generate noise in the vicinity of these ranches. Special-status wildlife within the area would be indirectly affected by noise generated by Project construction. No changes to permanent noise levels are anticipated following Project construction, as operation and maintenance activities at the dam would remain similar to existing conditions. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects related to temporary increases in ambient noise levels due to truck noise along haul routes and Project construction noise in adjacent sensitive habitat.**

b. Would the project result in generation of excessive groundborne vibration or groundborne noise levels?

Potentially Significant Impact. Refer to Response 3.13.a, above. Blasting and construction activities at the dam site are expected to generate substantial groundborne vibration and noise. These impacts would be limited to the Project site and surrounding undeveloped areas, and impacts would be limited to sensitive biological resources. No changes to permanent vibration levels are anticipated following Project construction, as operation and maintenance activities at the dam would remain similar to existing conditions. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects related to temporary generation of groundborne vibration and noise.**

c. For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

No Impact. The Project is not located within 2 miles of a public airport or public use airport, and would not expose people residing or working in the area to excessive noise levels. As a result, no significant impacts would occur, and no mitigation is required. **This topic will not be analyzed further in the EIR unless new information identifying it as a potentially significant impact is presented during the scoping process.**

3.14 POPULATION AND HOUSING

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a. Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of road or other infrastructure)?	☐	☐	☐	☒
b. Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

a. Would the project induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?

No Impact. The Project is the remediation of seismic and hydrologic hazards at the existing Vail Dam. It does not include construction of new homes or businesses and does not include extension of roads or other infrastructure. As a result, no significant impacts would occur, and no mitigation is required. **This topic will not be analyzed further in the EIR unless new information identifying it as a potentially significant impact is presented during the scoping process.**

b. Would the project displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?

No Impact. The Project is the remediation of seismic and hydrologic hazards at the existing Vail Dam. It does not require the displacement of any people or housing. As a result, no significant impacts would occur, and no mitigation is required. **This topic will not be analyzed further in the EIR unless new information identifying it as a potentially significant impact is presented during the scoping process.**

3.15 PUBLIC SERVICES

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a. Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:				
i. Fire protection?	☐	☐	☒	☐
ii. Police protection?	☐	☐	☒	☐
iii. Schools?	☐	☐	☒	☐
iv. Parks?	☒	☐	☐	☐
v. Other public facilities?	☐	☐	☒	☐

a. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:

i. Fire protection?
ii. Police protection?
iii. Schools?

Less Than Significant Impact. The Project is the remediation of seismic and hydrologic hazards at the existing Vail Dam. It does not include construction of governmental facilities, new homes, or businesses, does not include extension of roads or other infrastructure, and it is not anticipated to affect the population within the area. The Project would not introduce new facilities requiring fire protection, as the gravity dam would be constructed immediately downstream of the existing arch dam. No additional police protection would be required as RCWD provides security on site and public access is limited. No additional schools, parks, or other public facilities would be required as no changes in area population would occur as a result of the Project. Therefore, no significant impacts would occur, and no mitigation is required. **This topic will not be analyzed further in the EIR unless new information identifying it as a potentially significant impact is presented during the scoping process.**

iv. Parks?
v. Other public facilities?

Potentially Significant Impact. The Vail Lake Resort (Temecula/Vail Lake KOA) is located on RCWD-owned property along the southern shore of Vail Lake, in the vicinity of the confluence of Arroyo Seco Creek and Vail Lake. This property is operated as a recreational amenity by Kampgrounds Enterprises

Incorporated (KEI) under contract to RCWD. Project construction would not result in direct impacts to this area; however, following construction, changes in lake water levels could affect facilities such as docks, boat launches, fishing areas, and other amenities, which could be inundated if the reservoir level is increased to the spillway elevation. If inundation of facilities is anticipated, RCWD may elect to relocate or otherwise alter the recreational facilities to accommodate the higher lake levels. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project impacts due to the potential need to modify recreational facilities to accommodate increases in lake water levels.**

3.16 RECREATION

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☐	☒
b. Does the project include recreational facilities or require the construction or expansion of recreational facilities which have an adverse physical effect on the environment?	☐	☐	☐	☒

a. Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?

No Impact. Refer to Response 3.15.a, in Section 3.15, Public Services, above. The Project would not alter population in the area or increase the use of existing parks, no significant impacts would occur, and no mitigation is required. **This topic will not be analyzed further in the EIR unless new information identifying it as a potentially significant impact is presented during the scoping process.**

b. Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?

No Impact. Refer to Response 3.15.a, in Section 3.15, Public Services, above, for a discussion of facilities at the Vail Lake Resort. The Project does not include recreational facilities or require the construction or expansion of recreational facilities. **This topic will not be analyzed further in the EIR unless new information identifying it as a potentially significant impact is presented during the scoping process.**

3.17 TRANSPORTATION

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a. Conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?	☒	☐	☐	☐
b. Conflict or be inconsistent with CEQA Guidelines section 15064.3[10] or will conflict with an applicable congestion management program, including, but not limited to, level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?	☒	☐	☐	☐
c. Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☒	☐
d. Result in inadequate emergency access?	☐	☐	☒	☐

a. Would the project conflict with a program plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?

Potentially Significant Impact. The Project does not include the construction or removal of public roads or other circulation system features. No changes to transit, bicycle, or pedestrian facilities would be required, and no impacts would result from Project operation. Truck trips associated with importing aggregate materials from the off-site quarry would utilize existing public roadways and non-public access roads during construction. This has the potential to affect the circulation system. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project impacts due to construction-related impacts to the circulation system.**

b. Would the project conflict or be inconsistent with CEQA Guidelines section 15064.3 or will conflict with an applicable congestion management program, including, but not limited to, level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?

Potentially Significant Impact. Section 15064.3 of the *State CEQA Guidelines* codifies that project-related transportation impacts are typically best measured by evaluating the project's vehicle miles traveled (VMT). Specifically, Subdivision (b) focuses on specific criteria related to transportation analysis and is divided into four subdivisions: (1) land use projects, (2) transportation projects, (3) qualitative analysis, and (4) methodology. Subdivision (b)(1) provides guidance on determining the significance of transportation impacts of land use projects using VMT; projects within 0.5 mile of a

[10] *State CEQA Guidelines* Section 15064.3(c) provides that a lead agency "may elect to be governed by the provisions" of the section immediately; otherwise, the section's provisions apply July 1, 2020. Here, the City has not elected to be governed by Section 15064.3. Accordingly, an analysis of vehicles miles traveled (VMT) is not necessary to determine whether a proposed project will have a significant transportation impact.

major transit stop/high-quality transit corridor should be considered to have a less than significant impact. Subdivision (b)(2) addresses VMT associated with transportation projects and states that projects that reduce VMT, such as pedestrian, bicycle, and transit projects, should be presumed to have a less than significant impact. Subdivision (b)(3) acknowledges that Lead Agencies may not be able to quantitatively estimate VMT for every project type; in these cases, a qualitative analysis may be used. Subdivision (b)(4) stipulates that Lead Agencies have the discretion to formulate a methodology that would appropriately analyze a project's VMT. The provisions of *State CEQA Guidelines* Section 15064.3 become applicable statewide beginning July 1, 2020.

The Project is neither a land use project nor a transportation project. It would not result in any long-term changes to traffic or circulation and would not contribute to traffic congestion within the area, as operation and maintenance activities associated with Vail Dam would not appreciably change in intensity or frequency. During construction, additional truck trips would be added on the on-site access roads and haul routes between the Project site and the off-site quarry, which would have the potential to increase congestion and result in a temporary increase in daily VMT. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project impacts due to increases in congestion on public roads during Project construction.**

c. Would the project substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?

Less Than Significant Impact. The Project includes improvements to access roads that traverse steep terrain as well as the canyon bottom to allow construction-related vehicles and equipment to access the site. These access roads may include sharp curves, creek crossings, and steep grades; however, as these features would be limited to RCWD's privately owned roads and would not be accessible to the public, no significant impacts would occur, and no mitigation is required. **This topic will not be analyzed further in the EIR unless new information identifying it as a potentially significant impact is presented during the scoping process.**

d. Would the project result in inadequate emergency access?

Less Than Significant Impact. The Project is the construction of a gravity dam to remediate seismic and hydrologic hazards associated with the current arch dam. Site access to Vail Dam is presently limited to the existing North Access Road and Canyon Access Road from De Portola Road through the VDC Recharge Basins, and the South Access Road from SR-79. Access along one or more routes may be temporarily unavailable as access road improvements are under construction; however, construction would be phased such that emergency access to the dam is always available via at least one route. Therefore, no significant impacts would occur, and no mitigation is required. **This topic will not be analyzed further in the EIR unless new information identifying it as a potentially significant impact is presented during the scoping process.**

3.18 TRIBAL CULTURAL RESOURCES

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a. Cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:				
i. Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or	☒	☐	☐	☐
ii. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resources Code section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	☒	☐	☐	☐

a. Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:

i. Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code Section 5020.1(k), or

ii. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1? In applying the criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.

Potentially Significant Impact. Chapter 532, Statutes of 2014 (i.e., AB 52), requires that Lead Agencies evaluate a project's potential to impact "tribal cultural resources." Such resources include sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American tribe that are eligible for inclusion in the California Register or included in a local register of historical resources (PRC, Section 21074). AB 52 also gives Lead Agencies the discretion to determine, supported by substantial evidence, whether a resource falling outside the definition stated above nonetheless qualifies as a "tribal cultural resource."

Also per AB 52 (specifically PRC Section 21080.3.1), as Lead Agency, RCWD must consult with California Native American tribes that are traditionally and culturally affiliated with the geographic area of the Project and have previously requested that the Lead Agency provide the tribe with notice of such projects.

In compliance with AB 52, letters were distributed in June 2020 to local Native American tribes that have previously requested to be notified of future projects proposed by RCWD. The letters have provided each tribe of the opportunity to request consultation with RCWD regarding the Project. In compliance with AB 52, tribes typically have 30 days from the date of receipt of notification to request consultation on the Project. However, Executive Order N-54-20 was issued by Governor Newsom on April 22, 2020 and suspends the timeframes from which tribes must request consultation and the lead agency must begin the consultation process for 60 days. Information provided through tribal consultation will inform the assessment as to whether tribal cultural resources are present, and the significance of any potential impacts to such resources. **This topic will be analyzed in the EIR and, if necessary, mitigation will be developed and included in the EIR to address potentially significant adverse Project effects to tribal historic resources.**

3.19 UTILITIES AND SERVICE SYSTEMS

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the project:				
a. Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?	☒	☐	☐	☐
b. Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?	☐	☐	☐	☒
c. Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	☐	☒
d. Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?	☒	☐	☐	☐
e. Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?	☒	☐	☐	☐

a. Would the project require or result in the relocation or construction of new or expanded water, wastewater treatment or stormwater drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?

Potentially Significant Impact. The Project is the remediation of seismic and hydrologic hazards at the existing Vail Dam through construction of a new gravity dam and appurtenant facilities. Changes will be required to local electric power lines and potentially telecommunications facilities serving the site. No changes to water, wastewater treatment, stormwater drainage, or natural gas facilities are proposed, and no impacts would occur with respect to these systems. **Potential impacts related to electric power and telecommunications facilities will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project impacts due to impacts from ancillary facilities.**

b. Would the project have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?

No Impact. The Project is the remediation of seismic and hydrologic hazards at the existing Vail Dam and will support RCWD's management of surface and groundwater resources. Dam operation would not contribute to demands on water supply. Therefore, no impacts would occur, and no mitigation is required. **This topic will not be analyzed further in the EIR unless new information identifying it as a potentially significant impact is presented during the scoping process.**

c. Would the project result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?

No Impact. The Project is the remediation of seismic and hydrologic hazards at the existing Vail Dam and will not affect demands on wastewater treatment providers. Therefore, no impacts would occur, and no mitigation is required. **This topic will not be analyzed further in the EIR unless new information identifying it as a potentially significant impact is presented during the scoping process.**

d. Would the project generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?

Potentially Significant Impact. Project construction will include substantial site preparation activities and partial demolition of the existing Vail Dam. These activities are anticipated to generate waste materials that are not suitable for reuse in the construction of the gravity dam. RCWD proposes to stockpile waste materials on its property and reuse them on other projects requiring fill; however, it is uncertain whether all waste materials would be suitable for reuse. In the event that waste materials must be transported off site for disposal, the Project could affect regional landfills. Operation of the Project would not appreciably change solid waste generation compared with existing conditions, as the nature and frequency of operation and maintenance activities at the dam would be similar for the gravity dam as for the existing arch dam. **This topic will be analyzed in the EIR and, if necessary, mitigation will be developed and included in the EIR to address potentially significant adverse Project effects related to the capacity of regional landfills servicing the site for any waste materials not stored on site.**

e. Would the project comply with federal, state, and local management and reduction statutes and regulations related to solid waste?

Potentially Significant Impact. Refer to Response 3.19.d, above. The Project would be required to comply with federal, State, and local statutes and regulations related to solid wastes, and potential project-related impacts will be assessed in the EIR. **This topic will be analyzed in the EIR and, if necessary, mitigation will be developed and included in the EIR to address potentially significant adverse Project effects related to solid waste regulations.**

3.20 WILDFIRE

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:				
a. Substantially impair an adopted emergency response plan or emergency evacuation plan?	☐	☐	☒	☐
b. Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?	☒	☐	☐	☐
c. Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?	☒	☐	☐	☐
d. Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?	☒	☐	☐	☐

a. Would the project substantially impair an adopted emergency response plan or emergency evacuation plan?

Less Than Significant Impact. The Project area and its immediate surroundings are classified as very high to high fire hazard severity zones. The Project would allow RCWD to increase the amount of water stored in Vail Lake by increasing the reservoir level to the spillway elevation, and updates to the emergency response plan may be required to address the expansion of the potential inundation area in the event of catastrophic dam failure (refer to Response 3.9.f in Section 3.9, Hazards and Hazardous Materials, for a discussion of consistency with emergency plans). Project construction and operation would not introduce new barriers or constraints on emergency response or evacuation, as the dam access roads would not typically be used for evacuation except for RCWD and construction personnel. The Project would not require or result in any long term or permanent lane closures on roadways adjacent to the site. Therefore, no significant impacts would occur, and no mitigation is required. **This topic will not be analyzed further in the EIR unless new information identifying it as a potentially significant impact is presented during the scoping process.**

b. Would the project, due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?

Potentially Significant Impact. Refer to Response 3.9.g in Section 3.9, Hazards and Hazardous Materials. The Project is the remediation of seismic and hydrologic hazards at Vail Dam. Construction would substantially alter topography at the site of the new gravity dam; however, this is not anticipated to affect prevailing winds or otherwise exacerbate wildfire risks. During construction, additional workers would be within areas classified as high to very high fire hazard severity zones. It is anticipated that workers would not remain in the area in the event of a fire, and that they would

not be exposed to wildfire-related pollutants. The Project is located within an area of moderate to very high fire risk, but would not introduce new structures that would be substantially at risk of loss from fire. Project construction activities would use vehicles and machinery that have the potential to spark a fire in the area, which could expose workers and residents in neighborhoods to the west of the Project site to fire-related pollutants. **This topic will be analyzed in the EIR, and mitigation will be developed and included in the EIR, if necessary, to address potentially significant adverse Project effects.**

c. Would the project require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?

Potentially Significant Impact. The Project would require modifications to existing power line infrastructure to provide electricity to the new gravity dam facilities. Above-ground power lines would have the potential to exacerbate fire risks associated with sparking in the event of damage to the lines or transformers. During and following construction, Vail Lake would remain available as an emergency water source. No new fuel breaks are proposed. Modifications to access roads are included in the Project Description and will be addressed as appropriate in the EIR. **This topic will be analyzed in the EIR and, if necessary, mitigation will be developed and included in the EIR to address potentially significant adverse Project effects related to increased fire risk from above-ground power lines.**

d. Would the project expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?

Potentially Significant Impact. Refer to Section 3.9, Hazards and Hazardous Materials, regarding changes to flooding risks due to the increase in water storage in Vail Lake. With respect to fire-related flooding and landslides, operation of the Project would not affect the exposure of people or structures to risks associated with runoff, post-fire instability, or drainage changes. As noted in Response 3.20.a, above, construction activities associated with the Project have the potential to increase the risk of wildfire in the area. In such an event, there would be a risk of post-fire instability in the affected areas. **This topic will be analyzed in the EIR and, if necessary, mitigation will be developed and included in the EIR to address potentially significant adverse Project effects related to construction-generated wildfire.**

3.21 MANDATORY FINDINGS OF SIGNIFICANCE

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☒	☐	☐	☐
b. Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.)	☒	☐	☐	☐
c. Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☒	☐	☐	☐

a. Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?

Potentially Significant Impact. CEQA specifies that certain findings, if found to be affirmative, require that a determination of significant impact be made. As discussed in Section 3.4, Biological Resources, the Project has the potential to degrade the quality of the environment, have a significant impact on habitats of fish or wildlife species or cause a fish or wildlife population to drop below self-sustaining levels, and/or threaten to eliminate a plant or animal community, or reduce the number or restrict the range of a rare or endangered plant or animal. As discussed in Section 3.5, Cultural Resources, the Project may result in significant impacts to archaeological resources. **This topic will be analyzed in the EIR and, if necessary, mitigation will be developed and included in the EIR to address potentially significant adverse Project effects.**

b. Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?

Potentially Significant Impact. A significant impact may occur if the Project, in conjunction with related projects, would result in impacts that are less than significant when viewed separately but would be significant when viewed together. Due to the potentially significant impacts identified in various sections (including Sections 3.1, Aesthetics; 3.3, Air Quality; 3.4, Biological Resources;

3.5, Cultural Resources; 3.6, Energy; 3.7, Geology and Soils; 3.8, Greenhouse Gas Emissions; 3.9, Hazards and Hazardous Materials; 3.10, Hydrology and Water Quality; 3.11, Land Use and Planning; 3.13, Noise; 3.16, Recreation; 3.17, Transportation; 3.18, Tribal Cultural Resources; and 3.19, Utilities and Service Systems), cumulatively considerable impacts could result from implementation of the Project. **This topic will be analyzed in the EIR and, if necessary, mitigation will be developed and included in the EIR to address potentially significant adverse Project effects.**

c. Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?

Potentially Significant Impact. A significant impact may occur if environmental effects related to the Project could cause substantial direct or indirect adverse impacts to human beings as described in the checklist responses. Refer to Response 3.21.b, above, for a reference to all sections contained in this Initial Study that are anticipated to have a potentially significant impact as a result of the Project. **This topic will be analyzed in the EIR and, if necessary, mitigation will be developed and included in the EIR to address potentially significant adverse Project effects.**

4.0 REFERENCES

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NOP Comments

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NATIVE AMERICAN HERITAGE COMMISSION

7/28/2020

Governor's Office of Planning & Research

Jul 03 2020

STATE CLEARINGHOUSE

June 30, 2020

Jake Wiley, P.E.
Rancho California Water District
42135 Winchester Road
Temecula, CA 92590

Re: 2020069048, Vail Dam Seismic and Hydrologic Remediation Project, Riverside County

Dear Mr. Wiley:

The Native American Heritage Commission (NAHC) has received the Notice of Preparation (NOP), Draft Environmental Impact Report (DEIR) or Early Consultation for the project referenced above. The California Environmental Quality Act (CEQA) (Pub. Resources Code §21000 et seq.), specifically Public Resources Code §21084.1, states that a project that may cause a substantial adverse change in the significance of a historical resource, is a project that may have a significant effect on the environment. (Pub. Resources Code § 21084.1; Cal. Code Regs., tit.14, §15064.5 (b) (CEQA Guidelines §15064.5 (b)). If there is substantial evidence, in light of the whole record before a lead agency, that a project may have a significant effect on the environment, an Environmental Impact Report (EIR) shall be prepared. (Pub. Resources Code §21080 (d); Cal. Code Regs., tit. 14, § 5064 subd.(a)(1) (CEQA Guidelines §15064 (a)(1)). In order to determine whether a project will cause a substantial adverse change in the significance of a historical resource, a lead agency will need to determine whether there are historical resources within the area of potential effect (APE).

CEQA was amended significantly in 2014. Assembly Bill 52 (Gatto, Chapter 532, Statutes of 2014) (AB 52) amended CEQA to create a separate category of cultural resources, "tribal cultural resources" (Pub. Resources Code §21074) and provides that a project with an effect that may cause a substantial adverse change in the significance of a tribal cultural resource is a project that may have a significant effect on the environment. (Pub. Resources Code §21084.2). Public agencies shall, when feasible, avoid damaging effects to any tribal cultural resource. (Pub. Resources Code §21084.3 (a)). AB 52 applies to any project for which a notice of preparation, a notice of negative declaration, or a mitigated negative declaration is filed on or after July 1, 2015. If your project involves the adoption of or amendment to a general plan or a specific plan, or the designation or proposed designation of open space, on or after March 1, 2005, it may also be subject to Senate Bill 18 (Burton, Chapter 905, Statutes of 2004) (SB 18). Both SB 18 and AB 52 have tribal consultation requirements. If your project is also subject to the federal National Environmental Policy Act (42 U.S.C. § 4321 et seq.) (NEPA), the tribal consultation requirements of Section 106 of the National Historic Preservation Act of 1966 (154 U.S.C. 300101, 36 C.F.R. §800 et seq.) may also apply.

The NAHC recommends consultation with California Native American tribes that are traditionally and culturally affiliated with the geographic area of your proposed project as early as possible in order to avoid inadvertent discoveries of Native American human remains and best protect tribal cultural resources. Below is a brief summary of portions of AB 52 and SB 18 as well as the NAHC's recommendations for conducting cultural resources assessments.

Consult your legal counsel about compliance with AB 52 and SB 18 as well as compliance with any other applicable laws.

CHAIRPERSON
Laura Miranda
Luiseño

VICE CHAIRPERSON
Reginald Pagaling
Chumash

SECRETARY
Merri Lopez-Keifer
Luiseño

PARLIAMENTARIAN
Russell Attebery
Karuk

COMMISSIONER
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Wintun

COMMISSIONER
William Mungary
Paiute/White Mountain Apache

COMMISSIONER
Julie Tumamait-Stenslie
Chumash

COMMISSIONER
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COMMISSIONER
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EXECUTIVE SECRETARY
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Pomo

NAHC HEADQUARTERS
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AB 52

AB 52 has added to CEQA the additional requirements listed below, along with many other requirements:

1. Fourteen Day Period to Provide Notice of Completion of an Application/Decision to Undertake a Project: Within fourteen (14) days of determining that an application for a project is complete or of a decision by a public agency to undertake a project, a lead agency shall provide formal notification to a designated contact of, or tribal representative of, traditionally and culturally affiliated California Native American tribes that have requested notice, to be accomplished by at least one written notice that includes:

- **a.** A brief description of the project.
- **b.** The lead agency contact information.
- **c.** Notification that the California Native American tribe has 30 days to request consultation. (Pub. Resources Code §21080.3.1 (d)).
- **d.** A "California Native American tribe" is defined as a Native American tribe located in California that is on the contact list maintained by the NAHC for the purposes of Chapter 905 of Statutes of 2004 (SB 18). (Pub. Resources Code §21073).

2. Begin Consultation Within 30 Days of Receiving a Tribe's Request for Consultation and Before Releasing a Negative Declaration, Mitigated Negative Declaration, or Environmental Impact Report: A lead agency shall begin the consultation process within 30 days of receiving a request for consultation from a California Native American tribe that is traditionally and culturally affiliated with the geographic area of the proposed project. (Pub. Resources Code §21080.3.1, subds. (d) and (e)) and prior to the release of a negative declaration, mitigated negative declaration or Environmental Impact Report. (Pub. Resources Code §21080.3.1(b)).

- **a.** For purposes of AB 52, "consultation shall have the same meaning as provided in Gov. Code §65352.4 (SB 18). (Pub. Resources Code §21080.3.1 (b)).

3. Mandatory Topics of Consultation If Requested by a Tribe: The following topics of consultation, if a tribe requests to discuss them, are mandatory topics of consultation:

- **a.** Alternatives to the project.
- **b.** Recommended mitigation measures.
- **c.** Significant effects. (Pub. Resources Code §21080.3.2 (a)).

4. Discretionary Topics of Consultation: The following topics are discretionary topics of consultation:

- **a.** Type of environmental review necessary.
- **b.** Significance of the tribal cultural resources.
- **c.** Significance of the project's impacts on tribal cultural resources.
- **d.** If necessary, project alternatives or appropriate measures for preservation or mitigation that the tribe may recommend to the lead agency. (Pub. Resources Code §21080.3.2 (a)).

5. Confidentiality of Information Submitted by a Tribe During the Environmental Review Process: With some exceptions, any information, including but not limited to, the location, description, and use of tribal cultural resources submitted by a California Native American tribe during the environmental review process shall not be included in the environmental document or otherwise disclosed by the lead agency or any other public agency to the public, consistent with Government Code §6254 (r) and §6254.10. Any information submitted by a California Native American tribe during the consultation or environmental review process shall be published in a confidential appendix to the environmental document unless the tribe that provided the information consents, in writing, to the disclosure of some or all of the information to the public. (Pub. Resources Code §21082.3 (c)(1)).

6. Discussion of Impacts to Tribal Cultural Resources in the Environmental Document: If a project may have a significant impact on a tribal cultural resource, the lead agency's environmental document shall discuss both of the following:

- **a.** Whether the proposed project has a significant impact on an identified tribal cultural resource.
- **b.** Whether feasible alternatives or mitigation measures, including those measures that may be agreed to pursuant to Public Resources Code §21082.3, subdivision (a), avoid or substantially lessen the impact on the identified tribal cultural resource. (Pub. Resources Code §21082.3 (b)).

7. Conclusion of Consultation: Consultation with a tribe shall be considered concluded when either of the following occurs:

a. The parties agree to measures to mitigate or avoid a significant effect, if a significant effect exists, on a tribal cultural resource; or

b. A party, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached. (Pub. Resources Code §21080.3.2 (b)).

8. Recommending Mitigation Measures Agreed Upon in Consultation in the Environmental Document: Any mitigation measures agreed upon in the consultation conducted pursuant to Public Resources Code §21080.3.2 shall be recommended for inclusion in the environmental document and in an adopted mitigation monitoring and reporting program, if determined to avoid or lessen the impact pursuant to Public Resources Code §21082.3, subdivision (b), paragraph 2, and shall be fully enforceable. (Pub. Resources Code §21082.3 (a)).

9. Required Consideration of Feasible Mitigation: If mitigation measures recommended by the staff of the lead agency as a result of the consultation process are not included in the environmental document or if there are no agreed upon mitigation measures at the conclusion of consultation, or if consultation does not occur, and if substantial evidence demonstrates that a project will cause a significant effect to a tribal cultural resource, the lead agency shall consider feasible mitigation pursuant to Public Resources Code §21084.3 (b). (Pub. Resources Code §21082.3 (e)).

10. Examples of Mitigation Measures That, If Feasible, May Be Considered to Avoid or Minimize Significant Adverse Impacts to Tribal Cultural Resources:

a. Avoidance and preservation of the resources in place, including, but not limited to:

i. Planning and construction to avoid the resources and protect the cultural and natural context.

ii. Planning greenspace, parks, or other open space, to incorporate the resources with culturally appropriate protection and management criteria.

b. Treating the resource with culturally appropriate dignity, taking into account the tribal cultural values and meaning of the resource, including, but not limited to, the following:

i. Protecting the cultural character and integrity of the resource.

ii. Protecting the traditional use of the resource.

iii. Protecting the confidentiality of the resource.

c. Permanent conservation easements or other interests in real property, with culturally appropriate management criteria for the purposes of preserving or utilizing the resources or places.

d. Protecting the resource. (Pub. Resource Code §21084.3 (b)).

e. Please note that a federally recognized California Native American tribe or a non-federally recognized California Native American tribe that is on the contact list maintained by the NAHC to protect a California prehistoric, archaeological, cultural, spiritual, or ceremonial place may acquire and hold conservation easements if the conservation easement is voluntarily conveyed. (Civ. Code §815.3 (c)).

f. Please note that it is the policy of the state that Native American remains and associated grave artifacts shall be repatriated. (Pub. Resources Code §5097.991).

11. Prerequisites for Certifying an Environmental Impact Report or Adopting a Mitigated Negative Declaration or Negative Declaration with a Significant Impact on an Identified Tribal Cultural Resource: An Environmental Impact Report may not be certified, nor may a mitigated negative declaration or a negative declaration be adopted unless one of the following occurs:

a. The consultation process between the tribes and the lead agency has occurred as provided in Public Resources Code §21080.3.1 and §21080.3.2 and concluded pursuant to Public Resources Code §21080.3.2.

b. The tribe that requested consultation failed to provide comments to the lead agency or otherwise failed to engage in the consultation process.

c. The lead agency provided notice of the project to the tribe in compliance with Public Resources Code §21080.3.1 (d) and the tribe failed to request consultation within 30 days. (Pub. Resources Code §21082.3 (d)).

The NAHC's PowerPoint presentation titled, "Tribal Consultation Under AB 52: Requirements and Best Practices" may be found online at: http://nahc.ca.gov/wp-content/uploads/2015/10/AB52TribalConsultation_CalEPAPDF.pdf

SB 18

SB 18 applies to local governments and requires local governments to contact, provide notice to, refer plans to, and consult with tribes prior to the adoption or amendment of a general plan or a specific plan, or the designation of open space. (Gov. Code §65352.3). Local governments should consult the Governor's Office of Planning and Research's "Tribal Consultation Guidelines," which can be found online at: https://www.opr.ca.gov/docs/09_14_05_Updated_Guidelines_922.pdf.

Some of SB 18's provisions include:

1. Tribal Consultation: If a local government considers a proposal to adopt or amend a general plan or a specific plan, or to designate open space it is required to contact the appropriate tribes identified by the NAHC by requesting a "Tribal Consultation List." If a tribe, once contacted, requests consultation the local government must consult with the tribe on the plan proposal. A tribe has 90 days from the date of receipt of notification to request consultation unless a shorter timeframe has been agreed to by the tribe. (Gov. Code §65352.3 (a)(2)).
2. No Statutory Time Limit on SB 18 Tribal Consultation. There is no statutory time limit on SB 18 tribal consultation.
3. Confidentiality: Consistent with the guidelines developed and adopted by the Office of Planning and Research pursuant to Gov. Code §65040.2, the city or county shall protect the confidentiality of the information concerning the specific identity, location, character, and use of places, features and objects described in Public Resources Code §5097.9 and §5097.993 that are within the city's or county's jurisdiction. (Gov. Code §65352.3 (b)).
4. Conclusion of SB 18 Tribal Consultation: Consultation should be concluded at the point in which:
    a. The parties to the consultation come to a mutual agreement concerning the appropriate measures for preservation or mitigation; or
    b. Either the local government or the tribe, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached concerning the appropriate measures of preservation or mitigation. (Tribal Consultation Guidelines, Governor's Office of Planning and Research (2005) at p. 18).

Agencies should be aware that neither AB 52 nor SB 18 precludes agencies from initiating tribal consultation with tribes that are traditionally and culturally affiliated with their jurisdictions before the timeframes provided in AB 52 and SB 18. For that reason, we urge you to continue to request Native American Tribal Contact Lists and "Sacred Lands File" searches from the NAHC. The request forms can be found online at: http://nahc.ca.gov/resources/forms/.

NAHC Recommendations for Cultural Resources Assessments

To adequately assess the existence and significance of tribal cultural resources and plan for avoidance, preservation in place, or barring both, mitigation of project-related impacts to tribal cultural resources, the NAHC recommends the following actions:

1. Contact the appropriate regional California Historical Research Information System (CHRIS) Center (http://ohp.parks.ca.gov/?page_id=1068) for an archaeological records search. The records search will determine:
    a. If part or all of the APE has been previously surveyed for cultural resources.
    b. If any known cultural resources have already been recorded on or adjacent to the APE.
    c. If the probability is low, moderate, or high that cultural resources are located in the APE.
    d. If a survey is required to determine whether previously unrecorded cultural resources are present.

2. If an archaeological inventory survey is required, the final stage is the preparation of a professional report detailing the findings and recommendations of the records search and field survey.
    a. The final report containing site forms, site significance, and mitigation measures should be submitted immediately to the planning department. All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum and not be made available for public disclosure.
    b. The final written report should be submitted within 3 months after work has been completed to the appropriate regional CHRIS center.

3. Contact the NAHC for:

a. A Sacred Lands File search. Remember that tribes do not always record their sacred sites in the Sacred Lands File, nor are they required to do so. A Sacred Lands File search is not a substitute for consultation with tribes that are traditionally and culturally affiliated with the geographic area of the project's APE.

b. A Native American Tribal Consultation List of appropriate tribes for consultation concerning the project site and to assist in planning for avoidance, preservation in place, or, failing both, mitigation measures.

4. Remember that the lack of surface evidence of archaeological resources (including tribal cultural resources) does not preclude their subsurface existence.

a. Lead agencies should include in their mitigation and monitoring reporting program plan provisions for the identification and evaluation of inadvertently discovered archaeological resources per Cal. Code Regs., tit. 14, §15064.5(f) (CEQA Guidelines §15064.5(f)). In areas of identified archaeological sensitivity, a certified archaeologist and a culturally affiliated Native American with knowledge of cultural resources should monitor all ground-disturbing activities.

b. Lead agencies should include in their mitigation and monitoring reporting program plans provisions for the disposition of recovered cultural items that are not burial associated in consultation with culturally affiliated Native Americans.

c. Lead agencies should include in their mitigation and monitoring reporting program plans provisions for the treatment and disposition of inadvertently discovered Native American human remains. Health and Safety Code §7050.5, Public Resources Code §5097.98, and Cal. Code Regs., tit. 14, §15064.5, subdivisions (d) and (e) (CEQA Guidelines §15064.5, subds. (d) and (e)) address the processes to be followed in the event of an inadvertent discovery of any Native American human remains and associated grave goods in a location other than a dedicated cemetery.

If you have any questions or need additional information, please contact me at my email address: Andrew.Green@nahc.ca.gov.

Sincerely,



Andrew Green
Cultural Resources Analyst

cc: State Clearinghouse

South Coast
Air Quality Management District
21865 Copley Drive, Diamond Bar, CA 91765-4178
(909) 396-2000 • www.aqmd.gov

SENT VIA E-MAIL: July 21, 2020

wileyj@ranchowater.com
Jake Wiley, Engineering Manager
Rancho California Water District, CIP & Development
42135 Winchester Road
Temecula, CA 92590

Notice of Preparation of a Draft Environmental Impact Report for the Vail Dam Seismic and Hydrologic Remediation Project

South Coast Air Quality Management District (South Coast AQMD) staff appreciates the opportunity to comment on the above-mentioned document. South Coast AQMD staff's comments are recommendations regarding the analysis of potential air quality impacts from the Proposed Project that should be included in the Draft Environmental Impact Report (EIR). Please send South Coast AQMD a copy of the Draft EIR upon its completion and public release. Note that copies of the Draft EIR that are submitted to the State Clearinghouse are not forwarded to South Coast AQMD. Please forward a copy of the Draft EIR directly to the address shown in the letterhead. **In addition, please send with the Draft EIR all appendices or technical documents related to the air quality, health risk, and greenhouse gas analyses and electronic versions of all air quality modeling and health risk assessment files[1]. These include emission calculation spreadsheets and modeling input and output files (not PDF files). Without all files and supporting documentation, South Coast AQMD staff will be unable to complete our review of the air quality analyses in a timely manner. Any delays in providing all supporting documentation will require additional time for review beyond the end of the comment period.**

CEQA Air Quality Analysis

South Coast AQMD adopted its CEQA Air Quality Handbook in 1993 to assist other public agencies with the preparation of air quality analyses. It is recommended that the Lead Agency use this Handbook as guidance when preparing its air quality analysis. Copies of the Handbook are available from South Coast AQMD's Subscription Services Department by calling (909) 396-3720. More guidance developed since this Handbook is also available on South Coast AQMD's website at: http://www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook/ceqa-air-quality-handbook-(1993). South Coast AQMD staff also recommends that the Lead Agency use the CalEEMod land use emissions software. This software has recently been updated to incorporate up-to-date state and locally approved emission factors and methodologies for estimating pollutant emissions from typical land use development. CalEEMod is the only software model maintained by the California Air Pollution Control Officers Association (CAPCOA) and replaces the now outdated URBEMIS. This model is available free of charge at: www.caleemod.com.

South Coast AQMD has developed both regional and localized significance thresholds. South Coast AQMD staff recommends that the Lead Agency quantify criteria pollutant emissions and compare the

[1] Pursuant to the CEQA Guidelines Section 15174, the information contained in an EIR shall include summarized technical data, maps, plot plans, diagrams, and similar relevant information sufficient to permit full assessment of significant environmental impacts by reviewing agencies and members of the public. Placement of highly technical and specialized analysis and data in the body of an EIR should be avoided through inclusion of supporting information and analyses as appendices to the main body of the EIR. Appendices to the EIR may be prepared in volumes separate from the basic EIR document, but shall be readily available for public examination and shall be submitted to all clearinghouses which assist in public review.

emissions to South Coast AQMD's CEQA regional pollutant emissions significance thresholds[2] and localized significance thresholds (LSTs)[3] to determine the Proposed Project's air quality impacts. The localized analysis can be conducted by either using the LST screening tables or performing dispersion modeling.

The Lead Agency should identify any potential adverse air quality impacts that could occur from all phases of the Proposed Project and all air pollutant sources related to the Proposed Project. Air quality impacts from both construction (including demolition, if any) and operations should be calculated. Construction-related air quality impacts typically include, but are not limited to, emissions from the use of heavy-duty equipment from grading, earth-loading/unloading, paving, architectural coatings, off-road mobile sources (e.g., heavy-duty construction equipment) and on-road mobile sources (e.g., construction worker vehicle trips, material transport trips, and hauling trips). Operation-related air quality impacts may include, but are not limited to, emissions from stationary sources (e.g., boilers), area sources (e.g., solvents and coatings), and vehicular trips (e.g., on- and off-road tailpipe emissions and entrained dust). Air quality impacts from indirect sources, such as sources that generate or attract vehicular trips, should be included in the analysis. Furthermore, emissions from the overlapping construction and operational activities should be combined and compared to South Coast AQMD's regional air quality CEQA *operational* thresholds to determine the level of significance.

If the Proposed Project generates or attracts vehicular trips, especially heavy-duty diesel-fueled vehicles, it is recommended that the Lead Agency perform a mobile source health risk assessment[4]. An analysis of all toxic air contaminant impacts due to the use of equipment potentially generating such air pollutants should also be included.

In addition, guidance on siting incompatible land uses (such as placing homes near freeways) can be found in the California Air Resources Board's *Air Quality and Land Use Handbook: A Community Health Perspective*, which can be found at: http://www.arb.ca.gov/ch/handbook.pdf. CARB's Land Use Handbook is a general reference guide for evaluating and reducing air pollution impacts associated with new projects that go through the land use decision-making process. Guidance[5] on strategies to reduce air pollution exposure near high-volume roadways can be found at: https://www.arb.ca.gov/ch/rd_technical_advisory_final.PDF.

Mitigation Measures

In the event that the Proposed Project generates significant adverse air quality impacts, CEQA requires that all feasible mitigation measures that go beyond what is required by law be utilized during project construction and operation to minimize these impacts. Pursuant to CEQA Guidelines Section 15126.4 (a)(1)(D), any impacts resulting from mitigation measures must also be discussed. Several resources are available to assist the Lead Agency with identifying potential mitigation measures for the Proposed Project, including:

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[2] South Coast AQMD's CEQA regional pollutant emissions significance thresholds can be found here: http://www.aqmd.gov/docs/default-source/ceqa/handbook/scaqmd-air-quality-significance-thresholds.pdf.

[3] Guidance for performing a localized air quality analysis can be found at: http://www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook/localized-significance-thresholds.

[4] Guidance for performing a mobile source health risk assessment ("*Health Risk Assessment Guidance for Analyzing Cancer Risk from Mobile Source Diesel Idling Emissions for CEQA Air Quality Analysis*") can be found at: http://www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook/mobile-source-toxics-analysis.

[5] In April 2017, CARB published a technical advisory, *Strategies to Reduce Air Pollution Exposure Near High-Volume Roadways: Technical Advisory*, to supplement CARB's Air Quality and Land Use Handbook: A Community Health Perspective. This technical advisory is intended to provide information on strategies to reduce exposures to traffic emissions near high-volume roadways to assist land use planning and decision-making in order to protect public health and promote equity and environmental justice. The technical advisory is available at: https://www.arb.ca.gov/ch/landuse.htm.

- Chapter 11 "Mitigating the Impact of a Project" of South Coast AQMD'S *CEQA Air Quality Handbook*. South Coast AQMD's CEQA web pages available here: http://www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook/mitigation-measures-and-control-efficiencies
- South Coast AQMD's Rule 403 – Fugitive Dust, and the Implementation Handbook for controlling construction-related emissions and Rule 1403 – Asbestos Emissions from Demolition/Renovation Activities
- South Coast AQMD's Mitigation Monitoring and Reporting Plan (MMRP) for the 2016 Air Quality Management Plan (2016 AQMP) available here (starting on page 86): http://www.aqmd.gov/docs/default-source/Agendas/Governing-Board/2017/2017-mar3-035.pdf
- California Air Pollution Control Officers Association (CAPCOA)'s *Quantifying Greenhouse Gas Mitigation Measures* available here: http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf

South Coast AQMD Permits

In the event that implementation of the Proposed Project requires a permit from South Coast AQMD, South Coast AQMD should be identified as a Responsible Agency for the Proposed Project in the Draft EIR. The assumptions in the air quality analysis in the EIR will be the basis for evaluating the permit under CEQA and imposing permit conditions and limits. For more information on permits, please visit South Coast AQMD's webpage at: http://www.aqmd.gov/home/permits. Questions on permits can be directed to South Coast AQMD's Engineering and Permitting staff at (909) 396-3385.

Data Sources

South Coast AQMD rules and relevant air quality reports and data are available by calling South Coast AQMD's Public Information Center at (909) 396-2001 or at South Coast AQMD's website at: http://www.aqmd.gov.

South Coast AQMD staff is available to work with the Lead Agency to ensure that project air quality and health risk impacts are accurately evaluated and mitigated where feasible. If you have any questions regarding this letter, please contact me at lsun@aqmd.gov.

Sincerely,

Lijin Sun

Lijin Sun, J.D.
Program Supervisor, CEQA IGR
Planning, Rule Development & Area Sources

LS
RVC200708-22
Control Number

APPENDIX B

AIR QUALITY, GREENHOUSE GAS, AND ENERGY REPORT

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AIR QUALITY, ENERGY, AND GREENHOUSE GAS TECHNICAL ANALYSIS

VAIL DAM SEISMIC AND HYDROLOGIC

REMEDIATION PROJECT

RIVERSIDE COUNTY, CALIFORNIA

Rancho Water

LSA

October 2022

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AIR QUALITY, ENERGY, AND GREENHOUSE GAS TECHNICAL ANALYSIS

VAIL DAM SEISMIC AND HYDROLOGIC

REMEDIATION PROJECT

RIVERSIDE COUNTY, CALIFORNIA

Prepared for:

Rancho California Water District
42135 Winchester Road
Temecula, California 92590

Prepared by:

LSA
20 Executive Park, Suite 200
Irvine, California 92614
(949) 553-0666

Project No. RCW1902

October 2022

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EXECUTIVE SUMMARY

LSA prepared this Air Quality, Energy, and Greenhouse Gas (GHG) Technical Analysis for the proposed Vail Dam Seismic and Hydrologic Remediation Project (Project) located in Riverside County, California. This Air Quality, Energy, and GHG Technical Analysis provides a discussion of the Proposed Project, the physical setting of the Project area, and the regulatory framework for air quality. The report provides data on existing air quality and evaluates potential air quality and GHG impacts associated with the Proposed Project. Modeled operational air pollutant emissions are consistent with the trip generation estimates developed for the Proposed Project in the Proposed Project's Transportation Memorandum (LSA 2022).

Emissions with regional effects during Project construction, calculated with the California Emission Factor Model, Version 2017 (EMFAC2017) and California Off-Road Emission Factor Model, Version 2017 (OFFROAD2017) Emission Factors, would exceed the nitrogen oxides (NO_X) pollutant thresholds established by the South Coast Air Quality Management District (SCAQMD). Compliance with California regulations and SCAQMD rules and regulations during construction would reduce construction-related air quality impacts from fugitive dust emissions and construction equipment emissions. Standard dust suppression measures recommended by the SCAQMD have been identified for short-term construction to meet the SCAQMD emissions thresholds.

Historical air quality data show that existing carbon monoxide (CO) levels for the Project area and the general vicinity do not exceed either California Ambient Air Quality Standards (CAAQS) or National Ambient Air Quality Standards (NAAQS). The Proposed Project would not result in any significant impacts in CO concentrations at intersections in the Project vicinity.

The Proposed Project is located in Riverside County, which has been found to have serpentine and ultramafic rock in its soil. However, no such rock has been identified in the Project vicinity in the past 25 years. Therefore, the potential risk for naturally occurring asbestos (NOA) during Project construction is less than significant.

In September 2010, the SCAQMD proposed an analysis methodology using a tiered approach for the evaluation of GHG emissions for development projects. The SCAQMD's GHG screening levels Tiers 1 and 2 are not applicable because the Proposed Project is not exempt from the California Environmental Quality Act (CEQA) and the Rancho California Water District (RCWD) has not adopted a GHG reduction plan, respectively. The SCAQMD identified an interim screening level Tier 3 Numerical Screening Threshold of 3,000 metric tons of carbon dioxide equivalent per year (MT CO_2e/yr). However, this threshold was based on the Assembly Bill (AB) 32 GHG reduction target and 2020 GHG emissions inventory prepared for the California Air Resources Board's (CARB) 2008 Scoping Plan (CARB 2008). Because the Proposed Project would begin operations in the post-2020 timeframe, the 2020 numerical screening threshold of 3,000 MT CO_2e would need to be adjusted to reflect the State's post-2020 GHG reduction goals.

The CARB has completed a Scoping Plan, which will be utilized by the SCAQMD to establish the 2030 GHG efficiency threshold. SCAQMD has yet to publish a quantified GHG efficiency threshold for the 2030 target. A scaled threshold consistent with State goals detailed in Senate Bill (SB) 32, Executive

Order B-30-15, and Executive Order S-3-05 to reduce GHG emissions by 40 percent below 1990 levels by 2030 and 80 percent below 1990 levels by 2050, respectively, was developed for 2026, when construction of the Proposed Project would be completed. Though the SCAQMD has not published a quantified threshold beyond 2020, this assessment uses a threshold of 2,280 MT CO_2e per year, which was calculated for the Project completion year of 2026 based on the GHG reduction goals of SB 32 and Executive Order B-30-15. Because the Proposed Project is estimated to be below this adjusted Tier 3 screening threshold, no mitigation measure is required to reduce GHG emissions.

This evaluation was prepared in conformance with appropriate standards, using procedures and methodologies in the SCAQMD *CEQA Air Quality Handbook* (SCAQMD 1993) and associated updates. Air quality data posted on the respective websites of the CARB and the U.S. Environmental Protection Agency (EPA) are included to document the local air quality environment.

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LIST OF ABBREVIATIONS AND ACRONYMS

°C	degrees Celsius
°F	degrees Fahrenheit
µg/m^3	micrograms per cubic meter
AAQS	ambient air quality standards
AB	Assembly Bill
ac-ft	acre-feet
AERMOD	American Meteorological Society/Environmental Protection Agency Regulatory Model
AP-42	Compilation of Air Pollutant Emission Factors
APS	Alternative Planning Strategy
AQMP	Air Quality Management Plan
ATCM	Airborne Toxic Control Measure
BACT	best available control technology
Basin	South Coast Air Basin
bhp	brake horsepower
Brief	Brief of Amicus Curiae
BTU	British thermal unit
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
CAFE	Corporate Average Fuel Economy
CalEEMod	California Emissions Estimator Model
CalEPA	California Environmental Protection Agency
CalRecycle	California Department of Resources Recycling and Recovery
CARB	California Air Resources Board
CAT	Climate Action Team
CCAA	California Clean Air Act
CCR	California Code of Regulations
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations

CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
County	County of Riverside
CPUC	California Public Utilities Commission
cy	cubic yards
DPM	diesel particulate matter
DSOD	California Department of Water Resources Division of Safety of Dams
EIR	Environmental Impact Report
EMFAC2017	California Emission Factor Model, Version 2017
EO	Executive Order
EPA	U.S. Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FR	Federal Register
ft	foot/feet
GCC	global climate change
GHG	greenhouse gas
GWh	gigawatt-hours
GWP	global warming potential
H_2S	hydrogen sulfide
HARP	Hot Spots Analysis and Reporting Program
HARP 2	Hot Spots Analysis and Reporting Program, Version 2
HFCs	hydrofluorocarbons
HI	Hazard Index
HIA	Hazard Index Acute
HIC	Hazard Index Chronic
HRA	Health Risk Assessment
IPCC	Intergovernmental Panel on Climate Change
lbs	pounds
lbs/blast	pounds per blast

lbs/day	pounds per day
LOS	level of service
LST	localized significance threshold
m	meter/meters
MATES	Multiple Air Toxics Exposure Study
MCE	maximum credible earthquake
MEI	maximum exposed individual
mg/m^3	milligrams per cubic meter
MMT	million metric tons
MMT CO_2e	million metric tons of carbon dioxide equivalent
mpg	miles per gallon
mph	miles per hour
MPO	Metropolitan Planning Organization
MT	metric tons
MT CO_2e	metric tons of carbon dioxide equivalent
MT CO_2e/yr	metric tons of carbon dioxide equivalent per year
MT CO2e/yr/SP	metric tons of carbon dioxide equivalent per year per service population
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NAVD88	North American Vertical Datum of 1988
NDIR	Non-Dispersive Infrared Photometry
NEPA	National Environmental Policy Act
NF_3	nitrogen trifluoride
NHTSA	National Highway Traffic Safety Administration
Ninth Circuit	Ninth Circuit Court of Appeals
NIOSH	National Institute for Occupational Safety and Health
NO_2	nitrogen dioxide
NOA	naturally occurring asbestos
NO_X	nitrogen oxides
O_3	ozone (or smog)
OEHHA	Office of Environmental Health Hazard Assessment

OFFROAD2017	California Off-Road Emission Factor Model, Version 2017
OPR	Office of Planning and Research
PFCs	perfluorocarbons
PM	particulate matter
$PM_{2.5}$	particulate matter less than 2.5 microns in size
PM_{10}	particulate matter less than 10 microns in size
PMF	Probable Maximum Flood
PMI	point of maximum impacts
ppb	parts per billion
ppm	parts per million
Project	Vail Dam Seismic and Hydrologic Remediation Project
RCC	roller-compacted concrete
RCP	Regional Comprehensive Plan
RCWD	Rancho California Water District
REL	Reference Exposure Level
ROCs	reactive organic compounds
ROGs	reactive organic gases
RPS	Renewables Portfolio Standard
RTP	Regional Transportation Plan
RTP/SCS	Regional Transportation Plan/Sustainable Communities Strategy
SAFE Vehicles Rule	Safer Affordable Fuel-Efficient Vehicles Rule for Model Years 2021–2026 Passenger Cars and Light Trucks
SB	Senate Bill
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Management District
SCE	Southern California Edison
SCS	Sustainable Communities Strategy
SF_6	sulfur hexafluoride
SIP	State Implementation Plan
SO_2	sulfur dioxide
SoCalGas	Southern California Gas Company

SO_X	sulfur oxides
SP	service population
sq mi	square miles
SR-79	State Route 79
State	State of California
TAC	toxic air contaminant
T-BACT	best available control technology for toxics
TPY	tons per year
TSP	total suspended particulates
TWh	terawatt-hours
URF	unit risk factor
USDOT	U.S. Department of Transportation
UTM	Universal Transverse Mercator
VDC	Valle de los Caballos
VMT	vehicle miles traveled
VOCs	volatile organic compounds
VR	visual range
WGS	World Geodetic System
Working Group	GHG CEQA Significance Threshold Working Group
WRCOG	Western Riverside Council of Governments
ZEV	zero emissions vehicle
ZNE	zero net energy

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1.0 PROJECT DESCRIPTION

1.1 INTRODUCTION

This Air Quality, Energy, and Greenhouse Gas (GHG) Technical Analysis has been prepared to evaluate the potential air quality and climate change impacts associated with the proposed Vail Dam Seismic and Hydrologic Remediation Project (Project) in Riverside County, California. This report provides a Project-specific Air Quality, Energy, and GHG Technical Analysis by examining the impacts of the Proposed Project on adjacent sensitive uses, as well as the impacts of the Proposed Project on the regional air quality. This report also evaluates and recommends mitigation that would be required to reduce potential air quality and climate change impacts. Guidelines identified by the South Coast Air Quality Management District (SCAQMD) in its *CEQA Air Quality Handbook* (SCAQMD 1993) and associated updates were followed in this Air Quality, Energy, and GHG Technical Analysis.

1.2 PROJECT LOCATION AND DESCRIPTION

The Rancho California Water District (RCWD) proposes to remediate seismic and hydrologic hazards associated with the existing Vail Dam, an arch dam, by constructing a new straight-axis gravity concrete dam[1] immediately downstream of the existing dam. Hydrologic and seismic evaluations of the existing dam, conducted by the California Department of Water Resources Division of Safety of Dams (DSOD), indicate that the existing dam's spillway is insufficient to pass the Probable Maximum Flood (PMF)[2] without overtopping the dam and that the existing concrete arch dam would not resist the stresses induced by the Maximum Credible Earthquake (MCE). Dam failure would result in downstream flooding and the loss of Vail Lake, which would adversely affect water supply throughout RCWD's service area.

The Proposed Project has multiple benefits, including enhanced regional water supply reliability, groundwater recharge, passive flood protection, and improved water supply reliability. The Proposed Project is needed to protect residents, structures, transportation infrastructure, and other downstream resources from potential dam failure.

RCWD is the Lead Agency pursuant to the California Environmental Quality Act (CEQA). The Federal Emergency Management Agency (FEMA) will be the federal Lead Agency for compliance with the National Environmental Policy Act (NEPA).

1.3 PROJECT BACKGROUND

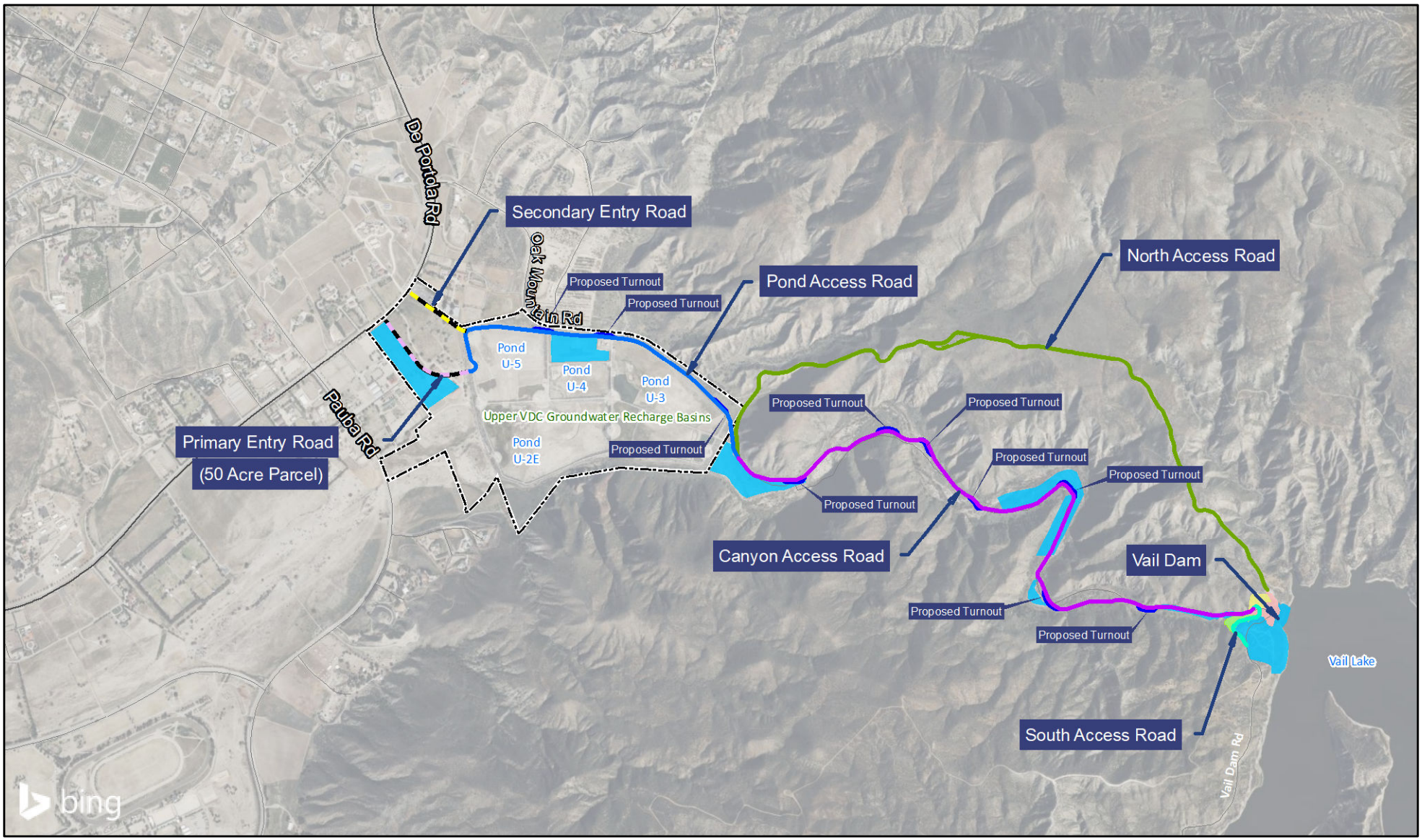
1.3.1 Regional Location and Setting

Vail Dam and Vail Lake are located in unincorporated southwestern Riverside County, east of the City of Temecula, in Southern California (see Figure 1-1, Project Location).

1 A gravity dam is designed to hold back water by primarily using the weight of the dam material to resist the horizontal water pressure. Gravity dams are designed for each section of the dam to be stable and independent of any other dam section.

2 The PMF is the flood that may be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible in the drainage basin under study (FEMA 2004).

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LSA

LEGEND

- Canyon Access Road
- North Access Road
- North Access Road Design Alternative
- Primary Entry Road (50 Acre Parcel)
- Secondary Entry Road
- Pond Access Road
- South Access Road
- Proposed Truck Turnout
- Property Boundary
- Dam Construction Area
- South Access Road Construction Area
- Staging and Laydown Area
- Temporary Construction Area

0 1000 2000
FEET

SOURCE: Bing Maps (2020); AECOM (6/2022)

I:\RCW1902\GIS\MXD\EIR-EIS\ProjectLocation.mxd (7/15/2022)

FIGURE 1-1

Vail Dam Seismic and Hydrologic Remediation Project

Project Location

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1.3.1.1 Vail Dam and Reservoir

Vail Dam spans Temecula Creek, a northwesterly draining tributary of the Santa Margarita River that drains the north side of Palomar Mountain. Vail Dam is a concrete arch dam spanning between concrete and rock abutments, approximately 120 feet (ft) high in the middle. The dam has a maximum height of 152 ft from the dam crest to the lowest point in the foundation and has a 3.5 ft high concrete parapet wall extending above the upstream dam crest. The dam has eight outlets, including a low-level outlet. Access to the dam is currently available from De Portola Road via the Upper Valle de los Caballos (VDC) Pond Access Road, and from that point, along the Canyon Access Road to access the left side of the dam or the North Access Road to access the right side of the dam. The left side of the dam can also be accessed from State Route 79 (SR-79) at Vail Lake Road, then via the campground area to Vail Dam Road (a gated access road) and then to the South Access Road.

Vail Lake impounds up to 42,680 acre-feet (ac-ft) of water with the reservoir at the spillway crest. The reservoir has a 318 square mile drainage area, which rapidly fills the reservoir in wet years. Water released from Vail Lake is typically re-stored in the Pauba Valley groundwater basin via the Upper VDC Recharge Basins. The average water level from 1978 (the year during which RCWD took ownership of Vail Dam) through May 2020 has been 1,445.1 ft NAVD88.[1] The operating level of the reservoir is dependent on a variety of factors, including restrictions on pumping into the reservoir to prevent introduction of quagga mussel,[2] requirements to recharge groundwater to reduce evaporation of stored water, mandated releases between May and October to maintain the water flow in the creek, and the amount of precipitation. Typical operations include maintaining approximately 1,457.6 ft NAVD88 (15 ft below the spillway crest) as the maximum level (e.g., if the lake level exceeds 1,457.6 ft, water is released to return the lake to that water level or below as soon as possible) to allow capacity for rainfall inflow.

1.3.1.2 Existing Conditions

The existing Project site includes Vail Dam, Vail Lake, and access roads, all of which are located on property owned by RCWD. Including Vail Lake, RCWD land holdings total 8,444 acres in the vicinity of Vail Lake. Land uses on the RCWD property include the following (RCWD 2016):

- The Vail Lake Village and RV Resort, which contains campsites, numerous associated buildings, maintenance facilities, sports courts, pools, boat and RV storage, and electrical, water, and sewer facilities;
- The Vail Lake Marina facilities, including associated buildings, boat launch, fields, RV and boat storage, and similar facilities (the boat launch is presently closed due to low lake levels);
- Numerous hiking, equestrian, and mountain biking trails located within the property; and
- Vail Dam facilities, including pipelines and other appurtenances.

1 NAVD88 = North American Vertical Datum of 1988

2 The quagga mussel is an aquatic invasive species, which is known to clog water intake structures (e.g., pipes and screens), disrupt native ecosystems, and inhibit recreational activities.

Land uses and land use designations surrounding Vail Lake can be characterized as follows:

- To the north, the area generally consists of undeveloped property with a County of Riverside (County) land use designation of rural mountainous (10-acre minimum lot size) or Bureau of Land Management conservation property with a County land use designation of open space – conservation.

- To the west (beyond the canyon below Vail Dam), the area generally consists of developed ranch property within the VDC Policy Area, with a County land use designation of rural residential (5-acre minimum), undeveloped property with a land use designation of agricultural, and RCWD's Upper VDC Groundwater Recharge Basins.

- To the south, the area consists primarily of recreational/campground uses, Cleveland National Forest, a variety of ranch and agricultural properties, and vacant undeveloped properties. The County land use designations for this area are rural residential (5-acre minimum), rural mountainous (10-acre minimum), open-space conservation, open-space habitat, and open-space recreation.

- To the east, the area generally consists of developed property associated with the Sundance Meadows private membership campground with a County land use designation of rural residential (5-acre minimum) or vacant undeveloped property with a land use designation of rural mountainous (10-acre minimum).

There are no existing substantial sources of on-site criteria pollutants and GHG emissions associated with the Vail Dam facilities, including pipelines and other appurtenances. Sources of operational emissions associated with the Vail Dam facilities are primarily from periodic worker vehicle trips to the site for inspection and maintenance purposes. Operation of the Vail Dam facilities does not involve any stationary equipment that would generate emissions. However, because worker staff visits are periodic and sporadic in nature, and only consist of a single vehicle and/or boat on most occasions, the mobile emissions generated by Project operations are very minimal.

Vegetation and wildlife are diverse in the area, with scrub communities (inland sage scrub, chamise chaparral, and alluvial fan scrub) dominant. Woodland vegetation is limited but present, including both oak and riparian woodland communities. Native and nonnative grasslands occur, along with freshwater marsh and reservoir semiaquatic plant communities. Natural vegetation and soils temporarily store carbon as part of the terrestrial carbon cycle. Carbon is assimilated into plants as they grow and then dispersed back into the environment when they die. Soil carbon accumulates from inputs of plants, roots, and other living components of the soil ecosystem (i.e., bacteria, worms, etc.). Soil carbon is lost through biological respiration, erosion, and other forms of disturbance. The existing GHG emissions are likely to be negligible.

1.4 PROJECT DESCRIPTION

RCWD proposes to remediate seismic and hydrologic hazards associated with the existing Vail Dam, a concrete arch dam, by constructing a new straight-axis gravity concrete dam[1] immediately downstream of the existing dam. The new dam would connect to the existing concrete dam abutments and would be 6.8 ft higher than the original dam in order to route the PMF entirely through the existing spillway system. A 3.5 ft high parapet wall would be located on both sides of the crest. Reservoir water would not normally be against the upstream parapet wall, but the parapet wall would prevent overtopping of the dam during the PMF. The downstream parapet wall would be constructed to serve primarily as a guardrail for vehicles traversing the crest. The maximum water level in the reservoir would remain at the spillway elevation of 1,472.6 NAVD88 and no changes to typical dam operations are proposed. The existing dam spillway will serve as the spillway for the proposed dam and thus no change in maximum water levels or maximum inundation area for Vail Lake will occur.

The width of the dam crest (between parapet walls) would be 16 ft in most locations, up to 20 ft near the outlet tower. The crest width would allow vehicular access for construction and maintenance of the dam structure. Vehicular access would be provided by wrapping the dam around the existing right gravity abutment and providing access from the North Access Road (see below for additional description of access roads). The existing left gravity abutment downstream of the new dam would also need to be raised. The surface area of the lake would increase slightly (approximately 0.66 acre) with the addition of the area between the existing arch dam and the proposed straight-axis gravity dam.

The downstream face of the dam would be stepped concrete. The proposed dam would include new outlet works that would be designed to meet the emergency reservoir drawdown requirements. In addition, a concrete apron would be utilized to armor the area below the ogee and overpour weirs.

Construction materials and methods used for the Proposed Project would take into account local seismic activity. The added straight-axis concrete gravity structure would be constructed of Roller Compacted Concrete (RCC), which would be vertical at the upstream face of the structure and at a slope of approximately 0.8 horizontal to 1 vertical (H:V) on the downstream side. The downstream face would be constructed using 4 ft high lifts and the crest would be 10 ft wide. These improvements would protect against catastrophic dam failure during an MCE.

The existing spillway would be used as the spillway for the new gravity dam. Concrete aprons would be installed to armor the area below the ogee and overpour weirs.

In addition to the proposed straight-axis gravity concrete dam, the Proposed Project includes improvements to the on-site access roads, relocation of pipelines within the footprint of the new dam foundation excavation, provision for on-site construction staging and material disposal areas,

[1] A gravity dam is designed to hold back water primarily by using the weight of the dam material to resist the horizontal water pressure. Each gravity dam section is designed to be stable and independent of any other dam section.

rerouting of Southern California Edison (SCE) electrical lines, and partial demolition of the existing arch dam.

1.4.1 Access Roads

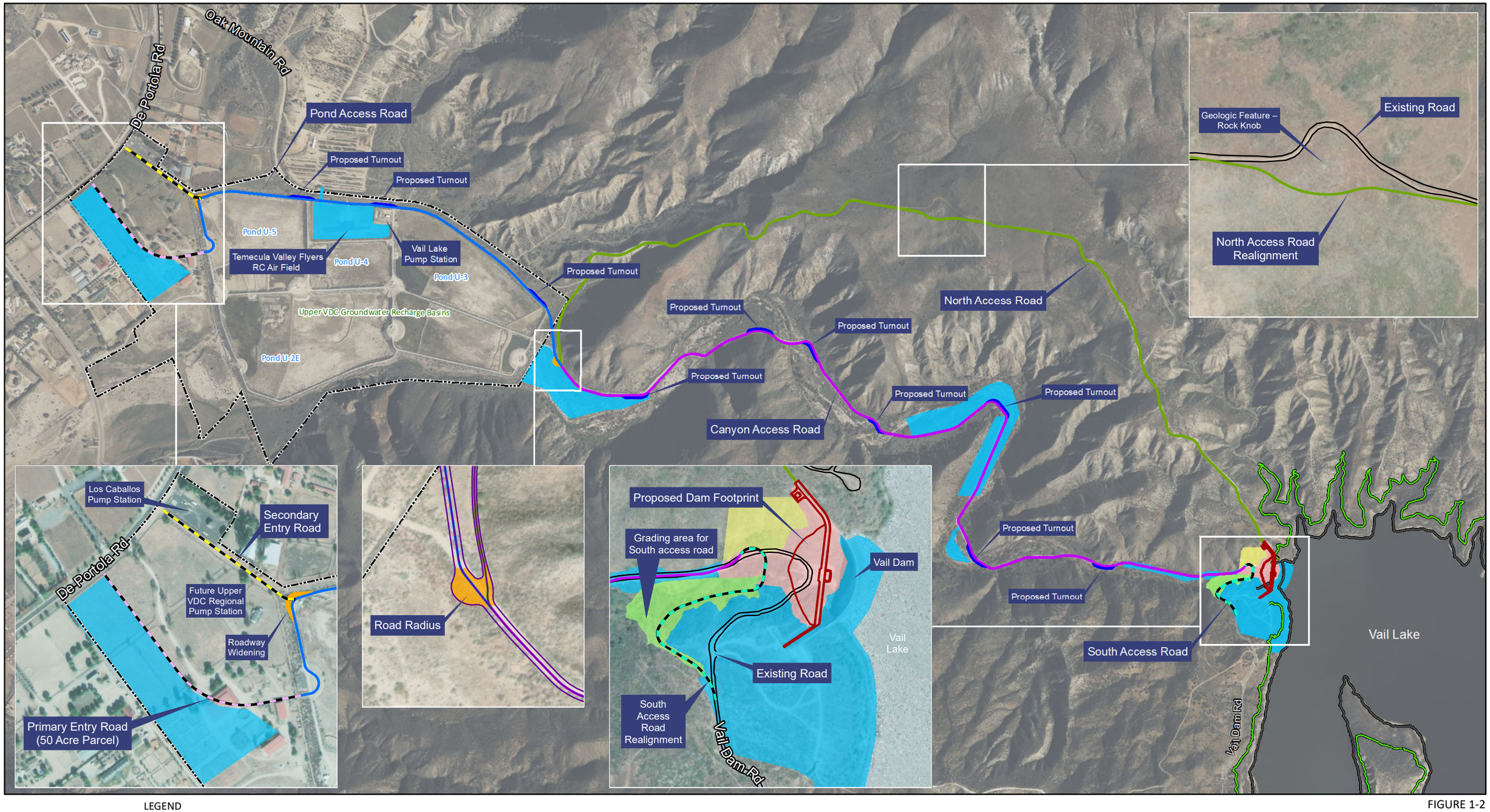
Improvements would be required to existing on-site access roads to accommodate construction traffic; however, no improvements to public roadways are required. Refer to Figure 1-2, Staging/ Laydown Areas and Access Roads, for a depiction of the construction areas, as well as Project access.

Existing on-site roadways that provide access from De Portola Road to the dam include the Secondary Entry Road (the existing, unpaved access road from De Portola Road to the Pond Access Road), the Pond Access Road, the Canyon Access Road, and the North Access Road. The South Access Road connects to Vail Dam Road, providing access to Vail Lake Road (which connects to SR-79) via the campground area. Construction access from SR-79 is limited to delivery of modular barges to Vail Lake. Improvements to the South Access Road would consist of realigning the existing road, and no improvements are proposed to Vail Dam Road or Vail Lake Road. Oak Mountain Road, an existing private dirt road accessed off De Portola Road, would not be used for construction access. Improvements would be required to all existing access roads to accommodate construction traffic and existing access by RCWD light-duty vehicles.

One new road segment would be constructed. The Primary Entry Road (50 Acre Parcel) is a proposed alternate access point from De Portola Road which would connect to the Pond Access Road at the edge of the Upper VDC Recharge Basins. Once the Primary Entry Road (50 Acre Parcel) has been completed, all routine construction access for the Project area would be provided along that route. The existing Secondary Entry Road at De Portola Road would provide a secondary access for RCWD vehicles. RCWD intends to maintain both the Primary Entry Road (50 Acre Parcel) and the Secondary Entry Road after completion of the proposed Project. Improvements are described in more detail below. Improvements are described below.

1.4.1.1 Primary Entry Road (50 Acre Parcel)

The proposed Primary Entry Road (50 Acre Parcel) across the RCWD's 50-acre parcel is a short segment that would connect the Pond Access Road to De Portola Road (an existing, paved roadway) and would be constructed within property owned by RCWD, south of the future Upper VDC Regional Pump Station and Chlorine Contact Tank Project (RCWD Project No. D1903), to avoid conflict with that project. The first order of work will be to construct this access road for construction access to the dam. The Primary Entry Road would provide two travel lanes (25 ft total width) and include gravel surfacing, and it would also provide access to one of the construction staging areas. RCWD would demolish one unused building, formerly a horse stable, to allow construction of the Primary Entry Road.



LEGEND

- Canyon Access Road
- North Access Road
- Primary Entry Road (50 Acre Parcel)
- Secondary Entry Road
- Pond Access Road
- Realigned South Access Road
- Proposed Truck Turnout
- Roadway Radius
- Proposed Dam Footprint
- Property Boundary
- Dam Construction Area
- South Access Road Construction Area
- Staging and Laydown Area
- Temporary Construction Area
- Spillway Crest Elevation (1472.6' NAVD88)
- Current Water Level (1428.2' NAVD88)

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SOURCE: Bing Maps (2020); AECOM (6/2022)

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FIGURE 1-2

Vail Dam Seismic and Hydrologic Remediation Project

Staging/Laydown Areas and Access Roads

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1.4.1.2 Secondary Entry Road

An existing unpaved access road from De Portola Road located adjacent to the RCWD's Los Caballos Pump Station will continue to provide routine access for RCWD vehicles only from De Portola Road to the Pond Access Road. This unpaved roadway is 20 ft wide in its existing condition; improvements would be limited to scraping the surface and placing a 4-inch gravel wear surface within the existing road limits. This road would be used during daytime hours and would not provide routine construction access. Construction-related activities would be limited to installation of a noise barrier and potential delivery of oversized equipment; daily construction traffic would be routed along the Primary Entry Road (50 Acre Parcel).

1.4.1.3 North Access Road

There is an existing unimproved North Access Road that traverses about 2 miles from the northeast corner of the Upper VDC percolation ponds to the right abutment of the existing dam. The existing connection between the North Access Road and the Pond Access Road would be improved to facilitate the turning radius of a truck with a 40 ft wheelbase. The details of the proposed improvement to this area are shown on Figure 1-2. The existing North Access Road would be improved to provide vehicular access to the crest of the new dam. The North Access Road would be the primary vehicular access route to the crest of the new dam after Project completion. Vehicular access is not feasible from the left abutment due to the height of the existing left gravity abutment.

Project improvements would include gravel surfacing and improvements in drainage. Material from excavation of the dam foundation may be reused to improve the North Access Road. The road would remain a single-lane road. As shown on Figure 1-2, realignment would be needed where the road is outside of the property boundary and where excavation through a rock knob would be required. In addition, RCWD identified a design alternative, which is not the preferred option but has been retained in project plans pending coordination with the applicable resource agencies. The North Access Road realignment design option is also shown on Figure 1-2.

1.4.1.4 Canyon Access Road

The existing unpaved access road through the canyon below the dam is approximately 2 miles long. It is currently a single-lane road bound on both sides by vegetation with limited sight lines. This access road would need to be widened to two lanes (25 ft total width) for construction traffic, with several turnouts to allow vehicles to pass. Widening would be accomplished through removal of the existing vegetation on both sides of the existing road. This widening is only for construction purposes and the sides of the access road would be revegetated at the completion of construction. The roadway would be restored to its existing single-lane configuration after construction of the dam is complete. Other improvements to the Canyon Access Road would include gravel surfacing, which would remain within the single-lane road following construction. The existing five Arizona-type crossings of the creek would remain. However, temporary culverts or placement of clean rock may be required during construction at the five Arizona crossings to provide construction vehicle crossings. Any temporary culverts or fill would be removed following completion of construction, and the creek would be restored to approximate pre-project contours and habitat conditions or better. Within approximately 550 ft of the new dam, the elevation of the Canyon Access Road would be raised by up to 7 ft to avoid overtopping during high-volume lake water release. Vegetated riprap

would be placed within the Temecula Creek channel along the southern side of the raised road portion to reduce potential erosion.

1.4.1.5 Pond Access Road

The Pond Access Road is an existing unpaved road providing access to the Upper VDC Recharge Basins and connecting to the North Access Road and Canyon Access Road. It is 20–25 ft wide in its existing condition. The roadway surface would be scraped or lightly graded to smooth the roadway surface and vegetation that has encroached onto the roadway from the slopes of the road would be removed as part of the Proposed Project. Vegetated roadway slopes on the sides of the roadway would not be scraped or graded. The Pond Access Road would not be widened as part of the Proposed Project with the exception of three turnouts to allow trucks to pass and a small area near the northeast corner of the ponds where there is insufficient turning radius for the larger trucks turning onto the North Access Road. At the maximum curve, this area would be widened from approximately 25 ft (including shoulders) to 50 ft as part of the Proposed Project; the location of the widening is shown on Figure 1-2. The Pond Access Road would provide two travel lanes for light utility vehicles and one travel lane for heavy hauling trucks. During construction, on-site construction flag persons may be required to facilitate heavy hauling truck use of the Pond Access Roads.

1.4.1.6 South Access Road

The existing South Access Road connects to Vail Dam Road, which is a gravel one-lane roadway used by RCWD service vehicles that connects to Vail Lake Road via the campground (this route would not be used except as a possible delivery route for the modular barge system). The South Access Road would need to be relocated as it is within the footprint of the foundation excavation of the new dam. A new roadway embankment would be constructed along the north-facing slope of the canyon, approximately 150 ft downstream of the existing access road. The proposed realignment of the South Access Road is shown on Figure 1-2. This location was selected to provide access from the spillway area and to provide a construction staging area immediately downstream of the new dam. After relocation, the South Access Road would maintain a connection to Vail Oak Road for use by RCWD service vehicles. Following construction, the graded slopes on the side of the South Access Road would be revegetated with appropriate native vegetation. Vegetated riprap would be placed at the foot of the embankment along Temecula Creek to reduce potential erosion.

It is anticipated that the South Access Road embankment would be constructed using materials excavated from the new dam foundation. This road would also have gravel surfacing and drainage improvements. The South Access Road would be inundated in the event the reservoir spills; therefore, during operation, major erosion would need to be repaired on this road in the event of spill events. Implementation of the Project would give RCWD greater control over the lake water level in the event of an emergency release and would substantially decrease the likelihood of a spill event. Therefore, damage to the South Access Road during a major weather event is considered to be a low risk.

1.4.2 Electrical, Mechanical, and Instrumentation for the Dam

The existing dam facilities have overhead electrical service provided by SCE. The existing overhead service would need to be rerouted to accommodate the footprint of the new dam and outlet works facilities. New power poles would be provided to route the existing service up the downstream side of the right abutment to the new Dam Control Building. All new electrical utility facilities would be designed per SCE standards. Power is used for lighting, security cameras, gate actuators, trash rack hoists, and monitoring and control systems. The operation of the Dam Control Building would continue after Project construction; however, the building would be fully enclosed with all new equipment.

1.4.3 Demolition of the Existing Dam

The three central monoliths of the existing arch dam would be partially removed to allow for the hydraulic connection of the reservoir with the new outlet tower. The remainder of the existing arch dam would remain in place. The demolition would likely include saw cutting the arch monoliths into manageable sizes that can be removed with a barge-supported crane. Auxiliary barges would transport the demolition debris to the shoreline, likely to the spillway staging area. All the demolition debris will be removed from the site for off-site disposal via the Canyon Access Road. Upon completion, water will fill the area between the existing and proposed dam, slightly increasing the overall size of the reservoir by 0.66 acre.

It is anticipated that the contractor would support the demolition equipment on a modular pontoon system that would be trucked to the site and then assembled to form a larger barge. Multiple barges may be required to transport equipment and demolition debris to/from the shoreline and the dam. The barges could be launched from the existing launch ramp (in the southeast part of the reservoir) or lofted into the reservoir with a crane located in the staging/laydown area planned in the spillway area (see Figure 1-2). Use of the existing launch ramp will not be feasible if the water level is too low. No improvements are planned to the existing launch ramp, Vail Lake Road (the access road to the ramp), or Vail Dam Road south of the ramp. Any grading performed in the vicinity of the staging area to prepare a flat area for crane access will use on-site materials (e.g., dam foundation excavation materials) and will be revegetated with native vegetation at the end of the demolition.

Demolition of the existing gravity abutments would also occur where the new dam contacts those abutments. This would consist of hydroblasting and removing 2–3 inches of concrete on the sloping downstream faces of the abutments and removing the upper 6 inches of the crests of both the right and left gravity abutments.

1.4.4 Construction Staging and On-Site Disposal

Project implementation would include staging areas to support construction and demolition activities. Material disposal areas are also planned for placement of excess foundation excavation spoils.

1.4.4.1 Staging Area

Limited area is available immediately adjacent to the proposed dam and downstream due to the narrow width of this portion of the canyon. Therefore, staging areas have been identified in various

locations, including the relatively level area downstream of the spillway, wider portions of the canyon downstream of the dam, within a vacant portion of RCWD's property adjacent to De Portola Road, and within the Temecula Valley Flyers RC Air Field ("Flyers Field") north of Basin U-4 in the Upper VDC Recharge Basins, which is currently leased to the Temecula Flyers for remote-controlled aircraft use. The proposed staging areas are shown on Figure 1-2**.** Staging areas include aggregate stockpile areas, laydown areas, and access and staging areas. It is anticipated that the contractor would determine the optimal locations within the staging areas for each activity. With the exception of staging areas located within disturbed/developed areas, all staging areas would be revegetated to pre-project habitat conditions or better following completion of construction. Staging areas would be required to provide the following:

1. **RCC Mix Plant Area:** This area would contain a portable concrete mix plant with silos of cement and fly ash and stockpiles of aggregate in 3 to 4 sizes. This mix plant area is anticipated to be located at the Flyers Field (see Figure 1-2) in the Upper VDC Recharge Basins. The RCC would be hauled from the mix plant to the dam site with off-road trucks. The RCC would be hauled from the mix plant to the dam site with off-road trucks.

2. **Foundation Grout Mix Plant:** This area would contain a small mix plant for the grout used in the foundation grouting. This grout mix plant would be located adjacent to the dam site.

3. **Crushing Plant:** This area would contain a portable rock crushing plant for crushing materials excavated from the dam foundation. Because of the limited space available adjacent to the dam, it is likely that the crushing plant would be located in a mid-canyon area.

4. **Contractor Trailers:** Both the contractor's and engineer's field offices would be located within staging areas.

5. **Laydown Areas:** These areas would provide material laydown/storage areas and space for activities such as fabricating rebar and assembling concrete forms, etc.

6. **Crane Access Areas:** Portions of the staging and laydown area near the dam spillway may be graded to provide flat areas for crane access during the partial demolition of the existing arch dam. Cranes may be used to lift modular barge components from flatbed trucks into the lake and to move demolition debris from barges onto trucks for disposal.

7. **Topsoil Stockpile Areas:** Topsoil from areas within the impact limits that support native vegetation will be salvaged and stockpiled during construction. Following construction, the salvaged topsoil will be spread onto areas to be restored to native habitat.

1.4.4.2 Disposal Areas

Approximately 64,900 cubic yards (cy) of materials (including the previous foundation spoils, alluvium, fill, and moderately weathered rock) would be generated for excavation for the dam foundation. Most of this material would be used to grade the new alignment of the South Access Road and to provide flat areas near Vail Dam to support crane access for demolition activities. The balance of the excavation materials would require removal from the dam area and subsequent

disposal. RCWD currently plans to keep the excess materials on its property for possible future re-use. Disposal areas are anticipated to be located within the staging and laydown area near De Portola Road on RCWD's 50 acre parcel, as shown on Figure 1-2. Off-site disposal, if needed, would be at a nearby licensed landfill.

1.4.5 Vail Lake Water Storage

The replacement dam would be constructed so the resultant storage capacity and maximum reservoir level would be essentially equal to the capacity and elevation prior to the water level restriction, with a slight increase in lake surface area of approximately 0.66 acre between the existing dam and the proposed dam. Currently, water levels are restricted to between a high of 1,457.6 feet NAVD88[1] (15 feet below the spillway crest) and a low of 1,437.6 feet NAVD88. Remediation of seismic and hydrologic hazards at Vail Dam would allow for the removal of the water level restrictions. Specifically, the reservoir water level could be increased up to the spillway elevation (1,472.6 ft NAVD88). However, RCWD would not manually fill the reservoir to more than 1,457.6 ft NAVD88 (15 ft below the spillway crest) to allow capacity for rainfall inflow.

The operating level of the reservoir is dependent on a variety of factors, including restrictions on pumping into the reservoir to prevent introduction of quagga mussel,[2] requirements to recharge groundwater to reduce evaporation of stored water, and the amount of precipitation. As such, the reservoir would continue to be subject to semiregular fluctuations in water level.

1.4.6 Construction Schedule

Construction of the new dam is anticipated to be initiated in the fall of 2023 and completed in late 2025. It is anticipated that the new dam and outlet works would be substantially complete in approximately 23 months. The existing dam would then be partially demolished after completion of the tower, and it is expected that construction would be complete in approximately 31 months (AECOM 2019). Based on the Construction Trip Generation Summary for the Vail Dam Seismic and Hydrologic Remediation Project (LSA 2022), the Proposed Project would be constructed in 14 phases as shown in Table 1.A. Potential overlapping phases are also shown in Table 1.B, below.

Once the Proposed Project is complete, Vail Lake and Vail Dam would not require any part-time construction workers or full-time, dedicated RCWD staff on site. Revegetation of temporary impact areas would occur following construction, with maintenance and monitoring occurring over a 5-year period following plant installation.

1 NAVD88 = North American Vertical Datum of 1988.

2 The quagga mussel is an aquatic invasive species, which is known to clog water intake structures (e.g., pipes and screens), disrupt native ecosystems, and inhibit recreational activities.

Table 1.A: Construction Phase Timetable

Phase Number	Description	Duration
1	Mobilization	16 Weeks (Months 1–4)
2	Access Roads and Staging Areas	24 Weeks (Months 2–8)
3	Demolition of Facilities at the New Dam	10 Weeks (Months 5–9)
4	Foundation Excavation	48 Weeks (Months 5–16)
5	Temporary Energy Dissipation Vault	18 Weeks (Months 5–9)
6	Armor Spillway	6 Weeks (Months 8–10)
7	Foundation Treatment and Grouting	20 Weeks (Months 10–15)
8	Roller-Compacted Concrete Placement	31 Weeks (Months 13–20)
9	Outlet Tower	28 Weeks (Months 17–23)
10	Dam Drainage	19 Weeks (Months 18–22)
11	Dam Instrumentation	10 Weeks (Months 22–24)
12	Permanent Energy Dissipation Vault	8 Weeks (Months 23–25)
13	Demolition of the Existing Facilities	19 Weeks (Months 25–29)
14	Site Reclamation and Demobilization	6 Weeks (Months 30–31)

Source: Construction information memorandum (AECOM 2020). Adjusted to account for 90% Design.

Table 1.B: Overlapping Construction Phases

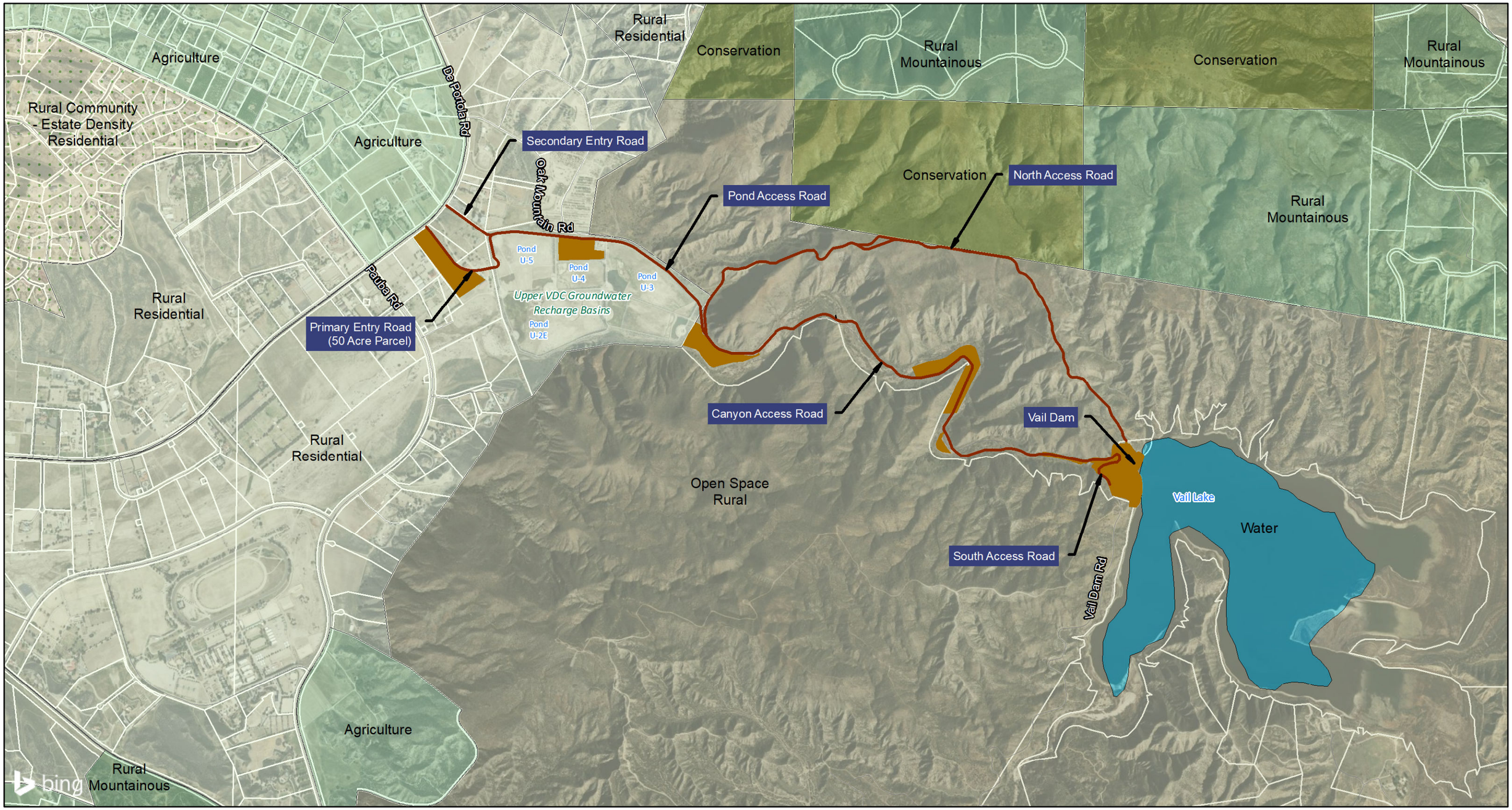
Overlapping Phases	Duration
1 and 2	10 Weeks (Months 2–4)
3, 4, and 5	6 Weeks (Months 5–6)
7 and 8	8 Weeks (Months 13–15)
8 and 9	4 Weeks (Months 17–18)
8, 9, and 10	11 Weeks (Months 18–20)
9 and 10	5 Weeks (Months 21–22)
9, 10, and 11	2 Weeks (Month 22)
9 and 11	4 Weeks (Months 22–23)
11 and 12	7 Weeks (Months 23–24)

Source: Construction information memorandum (AECOM 2020). Adjusted to account for 90% Design.

1.5 EXISTING SENSITIVE LAND USES IN THE PROJECT AREA

Sensitive receptors are segments of the population susceptible to poor air quality such as children, the elderly, and those with preexisting health problems. Examples of sensitive receptors include residences, schools and school yards, parks and playgrounds, daycare centers, nursing homes, and medical facilities. As shown in Figure 1-3, the Project site is surrounded primarily by rural residential uses (i.e., single-family homes), agricultural land uses, conservation areas, Vail Lake, and open spaces. The areas adjacent to the Project site include the following uses:

- **North:** NexStar Ranch (horse ranch, residential), agricultural areas, and undeveloped areas; equestrian trails north of and outside of the Upper VDC Recharge Basins to the Secondary Entry Road and via RCWD property along the south side of the NexStar Ranch property to Oak Mountain Road



LSA

LEGEND

- Project Feature Access Roads
- Project Feature Areas

Surrounding Land Use

- Rural Community - Estate Density Residential
- Rural Residential
- Rural Mountainous
- Agriculture
- Conservation
- Open Space Rural
- Water

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FIGURE 1-3

Vail Dam Seismic and Hydrologic Remediation Project

Surrounding Land Uses

SOURCE: Bing Maps (2020); AECOM (6/2022); Riverside County Transportation and Land Use Management Agency (2012)

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- **East:** Vail Lake, including boat launch
- **South:** Rancho Pacifica Ranch (horse ranch, residential), Vail Lake Village and RV Resort and associated recreational facilities
- **West:** Residential (single-family homes) west of De Portola Road

For four construction phases (i.e., Mobilization, Site Reclamation and Demobilization, Access Road and Staging Areas, and Roller-Compacted Concrete Placement), the closest sensitive receptors near De Portola Road, Primary Entry Road (50 Acre Parcel), Secondary Entry Road, and the temporary concrete batch plant area at the Flyers Field are the rural residential land uses (i.e., single-family homes) located approximately 60 ft to the northeast, 560 ft to the northwest, and 700 ft to the southwest of the Project boundary. For all other construction phases, there are no sensitive receptors within 1 mile of the construction emission sources.

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2.0 BACKGROUND

2.1 AIR POLLUTANTS AND HEALTH EFFECTS

The Project site is located in unincorporated southwestern Riverside County, east of Temecula, which is part of the South Coast Air Basin (Basin) and is under the jurisdiction of the SCAQMD. Both the State and the federal government have established health-based ambient air quality standards (AAQS) for seven air pollutants. As detailed in Table 2.A, these pollutants include ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter less than 10 microns in size (PM_{10}), particulate matter less than 2.5 microns in size ($PM_{2.5}$), and lead. In addition, the State has set standards for sulfates, hydrogen sulfide (H_2S), vinyl chloride, and visibility-reducing particles. These standards are designed to protect the health and welfare of the populace with a reasonable margin of safety. Long-term exposure to elevated levels of criteria pollutants may result in adverse health effects. However, emission thresholds established by an air quality district are used to manage total regional emissions within an air basin based on the air basin's attainment status for criteria pollutants. These emission thresholds were established for individual projects that would contribute to regional emissions and pollutant concentrations and could adversely affect or delay the projected attainment target year for certain criteria pollutants.

Because of the conservative nature of the thresholds and the basin-wide context of individual project emissions, there is no known direct correlation between a single project and localized air quality-related health effects. One individual project that generates emissions exceeding a threshold does not necessarily result in adverse health effects for residents in the project vicinity. This condition is especially true when the criteria pollutants exceeding thresholds are those with regional effects, such as O_3 precursors like nitrogen oxides (NO_X) and volatile organic compounds (VOCs).

2.1.1 Ozone

Rather than being directly emitted, O_3 (smog) is formed by photochemical reactions between NO_x and VOCs. O_3 is a pungent, colorless gas. Elevated O_3 concentrations result in reduced lung function, particularly during vigorous physical activity. This health problem is particularly acute in sensitive receptors such as the sick, the elderly, and young children. O_3 levels peak during the summer and early fall months.

2.1.2 Carbon Monoxide

CO is formed by the incomplete combustion of fossil fuels, almost entirely from automobiles. It is a colorless, odorless gas that can cause dizziness, fatigue, and impairments to central nervous system functions. CO passes through the lungs into the bloodstream, where it interferes with the transfer of oxygen to body tissues.

2.1.3 Particulate Matter

Particulate matter is the term used for a mixture of solid particles and liquid droplets found in the air. Coarse particles are those that are 10 microns or less in diameter, or PM_{10}. Fine, suspended PM with an aerodynamic diameter of 2.5 microns or less, or $PM_{2.5}$, is not readily filtered out by the lungs. Nitrates, sulfates, dust, and combustion particulates are major components of PM_{10} and

$PM_{2.5}$. These small particles can be directly emitted into the atmosphere as byproducts of fuel combustion; through abrasion, such as tire or brake lining wear; or through fugitive dust (wind or mechanical erosion of soil). They can also be formed in the atmosphere through chemical reactions. Particulates may transport carcinogens and other toxic compounds that adhere to the particle surfaces and can enter the human body through the lungs.

2.1.4 Nitrogen Dioxide

NO_2 is a reddish brown gas that is a byproduct of combustion processes. Automobiles and industrial operations are the main sources of NO_2. Aside from its contribution to ozone formation, NO_2 also contributes to other pollution problems, including a high concentration of $PM_{2.5}$, poor visibility, and acid deposition. NO_2 may be visible as a coloring component on high-pollution days, especially in conjunction with high O_3 levels. NO_2 decreases lung function and may reduce resistance to infection.

2.1.5 Sulfur Dioxide

SO_2 is a colorless, irritating gas formed primarily from incomplete combustion of fuels containing sulfur. Industrial facilities also contribute to gaseous SO_2 levels in the region. SO_2 irritates the respiratory tract, can injure lung tissue when combined with $PM_{2.5}$, and reduces visibility and the level of sunlight.

2.1.6 Lead

Leaded gasoline (phased out in the United States beginning in 1973), paint (on older houses and cars), smelters (metal refineries), and the manufacture of lead storage batteries have been the primary sources of lead released into the atmosphere. Lead has multiple adverse neurotoxic health effects, and children are at special risk. Some lead-containing chemicals cause cancer in animals. Lead levels in the air have decreased substantially since leaded gasoline was eliminated. Ambient lead concentrations are only monitored on an as-warranted, site-specific basis in California. On October 15, 2008, the United States Environmental Protection Agency (EPA) strengthened the National Ambient Air Quality Standard for lead by lowering it from 1.5 to 0.15 micrograms per cubic meter ($\mu g/m^3$). The EPA revised the monitoring requirements for lead in December 2010. These requirements focus on airports and large urban areas, resulting in an increase in 76 monitors nationally.

2.1.7 Volatile Organic Compounds

VOCs (also known as reactive organic gases [ROGs] and reactive organic compounds [ROCs]) are formed from the combustion of fuels and the evaporation of organic solvents. VOCs are not defined as criteria pollutants; however, because VOCs accumulate in the atmosphere more quickly during the winter, when sunlight is limited and photochemical reactions are slower, they are a prime component of the photochemical smog reaction. There are no attainment designations for VOCs.

2.1.8 Visibility Reducing Particles

Visibility is often characterized by “visual range” (VR). VR is the maximum distance at which a person can barely perceive a dark object. The ability to perceive an object is determined by the difference in contrast between the object and the background. A 2 percent contrast is considered barely

perceptible, and typically at least 5 percent change in contrast is needed. The less water vapor, sea salt particulate, and pollutants in the air, the greater the VR. VRs of up to approximately 150 miles can occur in clean desert areas where there is very low relative humidity. In coastal regions, however, the occurrence of sea salt particulate and water vapor significantly reduces the maximum VR that could occur. The annual average VR in the Proposed Project area is approximately 57 miles as measured at the Aqua Tibia Wilderness Area, approximately 10 miles east of the Site.

2.1.9 Toxic Air Contaminants

In addition to the criteria pollutants discussed above, toxic air contaminants (TACs) are another group of pollutants of concern. TACs are injurious in small quantities and are regulated by the EPA and the CARB. Some examples of TACs include benzene, butadiene, formaldehyde, and hydrogen sulfide. The identification, regulation, and monitoring of TACs is relatively recent compared to that for criteria pollutants.

TACs do not have AAQS but are regulated by the EPA and CARB. In 1998, CARB identified particulate matter from diesel-fueled engines as a TAC. CARB has completed a risk management process that identified potential cancer risks for a range of activities and land uses that are characterized by use of diesel-fueled engines (CARB 2000). High-volume freeways, stationary diesel engines, and facilities attracting heavy and constant diesel vehicle traffic (distribution centers and truck stops) were identified as posing the highest risk to adjacent receptors. Other facilities associated with increased risk include warehouse distribution centers, large retail or industrial facilities, high-volume transit centers, and schools with a high volume of bus traffic. Health risks from TACs are a function of both concentration and duration of exposure.

Although diesel particulate matter (DPM) is not specifically monitored, recent studies indicate that exposure to it may contribute significantly to a cancer risk (a risk of approximately 500 to 700 in 1,000,000) that is greater than all other measured TACs combined (CARB 2000). CARB's Diesel Risk Reduction Plan is intended to substantially reduce DPM emissions and associated health risks through introduction of ultra-low-sulfur diesel fuel—a step already implemented—and cleaner-burning diesel engines. The technology for reducing DPM emissions from heavy-duty trucks is well established, and both State and federal agencies are moving aggressively to regulate engines and emission control systems to reduce and remediate diesel emissions. CARB anticipates that by 2020, average statewide DPM concentrations decreased by 85 percent from levels in 2000 with full implementation of the Diesel Risk Reduction Plan, meaning that the statewide health risk from DPM is expected to have decreased from 540 cancer cases in 1,000,000 to 21.5 cancer cases in 1,000,000.

Table 2.A presents a summary of State and federal AAQS, and Table 2.B summarizes the primary health effects and sources of common air pollutants.

Table 2.A: Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards[1]		Federal Standards[2]		
		Concentration[3]	Method[4]	Primary[3,5]	Secondary[3,6]	Method[7]
Ozone (O_3)[8]	1-Hour	0.09 ppm (180 µg/m³)	Ultraviolet Photometry	–	Same as Primary Standard	Ultraviolet Photometry
	8-Hour	0.07 ppm (137 µg/m³)		0.070 ppm (137 µg/m³)		
Respirable Particulate Matter (PM_{10})[9]	24-Hour	50 µg/m³	Gravimetric or Beta Attenuation	150 µg/m³	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 µg/m³		–		
Fine Particulate Matter ($PM_{2.5}$)[9]	24-Hour	-		35 µg/m³	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 µg/m³	Gravimetric or Beta Attenuation	12.0 µg/m³		
Carbon Monoxide (CO)	8-Hour	9.0 ppm (10 mg/m³)	Non-Dispersive Infrared Photometry (NDIR)	9 ppm (10 mg/m³)	–	Non-Dispersive Infrared Photometry (NDIR)
	1-Hour	20 ppm (23 mg/m³)		35 ppm (40 mg/m³)		
	8-Hour (Lake Tahoe)	6 ppm (7 mg/m³)		–	–	
Nitrogen Dioxide (NO_2)[10]	Annual Arithmetic Mean	0.03 ppm (57 µg/m³)	Gas Phase Chemi-luminescence	53 ppb (100 µg/m³)	Same as Primary Standard	Gas Phase Chemi-luminescence
	1-Hour	0.18 ppm (339 µg/m³)		100 ppb (188 µg/m³)	-	
Lead (Pb)[12,13]	30-Day Average	1.5 µg/m³	Atomic Absorption	–	–	High-Volume Sampler and Atomic Absorption
	Calendar Quarter	–		1.5 µg/m³ (for certain areas)[12]	Same as Primary Standard	
	Rolling 3-Month Average[9]	–		0.15 µg/m³		
Sulfur Dioxide (SO_2)[11]	24-Hour	0.04 ppm (105 µg/m³)	Ultraviolet Fluorescence	0.14 ppm (for certain areas)	–	Ultraviolet Fluorescence; Spectro-photometry (Pararosaniline Method)
	3-Hour	–		–	0.5 ppm (1,300 µg/m³)	
	1-Hour	0.25 ppm (655 µg/m³)		75 ppb (196 µg/m³)[11]	–	
	Annual Arithmetic Mean	–		0.030 ppm (for certain areas)[11]	–	
Visibility-Reducing Particles[12]	8-Hour	See footnote 14	Beta Attenuation and Transmittance through Filter Tape	No Federal Standards		
Sulfates	24-Hour	25 µg/m³	Ion Chromatography			
Hydrogen Sulfide	1-Hour	0.03 ppm (42 µg/m³)	Ultraviolet Fluorescence			
Vinyl Chloride[10]	24-Hour	0.01 ppm (26 µg/m³)	Gas Chromatography			

Table notes are provided on the following page.

[1] California standards for ozone, carbon monoxide (except 8-hour Lake Tahoe), sulfur dioxide (1- and 24-hour), nitrogen dioxide, and particulate matter (PM_{10}, $PM_{2.5}$, and visibility-reducing particles) are values that are not to be exceeded. All others are not to be equaled or exceeded. California Ambient Air Quality Standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

[2] National standards (other than ozone, particulate matter, and those based on the annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth-highest 8-hour concentration measured at each site in a year, averaged over 3 years, is equal to or less than the standard. For PM_{10}, the 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 µg/m^3 is equal to or less than 1. For $PM_{2.5}$, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over 3 years, are equal to or less than the standard. Contact the EPA for further clarification and current national policies.

[3] Concentration is expressed first in the units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

[4] Any equivalent measurement method that can be shown to the satisfaction of CARB to give equivalent results at or near the level of the air quality standard may be used.

[5] National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.

[6] National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

[7] Reference method as described by the EPA. An "equivalent method" of measurement may be used but must have a "consistent relationship to the reference method" and must be approved by the EPA.

[8] On October 1, 2015, the national 8-hour ozone primary and secondary standards were lowered from 0.075 to 0.070 ppm.

[9] On December 14, 2012, the national annual $PM_{2.5}$ primary standard was lowered from 15 µg/m^3 to 12.0 µg/m^3. The existing national 24-hour $PM_{2.5}$ standards (primary and secondary) were retained at 35 µg/m^3, as was the annual secondary standard of 15 µg/m^3. The existing 24-hour PM_{10} standards (primary and secondary) of 150 µg/m^3 also were retained. The form of the annual primary and secondary standards is the annual mean, averaged over 3 years.

[10] To attain the 1-hour national standard, the 3-year average of the annual 98th percentile of the 1-hour daily maximum concentrations at each site must not exceed 100 ppb. Note that the national 1-hour standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the national 1-hour standard to the California standards, the units can be converted from ppb to ppm. In this case, the national standard of 100 ppb is identical to 0.100 ppm.

[11] On June 2, 2010, a new 1-hour sulfur dioxide standard was established and the existing 24-hour and annual primary standards were revoked. To attain the 1-hour national standard, the 3-year average of the annual 99th percentile of the 1-hour daily maximum concentrations at each site must not exceed 75 ppb. The 1971 sulfur dioxide national standards (24-hour and annual) remain in effect until 1 year after an area is designated for the 2010 standard, except that in areas designated nonattainment for the 1971 standards, the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standards are approved.

Note that the 1-hour national standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the 1-hour national standard to the California standard, the units can be converted to ppm. In this case, the national standard of 75 ppb is identical to 0.075 ppm.

[12] CARB has identified lead and vinyl chloride as "toxic air contaminants" with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

[13] The national standard for lead was revised on October 15, 2008, to a rolling 3-month average. The 1978 lead standard (1.5 µg/m^3 as a quarterly average) remains in effect until 1 year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.

[14] In 1989, CARB converted both the general statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents, which are "extinction of 0.23 per kilometer" and "extinction of 0.07 per kilometer" for the statewide and Lake Tahoe Air Basin standards, respectively.

Source: Ambient Air Quality Standards (CARB 2016).
µg/m^3 = micrograms per cubic meter
°C = degrees Celsius
CARB = California Air Resources Board
EPA = United States Environmental Protection Agency
mg/m^3 = milligrams per cubic meter
ppb = parts per billion
ppm = parts per million
SO_2 = sulfur dioxide

Table 2.B: Summary of Health Effects of the Major Criteria Air Pollutants

Pollutant	Health Effects	Examples of Sources
Particulate matter ($PM_{2.5}$ and PM_{10}: less than or equal to 2.5 or 10 microns, respectively)	• Hospitalizations for worsened heart diseases • Emergency room visits for asthma • Premature death	• Cars and trucks (especially diesels) • Fireplaces and woodstoves • Windblown dust from roadways, agriculture, and construction
Ozone (O_3)	• Cough, chest tightness • Difficulty taking a deep breath • Worsened asthma symptoms • Lung inflammation	• Precursor sources:[1] motor vehicles, industrial emissions, and consumer products
Carbon monoxide (CO)	• Chest pain in heart patients[2] • Headaches, nausea[2] • Reduced mental alertness[2] • Death at very high levels[2]	• Any source that burns fuel, such as cars, trucks, construction and farming equipment, and residential heaters and stoves
Nitrogen dioxide (NO_2)	• Increased response to allergens	• See CO sources
Toxic air contaminants	• Cancer • Chronic eye, lung, or skin irritation • Neurological and reproductive disorders	• Cars and trucks (especially diesels) • Industrial sources, such as chrome platers • Neighborhood businesses, such as dry cleaners and service stations • Building materials and products

Source: ARB Fact Sheet: Air Pollution and Health (CARB 2009).

[1] O_3 is not generated directly by these sources. Rather, chemicals emitted by these precursor sources react with sunlight to form ozone in the atmosphere.

[2] Health effects from CO exposures occur at levels considerably higher than ambient.

CARB = California Air Resources Board

CO = carbon monoxide

2.2 GREENHOUSE GASES AND GLOBAL CLIMATE CHANGE BACKGROUND

Global climate change (GCC) is the observed increase in the average temperature of the Earth's atmosphere and oceans along with other significant changes in climate (e.g., precipitation or wind) that last for an extended period of time. The term "global climate change" is often used interchangeably with the term "global warming," but "global climate change" is preferred to "global warming" because it helps convey that there are other changes in addition to rising temperatures.

Climate change refers to any change in measures of weather (e.g., temperature, precipitation, or wind) lasting for an extended period (decades or longer). Climate change may result from natural factors (e.g., changes in the sun's intensity), natural processes within the climate system (e.g., changes in ocean circulation), or human activities (e.g., the burning of fossil fuels, land clearing, or agriculture). The primary observed effect of GCC has been a rise in the average global tropospheric[8] temperature of 0.36°F per decade, determined from meteorological measurements worldwide between 1990 and 2005. Climate change modeling shows that further warming may occur, which may induce additional changes in the global climate system during the current century. Changes to the global climate system, ecosystems, and the environment of the State could include higher sea levels, drier or wetter weather, changes in ocean salinity, changes in wind patterns, or more energetic aspects of extreme weather, including droughts, heavy precipitation, heat waves, extreme

[8] The troposphere is the zone of the atmosphere characterized by water vapor, weather, winds, and decreasing temperature with increasing altitude.

cold, and increased intensity of tropical cyclones. Specific effects in the State might include a decline in the Sierra Nevada snowpack, erosion of the State's coastline, and seawater intrusion in the San Joaquin Delta.

Global surface temperatures have risen by 1.33°F ±0.32°F over the last 100 years. The rate of warming over the last 50 years is almost double that over the last 100 years (IPCC 2013). The latest projections, based on state-of-the-art climate models, indicate that temperatures in the State are expected to rise 3–10.5°F by the end of the century. The prevailing scientific opinion on climate change is that "most of the warming observed over the last 60 years is attributable to human activities" (IPCC 2013). Increased amounts of carbon dioxide (CO_2) and other GHGs are the primary causes of the human-induced component of warming. The observed warming effect associated with the presence of GHGs in the atmosphere (from either natural or human sources) is often referred to as "the greenhouse effect."[9]

GHGs are present in the atmosphere naturally, are released by natural sources, or are formed from secondary reactions taking place in the atmosphere. The following gases are widely seen as the principal contributors to human-induced GCC:[10]

- CO_2
- Methane (CH_4)
- Nitrous oxide (N_2O)
- Hydrofluorocarbons (HFCs)
- Perfluorocarbons (PFCs)
- Nitrogen trifluoride (NF_3)
- Sulfur hexafluoride (SF_6)

Over the last 200 years, human activities have caused substantial quantities of GHGs to be released into the atmosphere. These extra emissions are increasing GHG concentrations in the atmosphere and enhancing the natural greenhouse effect. While GHGs produced by human activities include naturally occurring GHGs (e.g., CO_2, CH_4, and N_2O), some gases (e.g., HFCs, PFCs, NF_3, and SF_6) are completely new to the atmosphere. Certain other gases (e.g., water vapor) are short-lived in the atmosphere compared to these GHGs, which remain in the atmosphere for significant periods of time and contribute to climate change in the long term. Water vapor is generally excluded from the list of GHGs because it is short-lived in the atmosphere and its atmospheric concentrations are largely determined by natural processes (e.g., oceanic evaporation). For the purposes of this air quality study, the term "GHGs" will refer collectively to the seven gases identified in the bulleted list provided above.

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9 The temperature on Earth is regulated by a system commonly known as the "greenhouse effect." Just as the glass in a greenhouse allows heat from sunlight in and reduces the amount of heat that escapes, greenhouse gases (GHGs) such as carbon dioxide, methane, and nitrous oxide in the atmosphere keep the Earth at a relatively even temperature. Without the greenhouse effect, the Earth would be a frozen globe; thus, the *naturally occurring* greenhouse effect is necessary to keep our planet at a comfortable temperature.

10 The GHGs listed are consistent with the definition in Assembly Bill 32 (Government Code 38505), as discussed later in this section.

These gases vary considerably in terms of global warming potential (GWP), which is a concept developed to compare the ability of each GHG to trap heat in the atmosphere relative to another gas. GWP is based on several factors, including the relative effectiveness of a gas in absorbing infrared radiation and the length of time that the gas remains in the atmosphere ("atmospheric lifetime"). The GWP of each gas is measured relative to CO_2, the most abundant GHG. The definition of GWP for a particular GHG is the ratio of heat trapped by one unit mass of the GHG to the ratio of heat trapped by one unit mass of CO_2 over a specified time period. GHG emissions are typically measured in terms of metric tons[11] (MT) of "CO_2 equivalents" (MT CO_2e). CARB uses *Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report* (IPCC 2007) GWPs for the GHG emission inventory. For example, N_2O is 298 times more potent at contributing to global warming than CO_2. Table 2.C identifies the GWP for each GHG analyzed in this report.

Table 2.C: Global Warming Potential for Selected Greenhouse Gases

Gas	Atmospheric Lifetime (Years)	Global Warming Potential (100-year Time Horizon)
Carbon Dioxide (CO_2)	~100	1
Methane (CH_4)	12	21
Nitrous Oxide (N_2O)	120	310
HFC-23	260	11,700
HFC-134a	1	140
HFC-152a	1	140
PFC: Tetrafluoromethane (CF4)	50,000	6,500
PFC: Hexafluoromethane (C2F6)	10,000	9,200
Sulfur Hexafluoride (SF6)	3,200	23,900

Source: *Second Update to the Climate Change Scoping Plan: Building on the Framework* (CARB 2017). Website: www.arb.ca.gov/our-work/programs/ab-32-climate-change-scoping-plan/2017-scoping-plan-documents (accessed September 2022).

The following discussion summarizes the characteristics of the seven primary GHGs.

2.2.1 Carbon Dioxide

In the atmosphere, carbon generally exists in its oxidized form, as CO_2. Natural sources of CO_2 include the respiration (breathing) of humans, animals, and plants; volcanic outgassing; decomposition of organic matter; and evaporation from the oceans. Human-caused sources of CO_2 include the combustion of fossil fuels and wood, waste incineration, mineral production, and deforestation. The Earth maintains a natural carbon balance, and when concentrations of CO_2 are upset, the system gradually returns to its natural state through natural processes. Natural changes to the carbon cycle work slowly, especially compared to the rapid rate at which humans are adding CO_2 to the atmosphere. Natural removal processes (e.g., photosynthesis by land- and ocean-dwelling plant species) cannot keep pace with this extra input of man-made CO_2, and consequently

[11] A metric ton is equivalent to approximately 1.1 tons.

the gas is building up in the atmosphere. The concentration of CO_2 in the atmosphere has risen approximately 46 percent since the late 1800s (NOAA 2020).

In 2019, total annual CO_2 accounted for approximately 83 percent of California's overall GHG emissions (CARB 2021a). Transportation is the single largest source of CO_2 in California, which is primarily comprised of on-road travel. Electricity production, industrial and residential sources also make important contributions to CO_2 emissions in California.

2.2.2 Methane

CH_4 is produced when organic matter decomposes in environments lacking sufficient oxygen. Natural sources of CH_4 include fires, geologic processes, and bacteria that produce CH_4 in a variety of settings (most notably, wetlands) (EPA 2010). Anthropogenic sources include rice cultivation, livestock, landfills and waste treatment, biomass burning, and fossil fuel combustion (e.g., the burning of coal, oil, and natural gas). As with CO_2, the major removal process of atmospheric CH_4—a chemical breakdown in the atmosphere—cannot keep pace with source emissions, and CH_4 concentrations in the atmosphere are increasing. Total annual emissions of CH_4 accounted for approximately 9 percent of GHG emissions in California (CARB 2021a).

2.2.3 Nitrous Oxide

N_2O is produced naturally by a wide variety of biological sources, particularly microbial action in soils and water. Tropical soils and oceans account for the majority of natural source emissions. N_2O is also a product of the reaction that occurs between nitrogen and oxygen during fuel combustion. Both mobile and stationary combustion sources emit N_2O. The quantity of N_2O emitted varies according to the type of fuel, technology, and pollution control device used, as well as maintenance and operating practices. Agricultural soil management and fossil fuel combustion are the primary sources of human-generated N_2O emissions in the State. N_2O emissions accounted for approximately 3 percent of GHG emissions in California in 2019 (CARB 2021a).

2.2.4 Hydrofluorocarbons, Perfluorocarbons, Nitrogen Trifluoride, and Sulfur Hexafluoride

HFCs are primarily used as substitutes for O_3-depleting substances regulated under the Montreal Protocol.[12] PFCs, NF_3, and SF_6 are emitted from various industrial processes, including aluminum smelting, semiconductor manufacturing, electric power transmission and distribution, and magnesium casting. There is no aluminum or magnesium production in the State; however, the rapid growth in the semiconductor industry, which is active in the State, has led to greater use of PFCs. However, there are no known Project-related emissions of these three GHGs; therefore, these substances are not discussed further in this analysis. HFCs, PFCs, and SF_6 accounted for about 5 percent of GHG emissions in California in 2019 (CARB 2021a).

[12] The Montreal Protocol is an international treaty that was approved on January 1, 1989, and was designated to protect the ozone (O_3) layer by phasing out the production of several groups of halogenated hydrocarbons believed to be responsible for O_3 depletion and that are potent greenhouse gases.

2.3 ENERGY BACKGROUND

The purpose of this energy analysis is to ensure that the energy implication is considered by RCWD, as the Lead Agency, and to quantify anticipated energy usage associated with construction and operation of the Proposed Project; to determine if the usage amounts are efficient, typical, or wasteful for the land use type; and to emphasize avoiding or reducing inefficient, wasteful, and unnecessary consumption of energy.

2.3.1 Electricity

Electricity is a man-made resource. The production of electricity requires the consumption or conversion of energy resources, including water, wind, oil, gas, coal, solar, geothermal, and nuclear resources, into energy. Electricity is used for a variety of purposes, such as lighting, heating, cooling, and refrigeration and for operating appliances, computers, electronics, machinery, and public transportation systems (EIA 2019a).

According to the most recent data available, in 2020, California's electricity was generated primarily by natural gas (37.06 percent), renewable sources (33.09 percent), large hydroelectric (12.21 percent), nuclear (9.33 percent), and coal (2.74 percent). Total electric generation in California in 2020 was 272,576 gigawatt-hours (GWh), down 2 percent from 2019's total generation of 277,704 GWh (CEC 2021a).

The Project site is within the service territory of SCE. SCE provides electricity to more than 15 million people in a 50,000 square miles (sq mi) area of Central, Coastal, and Southern California (SCE 2019). According to the California Energy Commission (CEC), total electricity consumption in the SCE service area in 2020 was 83,633 GWh (32,475 GWh for the residential sector and 51,158 GWh for the non-residential sector). Total electricity consumption in Riverside County in 2020 was 16,857 GWh (CEC 2021b).

2.3.2 Natural Gas

Natural gas is a nonrenewable fossil fuel. Fossil fuels are formed when layers of decomposing plant and animal matter are exposed to intense heat and pressure under the surface of the Earth over millions of years. Natural gas is a combustible mixture of hydrocarbon compounds (primarily methane [CH_4]) that is used as a fuel source. Natural gas is found in naturally occurring reservoirs in deep underground rock formations. Natural gas is used for a variety of uses such as heating buildings; generating electricity; and powering appliances such as stoves, washing machines and dryers, gas fireplaces, and gas grills (EIA 2019b).

Natural gas consumed in California is used for electricity generation (45 percent), residential uses (21 percent), industrial uses (25 percent), and commercial uses (9 percent). California continues to depend upon out-of-state imports for nearly 90 percent of its natural gas supply (CEC 2021c).

The Southern California Gas Company (SoCalGas) is the natural gas service provider for the Project site. SoCalGas provides natural gas to approximately 21.8 million people in a 24,000 sq mi service area throughout Central and Southern California, from Visalia to the Mexican border (SoCalGas 2019). According to the CEC, total natural gas consumption in the SoCalGas service area in 2020 was

5,424.71 million therms. Total natural gas consumption in Riverside County in 2019 was 452.99 million therms (CEC 2021d).

2.3.3 Petroleum/Transportation Energy

Petroleum is also a nonrenewable fossil fuel. Petroleum is a thick, flammable, yellow-to-black mixture of gaseous, liquid, and solid hydrocarbons that occurs naturally beneath the Earth's surface. Petroleum is primarily recovered by oil drilling. It is refined into a larger number of consumer products, primarily fuel oil and gasoline.

Gasoline is the most-used transportation fuel in California, with 97 percent of all gasoline being consumed by light-duty cars, pickup trucks, and sport utility vehicles. In 2019, total gasoline consumption in California was 360,237 thousand barrels or 1,819.9 trillion British thermal units (BTUs). Of the total gasoline consumption, 343,677 thousand barrels or 1,771.6 trillion BTUs were consumed for transportation (EIA 2020).

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3.0 REGULATORY SETTING

The regulatory setting related to air quality, energy, and GHG is described blow.

3.1 AIR QUALITY REGULATORY SETTING

The EPA and CARB regulate direct emissions from motor vehicles. The SCAQMD is the regional agency primarily responsible for regulating air pollution emissions from stationary sources (e.g., factories) and indirect sources (e.g., traffic associated with new development), as well as monitoring ambient pollutant concentrations.

3.1.1 Federal Regulations/Standards

3.1.1.1 Federal Clean Air Act

Pursuant to the Federal Clean Air Act (CAA) of 1970, the EPA established the National Ambient Air Quality Standards (NAAQS). The NAAQS were established for six major pollutants, termed "criteria" pollutants. Criteria pollutants are defined as those pollutants for which the federal and State governments have established AAQS, or criteria, for outdoor concentrations in order to protect public health.

Data collected at permanent monitoring stations are used by the EPA to classify regions as attainment or nonattainment, depending on whether the regions met the requirements stated in the primary NAAQS. Nonattainment areas are imposed with additional restrictions as required by the EPA. The EPA has designated the Southern California Association of Governments (SCAG) as the Metropolitan Planning Organization (MPO) responsible for ensuring compliance with the requirements of the CAA for the Basin.

In April 2003, the EPA was cleared by the White House Office of Management and Budget to implement the 8-hour ground-level O_3 standard. The EPA issued the proposed rule implementing the 8-hour O_3 standard in April 2003. The EPA completed final 8-hour nonattainment status on April 15, 2004. The EPA revoked the 1-hour O_3 standard on June 15, 2005, and lowered the 8-hour O_3 standard from 0.08 parts per million (ppm) to 0.075 ppm on April 1, 2008.

The EPA issued the final $PM_{2.5}$ implementation rule in fall 2004. The EPA lowered the 24-hour $PM_{2.5}$ standard from 65 to 35 µg/m³ and revoked the annual PM_{10} standard on December 17, 2006. The EPA issued final designations for the 2006 24-hour $PM_{2.5}$ standard on December 12, 2008.

3.1.1.2 General Conformity Requirements

On November 30, 1993, the EPA promulgated final general conformity guidance to the states at 40 Code of Federal Regulations (CFR) Part 51 Subpart W to develop general conformity regulations for all federal activities except those covered under transportation conformity. On September 14, 1994, the SCAQMD adopted these regulations by reference as part of Rule 1901, and the EPA approved this rule as part of the California SIP on April 23, 1999 (64 Federal Register [FR] 19916). Parallel general conformity regulations at 40 CFR Part 93 Subpart B apply in areas where the EPA has not approved general conformity requirements to the state implementation plan. On April 5, 2010, the

EPA promulgated revised general conformity requirements at 40 CFR Part 93 Subpart B (75 FR 17254). In the same action, the EPA eliminated most of the general conformity requirements under 40 CFR Part 51 Subpart W, because they were mostly duplicative of the requirements at 40 CFR Part 93 Subpart B, and revised 40 CFR § 51.851 to remove the obligation for states to include general conformity requirements in their implementation plans. The revised regulations took effect on July 6, 2010.

The general conformity regulations apply to a federal action in a nonattainment or maintenance area if the total of direct and indirect emissions of the relevant criteria pollutants and precursor pollutants caused by the federal action equal or exceed certain *de minimis* rates. By requiring an analysis of direct and indirect emissions, the EPA intended the regulating federal agency to make sure that only those emissions that are reasonably foreseeable and that the federal agency can practicably control subject to that agency's continuing program responsibility will be addressed.

The general conformity regulations incorporate a stepwise process, beginning with an applicability analysis. According to EPA guidance (EPA 1994), before any approval is given for a federal action to go forward, the regulating federal agency must apply the applicability requirements found at 40 CFR §93.153(b) to the federal action to evaluate whether, on a pollutant-by-pollutant basis, a determination of general conformity is required. The guidance states that the applicability analysis can be (but is not required to be) completed concurrently with any analysis required under NEPA. If the regulating federal agency determines that the general conformity regulations do not apply to the federal action, no further analysis or documentation is required. If the general conformity regulations do apply to the federal action, the regulating federal agency must next conduct a conformity evaluation in accord with the criteria and procedures in the implementing regulations, publish a draft determination of general conformity for public review, and then publish the final determination of general conformity.

3.1.2 State Regulations/Standards

3.1.2.1 California Clean Air Act

In 1988, the California Clean Air Act (CCAA) required that all air districts in the State endeavor to achieve and maintain California Ambient Air Quality Standards (CAAQS) for CO, O_3, SO_2, and NO_2 by the earliest practical date. The CCAA provides districts with the authority to regulate indirect sources and mandates that air quality districts focus particular attention on reducing emissions from transportation and area-wide emission sources. Each nonattainment district is required to adopt a plan to achieve a 5 percent annual reduction, averaged over consecutive 3-year periods, in district-wide emissions of each nonattainment pollutant or its precursors. A Clean Air Plan shows how a district would reduce emissions to achieve air quality standards. Generally, the State standards for these pollutants are more stringent than the national standards.

3.1.2.2 Assembly Bill 2588, Air Toxics "Hot Spots" Information and Assessment Act

Under Assembly Bill (AB) 2588, stationary sources of air pollutants are required to report the types and quantities of certain substances their facilities routinely released into the air. The goals of the Air Toxics "Hot Spots" Information and Assessment Act are to collect emission data, identify facilities having localized impacts, determine health risks, and notify nearby residents of significant risks.

3.1.3 Regional Regulations/Standards

3.1.3.1 South Coast Air Quality Management District

The SCAQMD attains and maintains air quality conditions in the Basin through a comprehensive program of planning, regulation, enforcement, technical innovation, and promotion of the understanding of air quality issues. The clean air strategy of the SCAQMD includes preparation of plans for attainment of AAQS, adoption and enforcement of rules and regulations concerning sources of air pollution, and issuance of permits for stationary sources of air pollution. The SCAQMD also inspects stationary sources of air pollution; responds to citizen complaints; monitors ambient air quality and meteorological conditions; and implements programs and regulations required by the CAA, CAAA, and CCAA. Air quality plans applicable to the Proposed Project are discussed below.

Air Quality Management Plan. The SCAQMD and SCAG are responsible for formulating and implementing the Air Quality Management Plan (AQMP) for the Basin. The main purpose of an AQMP is to bring the area into compliance with federal and State air quality standards. The SCAQMD prepares a new AQMP every 3 years (SCAQMD 2017). CARB approved the plan on March 10, 2017, and forwarded the AQMP to the EPA.

The Final 2016 AQMP incorporates the latest scientific and technological information and planning assumptions, including the 2016 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS)[13] and updated emission inventory methodologies for various source categories. The Final 2016 AQMP includes the new and changing federal requirements, implementation of new technology measures, and continued development of economically sound, flexible compliance approaches. The AQMP also provides policies and measures to guide responsible agencies in achieving federal standards for healthful air quality in the Basin. It also incorporates a comprehensive strategy aimed at controlling pollution from all sources, including stationary sources, on-road and off-road mobile sources, and area sources.

The SCAQMD adopts rules and regulations to implement portions of the AQMP. Several of these rules may apply to project construction or operation. For example, SCAQMD Rule 403 requires the implementation of the best available fugitive dust control measure during active construction periods capable of generating fugitive dust emissions from on-site earthmoving activities, construction/demolition activities, and construction equipment travel on paved and unpaved roads (SCAQMD 2005).

Although the SCAQMD is responsible for regional air quality planning efforts, it does not have the authority to directly regulate the air quality issues associated with new development projects within the Basin, such as the Proposed Project. Instead, the SCAQMD published the *CEQA Air Quality Handbook* (SCAQMD 1993) to assist lead agencies, as well as consultants, project proponents, and other interested parties, in evaluating potential air quality impacts of projects proposed in the Basin. The *CEQA Air Quality Handbook* provides standards, methodologies, and procedures for conducting air quality analyses in Environmental Impact Reports (EIRs) and was used extensively in the

[13] On May 7, 2020, The Southern California Association of Government's Regional Council adopted Connect SoCal (2020–2045 Regional Transportation Plan/Sustainable Communities Strategy) for federal transportation conformity purposes only.

preparation of this analysis. SCAQMD is currently in the process of replacing the *CEQA Air Quality Handbook* with the *Air Quality Analysis Guidance Handbook* (SCAQMD 2019a).

The latest plan is the 2016 AQMP, which incorporates the latest scientific and technological information and planning assumptions, including the 2016 RTP/SCS and updated emission inventory methodologies for various source categories. The 2016 AQMP included the integrated strategies and measures needed to meet the NAAQS, implementation of new technology measures, and demonstrations of attainment of the 1-hour and 8-hour O_3 NAAQS as well as the latest 24-hour and annual $PM_{2.5}$ standards. Key elements of the 2016 AQMP include the following:

- Calculation and credit for co-benefits from other planning efforts (e.g., climate, energy, and transportation)
- A strategy with fair-share emission reductions at the federal, State, and local levels
- Investment in strategies and technologies meeting multiple air quality objectives
- Identification of new partnerships and significant funding for incentives to accelerate deployment of zero and near-zero technologies
- Enhanced socioeconomic assessment, including an expanded environmental justice analysis
- Attainment of the 24-hour $PM_{2.5}$ standard in 2019 with no additional measures
- Attainment of the annual $PM_{2.5}$ standard by 2025 with implementation of a portion of the O_3 strategy
- Attainment of the 1-hour O_3 standard by 2022 with no reliance on "black box" future technology (CAA Section 182(e)(5) measures)

The SCAQMD is preparing an update to the 2016 AQMP, the 2022 AQMP, which will represent a comprehensive analysis of emissions, meteorology, regional air quality modeling, regional growth projections, and the impact of existing and proposed control measures.

Rules and Regulations. All projects are subject to SCAQMD rules and regulations in effect at the time of construction. Specific rules applicable to the construction anticipated under the Proposed Project would include the following:

- **Regulation IV—Prohibitions:** This regulation sets forth the restrictions for visible emissions, odor nuisance, fugitive dust, various air pollutant emissions, fuel contaminants, start-up/shutdown exemptions, and breakdown events. These prohibitions will apply to future development facilitated by approval of the Proposed Project.
- **Rule 401—Visible Emissions.** This rule is intended to prevent the discharge of pollutant emissions from an emissions source that results in visible emissions. Specifically, the rule prohibits the discharge of any air contaminant into the atmosphere by a person from any single

source of emission for a period or periods aggregating more than 3 minutes in any 1 hour that is as dark or darker in shade than that designated as No. 1 on the Ringelmann Chart, as published by the United States Bureau of Mines.

- **Rule 402—Nuisance.** This rule is intended to prevent the discharge of pollutant emissions from an emissions source that results in a public nuisance. Specifically, this rule prohibits any person from discharging quantities of air contaminants or other material from any source such that it would result in an injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public. Additionally, the discharge of air contaminants would also be prohibited where it would endanger the comfort, repose, health, or safety of any number of persons or the public, or that cause, or have a natural tendency to cause, injury or damage to business or property. This rule does not apply to odors emanating from agricultural operations necessary for the growing of crops or the raising of fowl or animals.

- **Rule 403—Fugitive Dust.** This rule is intended to reduce the amount of PM entrained in the ambient air as a result of anthropogenic (man-made) fugitive dust sources by requiring actions to prevent, reduce, or mitigate fugitive dust emissions. This rule prohibits emissions of fugitive dust from any active operation, open storage pile, or disturbed surface area that remains visible beyond the emission source property line. Rule 403 applies to any activity or man-made condition capable of generating fugitive dust and requires best available control measures to be applied to earth moving and grading activities. These requirements include submittal of a dust control plan, maintaining dust control records, and designating a SCAQMD-certified dust control supervisor.

- **Regulation XI—Source Specific Standards:** Regulation XI sets emissions standards for different sources:

    - **Rule 1157—PM_{10} Emissions from Aggregate and Related Operations.** This rule is intended to reduce fugitive dust emissions from the aggregate and related haul road operations. Rule 1175 applies to any activity or man-made condition capable of generating fugitive dust and requires best available control measures to be applied to aggregate processing activities.

    - **Rule 1186—PM_{10} Emissions from Unpaved Roads.** This rule is intended to reduce fugitive dust emissions from unpaved surface roads. Rule 1186 applies to any activity or man-made condition capable of generating fugitive dust and requires best available control measures to be applied to motor vehicle activities on unpaved surface roads.

- **Rule 1196—Clean On-Road Heavy-Duty Public Fleet Vehicles.** This rule requires public fleet operators of heavy-duty vehicles operating in the SCAQMD's jurisdiction to acquire alternative-fuel, dual-fuel, or dedicated gasoline heavy-duty vehicles when procuring or leasing these vehicles for use within the SCAQMD's jurisdiction to reduce air toxics and criteria pollutant emissions. This rule applies to all government agencies (such as federal, State, regional, county, and city governments) with 15 or more heavy-duty vehicles, any special districts (such as water, air, sanitation, and transit districts) with 15 or more heavy-duty vehicles, and school districts with 15 or more heavy-duty vehicles.

- **SCAQMD Rule 1403—Asbestos Emissions from Demolition/Renovation Activities.** The purpose of this rule is to limit emissions of asbestos, a toxic air contaminant, from structural demolition/ renovation activities. The rule requires people to notify the SCAQMD of proposed demolition/ renovation activities and to survey these structures for the presence of asbestos-containing materials. The rule also includes notification requirements for any intent to disturb asbestos-containing materials; emission control measures; and asbestos-containing material removal, handling, and disposal techniques. All proposed structural demolition activities associated with proposed project construction would need to comply with the requirements of Rule 1403.

Toxic Air Contaminants. At the local level, air pollution control or management districts may adopt and enforce CARB control measures. Under SCAQMD Regulation XIV (Toxics and Other Non-Criteria Pollutants), and in particular Rule 1401 (New Source Review), all sources that possess the potential to emit TACs are required to obtain permits from SCAQMD. Permits may be granted to these operations if they are constructed and operated in accordance with applicable regulations, including new source review standards and Airborne Toxic Control Measures (ATCMs). The SCAQMD limits emissions and public exposure to TACs through a number of programs. SCAQMD prioritizes TAC-emitting stationary sources based on the quantity and toxicity of the TAC emissions and the proximity of the facilities to sensitive receptors. The Air Toxics Control Plan (March 2000; current version revised March 26, 2004) is a planning document designed to examine the overall direction of the SCAQMD's air toxics control program. It includes development and implementation of strategic initiatives to monitor and control air toxics emissions. Control strategies that are deemed viable and are within the SCAQMD's jurisdiction will each be brought to the SCAQMD Board for further consideration through the normal public review process. Strategies that are to be implemented by other agencies will be developed in a cooperative effort, and the progress will be reported back to the Board periodically.

Cancer Risk Trends. In September 2008, the SCAQMD completed the Multiple Air Toxics Exposure Study (MATES) III (SCAQMD 2008a). MATES III is a monitoring and evaluation study conducted in the Basin and is a follow-up to previous air toxics studies. The study consists of several elements, including a monitoring program, an updated emissions inventory of TACs, and a modeling effort to characterize risk across the Basin. The study focuses on the carcinogenic risk from exposure to air toxics. However, it does not estimate mortality or other health effects from particulate exposures. MATES III shows that the immediate region around the Project area has an estimated carcinogenic risk ranging from 93 to 112 in a million.

In 2015, the SCAQMD published an in-depth analysis of the TACs and the resulting health risks for all of Southern California, MATES IV (SCAQMD 2015a), which showed that the cancer risk has decreased less than 50 percent since MATES III. Based on the MATES IV Estimated Risk model, the geographic grid containing the Project site is predicted to have an excess cancer risk of ranging from 188 to 210 in 1 million. DPM is included in this cancer risk along with all other TAC sources. DPM accounts for 68 percent of the total risk shown in MATES IV. Cumulative Project-generated TACs are limited to DPM.

3.2 ENERGY REGULATORY SETTING

Federal and State agencies regulate energy use and consumption through various means and programs. On the federal level, the United States Department of Transportation, the United States Department of Energy, and the EPA are three federal agencies with substantial influence over energy policies and programs. Generally, federal agencies influence and regulate transportation energy consumption through establishment and enforcement of fuel economy standards for automobiles and light trucks, through funding of energy related research and development projects, and through funding for transportation infrastructure improvements. On the state level, the California Public Utilities Commission (CPUC) and the CEC are two agencies with authority over different aspects of energy.

The CPUC regulates privately owned electric, natural gas, telecommunications, water, railroad, rail transit, and passenger transportation companies and serves the public interest by protecting consumers and ensuring the provision of safe, reliable utility service and infrastructure at reasonable rates, with a commitment to environmental enhancement and a healthy California economy.

The CEC is the state's primary energy policy and planning agency. The CEC forecasts future energy needs, promotes energy efficiency, supports energy research, develops renewable energy resources and plans for/directs state response to energy emergencies. Some of the more relevant federal and state energy-related laws and plans are discussed below.

3.2.1 Federal Regulations/Standards

3.2.1.1 Energy Independence and Security Act of 2007

The Energy Independence and Security Act of 2007 Updated (Public Law 110-140) seeks to provide the nation with greater energy independence and security by increasing the production of clean renewable fuels; improving vehicle fuel economy; and increasing the efficiency of products, buildings, and vehicles. It also seeks to improve the energy performance of the federal government. The Act sets increased CAFE standards; the Renewable Fuel Standard; appliance energy efficiency standards; building energy efficiency standards; and accelerated research and development tasks on renewable energy sources (e.g., solar energy, geothermal energy, and marine and hydrokinetic renewable energy technologies), carbon capture, and sequestration.

3.2.2 State Regulations/Standards

3.2.2.1 Senate Bill 1389 (2002)

In 2002, the State legislature passed Senate Bill (SB) 1389, which required the CEC to develop an integrated energy plan every 2 years for electricity, natural gas, and transportation fuels, for the California Energy Policy Report. The plan calls for the State to assist in the transformation of the transportation system to improve air quality, reduce congestion, and increase the efficient use of fuel supplies with the least environmental and energy costs. To further this policy, the plan identifies a number of strategies, including assistance to public agencies and fleet operators in implementing incentive programs for ZEVs and their infrastructure needs, and encouragement of urban designs that reduce VMT and accommodate pedestrian and bicycle access.

3.2.2.2 Renewable Portfolio Standard

SB 1078 established the California Renewable Portfolio Standards (RPS) program in 2002. SB 1078 initially required that 20 percent of electricity retail sales be served by renewable resources by 2017; however, this standard has become more stringent over time. In 2006, SB 107 accelerated the standard by requiring that the 20 percent mandate be met by 2010. In April 2011, SB 2 required that 33 percent of electricity retail sales be served by renewable resources by 2020. In 2015, SB 350 established tiered increases to the Renewable Portfolio Standards of 40 percent by 2024, 45 percent by 2027, and 50 percent by 2030. In 2018, SB 100 increased the requirement to 60 percent by 2030 and required that all State's electricity to come from carbon-free resources by 2045. SB 100 took effect on January 1, 2019 (CPUC 2018).

3.3 GREENHOUSE GAS EMISSION REGULATORY SETTING

This section describes regulations related to GHG at the federal, State, and local level.

3.3.1 Federal Regulations/Standards

The United States Supreme Court ruled on April 2, 2007, in Massachusetts v. U.S. Environmental Protection Agency, that CO_2 is an air pollutant, as defined under the CAA, and that the EPA has the authority to regulate GHG emissions. After a thorough examination of the scientific evidence and careful consideration of public comments, the EPA announced on December 7, 2009, that GHGs threaten the public health and welfare of the American people. This action was a prerequisite to finalizing the EPA's final GHG emissions standards for light-duty vehicles, which were jointly proposed by the EPA and the United States Department of Transportation (USDOT) National Highway Traffic Safety Administration (NHTSA). The standards were established on April 1, 2010, for 2012 through 2016 model year vehicles and on October 15, 2012, for 2017 through 2025 model year vehicles.

3.3.1.1 Mandatory Reporting Rule of Greenhouse Gases

On January 1, 2010, the EPA started, for the first time, requiring large emitters of heat-trapping emissions to begin collecting GHG data under a new reporting system. This program covers approximately 85 percent of the nation's GHG emissions and applies to roughly 10,000 facilities. Fossil fuel and industrial GHG suppliers, motor vehicle and engine manufacturers, and facilities that emit GHGs equivalent to 25,000 MT or more of CO_2e per year will be required to report GHG emissions data to the EPA annually. This reporting threshold is equivalent to the annual GHG emissions from approximately 4,600 passenger vehicles.

3.3.1.2 Corporate Average Fuel Economy Standards

The EPA and NHTSA have been working together on developing a national program of regulations to reduce GHG emissions and to improve fuel economy of light-duty vehicles. The EPA established the first-ever national GHG emissions standards under the CAA, and NHTSA established Corporate Average Fuel Economy (CAFE) standards under the Energy Policy and Conservation Act. On April 1, 2010, the EPA and NHTSA announced a joint Final Rulemaking that established standards for 2012 through 2016 model year vehicles. This was followed up on October 15, 2012, when the agencies issued a Final Rulemaking with standards for model years 2017 through 2025. On August 2, 2018,

the agencies released a notice of proposed rulemaking—the Safer Affordable Fuel-Efficient Vehicles Rule for Model Years 2021–2026 Passenger Cars and Light Trucks (SAFE Vehicles Rule). The purpose of the SAFE Vehicles Rule is "to correct the national automobile fuel economy and greenhouse gas emissions standards to give the American people greater access to safer, more affordable vehicles that are cleaner for the environment." The direct effect of the rule is to eliminate the standards that were put in place to gradually raise average fuel economy for passenger cars and light trucks under test conditions from 37 miles per gallon (mpg) in 2020 to 50 mpg in 2025.

On March 31, 2020, the EPA and the National Highway Traffic Safety Administration (NHTSA) issued the Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule (EPA 2021a) that increased the stringency of CAFE and CO_2 emissions standards by 1.5% each year through model year 2026. The current administration withdrew portions of the SAFE Rule, concluding that the SAFE Rule overstepped the agency's legal authority and finalized updated CAFE Standards for model years 2024 through 2026. The final rule establishes standards that would require an industry-wide fleet average of approximately 49 mpg for passenger cars and light trucks in model year 2026, by increasing fuel efficiency by 8 percent annually for model years 2024 and 2025, and 10 percent annually for model years 2026. The agency projects the final standards will save consumers nearly $1,400 in total fuel expenses over the lifetimes of vehicles produced in these model years and avoid the consumption of about 234 billion gallons of gas between model years 2030 to 2050. The NHTSA also projects that the standards will cut greenhouse gases from the atmosphere, reduce air pollution, and reduce the country's dependence on oil.

3.3.2 State Regulations/Standards

CARB is the lead agency for implementing climate change regulations in the State. Since its formation, CARB has worked with the public, the business sector, and local governments to find solutions to California's air pollution problems. Key efforts by the State are described below.

3.3.2.1 Assembly Bill 1493 (2002)

In a response to the transportation sector's significant contribution to California's CO_2 emissions, AB 1493 was enacted on July 22, 2002. AB 1493 requires CARB to set GHG emission standards for passenger vehicles and light-duty trucks (and other vehicles whose primary use is noncommercial personal transportation in the State) manufactured in 2009 and all subsequent model years. These standards (starting in model years 2009 to 2016) were approved by CARB in 2004, but the needed waiver of Clean Air Act Preemption was not granted by the EPA until June 30, 2009. CARB responded by amending its original regulation, now referred to as Low Emission Vehicle III, to take effect for model years starting in 2017 to 2025.

3.3.2.2 Executive Order S-3-05 (2005)

Governor Arnold Schwarzenegger signed Executive Order (EO) S-3-05 on June 1, 2005, which proclaimed that California is vulnerable to the impacts of climate change. To combat those concerns, EO S-3-05 established California's GHG emissions reduction targets, which established the following goals:

- GHG emissions should be reduced to 2000 levels by 2010;
- GHG emissions should be reduced to 1990 levels by 2020; and
- GHG emissions should be reduced to 80 percent below 1990 levels by 2050.

The Secretary of the California Environmental Protection Agency (CalEPA) is required to coordinate the efforts of various State agencies in order to collectively and efficiently reduce GHGs. A biannual progress report must be submitted to the Governor and State Legislature disclosing the progress made toward GHG emission reduction targets. In addition, another biannual report must be submitted illustrating the impacts of global warming on California's water supply, public health, agriculture, the coastline, and forestry, and report possible mitigation and adaptation plans to address these impacts.

The Secretary of CalEPA leads the Climate Action Team (CAT) made up of representatives from State agencies as well as numerous other boards and departments. The CAT members work to coordinate statewide efforts to implement global warming emission reduction programs and the State's Climate Adaptation Strategy. The CAT is also responsible for reporting on the progress made toward meeting the statewide GHG targets that were established in EO S-3-05 and further defined under AB 32, the "Global Warming Solutions Act of 2006". The first CAT report to the Governor and Legislature was released in March 2006; it laid out 46 specific emission reduction strategies for reducing GHG emissions and reaching the targets established in EO S-3-05. The most recent CAT report to the Governor and Legislature was released in December 2010 (CalEPA 2010).

3.3.2.3 Assembly Bill 32 (2006), California Global Warming Solutions Act

California's major initiative for reducing GHG emissions is AB 32, which was passed by the State legislature on August 31, 2006. This effort aimed at reducing GHG emissions to 1990 levels by 2020. CARB established the level of GHG emissions in 1990 at 427 MMT CO_2e. The emissions target of 427 MMT requires the reduction of 169 MMT from the State's projected business-as-usual 2020 emissions of 596 MMT. AB 32 requires CARB to prepare a Scoping Plan that outlines the main State strategies for meeting the 2020 deadline and to reduce GHGs that contribute to global climate change. The Scoping Plan was approved by CARB on December 11, 2008, and contains the main strategies that California implemented to achieve the reduction of approximately 169 MMT CO_2e, or approximately 30 percent, from the State's projected 2020 emissions level of 596 MMT CO_2e under a business-as-usual scenario (this is a reduction of 42 MMT CO_2e, or almost 10 percent from 2002–2004 average emissions). The Scoping Plan also includes CARB-recommended GHG reductions for each emissions sector of the State's GHG inventory. The Scoping Plan calls for the largest reductions in GHG emissions to be achieved by implementing the following measures and standards:

- Improved emissions standards for light-duty vehicles (estimated reductions of 31.7 MMT CO_2e);
- The Low-Carbon Fuel Standard (15.0 MMT CO_2e);
- Energy efficiency measures in buildings and appliances, and the widespread development of combined heat and power systems (26.3 MMT CO_2e); and
- A renewable portfolio standard for electricity production (21.3 MMT CO_2e).

The Scoping Plan identifies 18 emission reduction measures that address cap-and-trade programs, vehicle gas standards, energy efficiency, low carbon fuel standards, renewable energy, regional transportation-related GHG targets, vehicle efficiency measures, goods movement, solar roof programs, industrial emissions, high-speed rail, green building strategies, recycling, sustainable forests, water, and air. The measures would result in a total reduction of 174 MMT CO_2e by 2020.

On August 24, 2011, CARB unanimously approved the new supplemental assessment and reapproved its Scoping Plan, which provides the overall roadmap and rule measures to carry out AB 32. CARB also approved a more robust CEQA equivalent document supporting the supplemental analysis of the cap-and-trade program. The cap-and-trade took effect on January 1, 2012, with an enforceable compliance obligation that began on January 1, 2013.

CARB has not yet determined what amount of GHG reductions it recommends from local government operations and local land use decisions; however, the Scoping Plan states that land use planning and urban growth decisions will play an important role in the State's GHG reductions because local governments have primary authority to plan, zone, approve, and permit how land is developed to accommodate population growth and the changing needs of their jurisdictions (meanwhile, CARB is also developing an additional protocol for community emissions). CARB further acknowledges that decisions on how land is used will have large impacts on the GHG emissions that will result from the transportation, housing, industry, forestry, water, agriculture, electricity, and natural gas emission sectors. With regard to land use planning, the Scoping Plan expects an approximately 5.0 MMT CO_2e reduction due to implementation of SB 375.

In addition to reducing GHG emissions to 1990 levels by 2020, AB 32 directed CARB and the CAT to identify a list of "discrete early-action GHG reduction measures" that could be adopted and made enforceable by January 1, 2010. On January 18, 2007, Governor Schwarzenegger signed EO S-1-07, further solidifying California's dedication to reducing GHGs by setting a new Low Carbon Fuel Standard. EO S-1-07 sets a target to reduce the carbon intensity of California transportation fuels by at least 10 percent by 2020 and directs CARB to consider the Low Carbon Fuel Standard as a discrete early action measure. In 2011, U.S. District Court Judge Lawrence O'Neil issued an injunction preventing implementation of the Low Carbon Fuel Standard, ruling that it is unconstitutional. In 2012, the Ninth Circuit Court of Appeals (Ninth Circuit) stayed the District Court's injunction, allowing implementation of the Low Carbon Fuel Standard. The Ninth Circuit decided to uphold the Low Carbon Fuel Standard.

In June 2007, CARB approved a list of 37 early-action measures, including three discrete early-action measures (Low Carbon Fuel Standard, Restrictions on GWP Refrigerants, and Landfill CH_4 Capture, CARB 2007a). Discrete early-action measures are measures that were required to be adopted as regulations and made effective no later than January 1, 2010, which is the date established by Health and Safety Code Section 38560.5. CARB adopted additional early-action measures in October 2007 that tripled the number of discrete early-action measures. These measures relate to truck efficiency, port electrification, reduction of PFCs from the semiconductor industry, reduction of propellants in consumer products, proper tire inflation, and SF_6 reductions from the non-electricity sector. The combination of early-action measures is estimated to reduce statewide GHG emissions by nearly 16 MMT (CARB 2007b).

CARB approved the First Update to the Climate Change Scoping Plan on May 22, 2014 (CARB 2014a). The First Update identifies opportunities to leverage existing and new funds to further drive GHG emission reductions through strategic planning and targeted low carbon investments. The First Update defines CARB climate change priorities until 2020 and also sets the groundwork to reach long-term goals set forth in EO S-3-05 and EO B-16-2012. The Update highlights California's progress toward meeting the "near-term" 2020 GHG emission reduction goals as defined in the initial Scoping Plan. It also evaluates how to align the State's "longer-term" GHG reduction strategies with other State policy priorities for water, waste, natural resources, clean energy, transportation, and land use. CARB released a Second Update to the Scoping Plan, the 2017 Scoping Plan (CARB 2017), to reflect the 2030 target set by EO B-30-15 and codified by SB 32.

CARB is currently working on an update to the 2017 Scoping Plan, which will be released this year. The 2022 Scoping Plan Update will assess progress towards achieving the SB 32 2030 target and lay out a path to achieve carbon neutrality no later than 2045.

3.3.2.4 Senate Bill 97 (2007)

SB 97, signed by Governor Schwarzenegger in August 2007 (Chapter 185, Statutes of 2007; and Public Resources Code Sections 21083.05 and 21097), acknowledges that climate change is a prominent environmental issue that requires analysis under CEQA. This bill directed the Governor's Office of Planning and Research (OPR) to prepare, develop, and transmit to the California Natural Resources Agency guidelines for mitigating GHG emissions or the effects of GHG emissions, as required by CEQA.

The California Natural Resources Agency adopted the amendments to the *State CEQA Guidelines* in November 2018, which then went into effect in December 2018. The amendments do not identify a threshold of significance for GHG emissions, nor do they prescribe assessment methodologies or specific mitigation measures. The amendments encourage lead agencies to consider many factors in performing a CEQA analysis, but preserve the discretion granted by CEQA to lead agencies in making their own determinations based on substantial evidence. The amendments also encourage public agencies to make use of programmatic mitigation plans and programs when they perform individual project analyses.

3.3.2.5 Senate Bill 375 (2008)

Signed into law on October 1, 2008, SB 375 supplements GHG reductions from new vehicle technology and fuel standards with reductions from more efficient land use patterns and improved transportation. Under the law, the CARB approved GHG reduction targets in February 2011 for California's 18 federally designated regional planning bodies, known as MPOs. The CARB may update the targets every 4 years and must update them every 8 years. MPOs in turn must demonstrate how their plans, policies and transportation investments meet the targets set by the CARB through SCS. The SCS are included with the RTP, a report required by State law. However, if an MPO finds that their SCS will not meet the GHG reduction target, they may prepare an Alternative Planning Strategy (APS). The APS identifies the impediments to achieving the targets.

3.3.2.6 Executive Order B-30-15 (2015)

Governor Jerry Brown signed EO B-30-15 on April 29, 2015, which added the immediate target of:

- GHG emissions should be reduced to 40 percent below 1990 levels by 2030.

All State agencies with jurisdiction over sources of GHG emissions were directed to implement measures to achieve reductions of GHG emissions to meet the 2030 and 2050 targets. CARB was directed to update the AB 32 Scoping Plan to reflect the 2030 target and is therefore moving forward with the update process. The mid-term target is critical to help frame the suite of policy measures, regulations, planning efforts, and investments in clean technologies and infrastructure needed to continue reducing emissions.

3.3.2.7 Senate Bill 350 (2015) Clean Energy and Pollution Reduction Act

SB 350, signed by Governor Jerry Brown on October 7, 2015, updates and enhances AB 32 by introducing the following set of objectives in clean energy, clean air, and pollution reduction for 2030:

- Raise California's renewable portfolio standard from 33 percent to 50 percent; and
- Increase energy efficiency in buildings by 50 percent by the year 2030.

The 50 percent renewable energy standard will be implemented by the California Public Utilities Commission for private utilities and by the California Energy Commission for municipal utilities. Each utility must submit a procurement plan showing it will purchase clean energy to displace other non-renewable resources. The 50 percent increase in energy efficiency in buildings must be achieved through the use of existing energy efficiency retrofit funding and regulatory tools already available to State energy agencies under the existing law. The addition made by this legislation requires State energy agencies to plan for and implement those programs in a manner that achieves the energy efficiency target.

3.3.2.8 Senate Bill 32, California Global Warming Solutions Act of 2016, and Assembly Bill 197

In summer 2016, the Legislature passed and the Governor signed SB 32 and AB 197. SB 32 affirms the importance of addressing climate change by codifying into statute the GHG emissions reductions target of at least 40 percent below 1990 levels by 2030 contained in Governor Brown's April 2015 EO B-30-15. SB 32 builds on AB 32 and keeps us on the path toward achieving the State's 2050 objective of reducing emissions to 80 percent below 1990 levels, consistent with an IPCC analysis of the emissions trajectory that would stabilize atmospheric GHG concentrations at 450 parts per million CO_2e and reduce the likelihood of catastrophic impacts from climate change.

AB 197, the companion bill to SB 32, provides additional direction to CARB related to the adoption of strategies to reduce GHG emissions. Additional direction in AB 197 meant to provide easier public access to air emissions data collected by CARB was posted in December 2016.

3.3.2.9 Senate Bill 100

On September 10, 2018, Governor Brown signed SB 100, which raises California's RPS requirements to 60 percent by 2030, with interim targets, and 100 percent by 2045. The bill also establishes a State policy that eligible renewable energy resources and zero-carbon resources supply 100 percent of all retail sales of electricity to California end-use customers and 100 percent of electricity procured to serve all State agencies by December 31, 2045. Under SB 100, the State cannot increase carbon emissions elsewhere in the western grid or allow resource shuffling to achieve the 100 percent carbon-free electricity target.

3.3.2.10 Executive Order B-55-18

EO B-55-18, signed September 10, 2018, sets a goal "to achieve carbon neutrality as soon as possible, and no later than 2045, and achieve and maintain net negative emissions thereafter." EO B-55-18 directs CARB to work with relevant State agencies to ensure that future Scoping Plans identify and recommend measures to achieve the carbon neutrality goal. The goal of carbon neutrality by 2045 is in addition to other statewide goals, meaning not only should emissions be reduced to 80 percent below 1990 levels by 2050, but that, by no later than 2045, the remaining emissions should be offset by equivalent net removals of CO_2e from the atmosphere, including through sequestration in forests, soils, and other natural landscapes.

3.3.2.11 Assembly Bill 75

AB 75 was passed in 1999 and mandates State agencies to develop and implement an integrated waste management plan to reduce GHG emissions related to solid waste disposal. In addition, the bill mandates that community service districts providing solid waste services report the disposal and diversion information to the appropriate city, county, or regional jurisdiction. Since 2004, the bill requires diversion of at least 50 percent of the solid waste from landfills and transformation facilities, and submission to the California Department of Resources Recycling and Recovery (CalRecycle; formerly known as the California Integrated Waste Management Board) of an annual report describing the diversion rates.

3.3.2.12 Assembly Bill 341

In 2011, the State legislature enacted AB 341, increasing the diversion target to 75 percent statewide. AB 341 also requires the provision of recycling service to commercial and residential facilities that generate 4 cy or more of solid waste per week. In addition, multifamily apartments with five or more units are also required to implement a recycling program. The final regulation was approved by the Office of Administrative Law on May 7, 2012, and went into effect on July 1, 2012.

3.3.3 Regional Regulations/Standards

3.3.3.1 South Coast Air Quality Management District

In 2008, SCAQMD formed a Working Group to identify GHG emissions thresholds for land use projects that could be used by local lead agencies in the Basin. The Working Group developed several different options that are contained in the SCAQMD 2008 draft guidance document titled *Interim CEQA GHG Significance Threshold for Stationary Sources, Rules and Plans* (SCAQMD 2008b) that could be applied by lead agencies. On September 28, 2010, SCAQMD Working Group Meeting

#15 provided further guidance, including a tiered approach for evaluating GHG emissions for development projects where SCAQMD is not the lead agency (SCAQMD 2010). The SCAQMD has not presented a finalized version of these thresholds to the governing board.

The SCAQMD identifies the emissions level for which a project would not be expected to substantially conflict with any State legislation adopted to reduce statewide GHG emissions. As such, the utilization of a service population represents the rates of emissions needed to achieve a fair share of the State's mandated emissions reductions. Overall, SCAQMD identifies a GHG efficiency level that, when applied statewide or to a defined geographic area, would meet the year 2020 and post-2020 emissions targets as required by AB 32 and SB 32. If projects are able to achieve targeted rates of emissions per the service population, the State will be able to accommodate expected population growth and achieve economic development objectives, while also abiding by AB 32's emissions target and future post-2020 targets.

3.3.3.2 Southern California Association of Governments

SCAG is a regional council consisting of the following six counties: Imperial, Los Angeles, Orange, Riverside, San Bernardino, and Ventura. In total, the SCAG region encompasses 191 cities and over 38,000 square miles within Southern California. SCAG is the MPO serving the region under federal law and serves as the Joint Powers Authority, the Regional Transportation Planning Agency, and the Council of Governments under State law. As the Regional Transportation Planning Agency, SCAG prepares long-range transportation plans for the Southern California region, including RTP/SCS and the 2008 Regional Comprehensive Plan (RCP).

On September 3, 2020, SCAG adopted Connect SoCal–The 2020–2045 Regional Transportation Plan/Sustainable Communities Strategy (2020–2045 RTP/SCS) (SCAG 2020). In general, the SCS outlines a development pattern for the region, which, when integrated with the transportation network and other transportation measures and policies, would reduce vehicle miles traveled (VMT) from automobiles and light-duty trucks and thereby reduce GHG emissions from these sources. For the SCAG region, CARB has set GHG reduction targets at 8 percent below 2005 per capita emissions levels by 2020, and 19 percent below 2005 per capita emissions levels by 2035. The RTP/SCS lays out a strategy for the region to meet these targets. Overall, the SCS is meant to provide growth strategies that will achieve the regional GHG emissions reduction targets. Land use strategies to achieve the region's targets include planning for new growth around high-quality transit areas and livable corridors and creating neighborhood mobility areas to integrate land use and transportation and plan for more active lifestyles (SCAG 2020). However, the SCS does not require that local General Plans, Specific Plans, or zoning be consistent with the SCS; instead, it provides incentives to governments and developers for consistency.

3.3.3.3 Rancho California Water District 2017 Strategic Plan

The 2017 Strategic Plan is consistent with the 2014 California Water Action Plan, which furthers implementation of California's Climate Change Scoping Plan for reducing GHG emissions.

The 2017 Strategic Plan underscores the importance of continued implementation of RCWD's Water Shortage Contingency Plan, Water Use Efficiency Program, and Drought Communications Plan.

The measures proposed in RCWD's 2017 Strategic Plan build on inventory results and key opportunities prioritized by RCWD staff, other member agencies of the Western Riverside Council of Governments (WRCOG), and members of the public. The strategies in the plan consist of measures that identify the steps needed to support reductions in GHG emissions. All standards presented in the plan respond to the needs of development, avoiding unnecessary regulation, streamlining new development, and achieving a more efficient use of resources (RCWD 2017).

3.3.3.4 County of Riverside Climate Action Plan

The County of Riverside CAP (December 8, 2015) was designed under the premise that the County of Riverside, and the community it represents, is uniquely capable of addressing emissions associated with sources under Riverside County's jurisdiction, and that Riverside County's emission reduction efforts should coordinate with the state strategies of reducing emissions in order to accomplish these reductions in an efficient and cost-effective manner. The County of Riverside Climate Action Plan Update, November 2019 (CAP Update) establishes GHG emission reduction programs and regulations that correlate with and support evolving State GHG emissions reduction goals and strategies. The CAP Update includes reduction targets for year 2030 and year 2050. These reduction targets require the County to reduce emissions by at least 525,511 MT CO_2e below the 1990 scenario by 2030 and at least 2,982,948 MT CO_2e below the 1990 scenario by 2050 (CAP Update, p.7-1) To evaluate consistency with the CAP Update, the County has implemented CAP Update Screening Tables (Screening Tables) to aid in measuring the reduction of GHG emissions attributable to certain design and construction measures incorporated in development projects. To this end, the Screening Tables establish categories of GHG Implementation Measures. Under each Implementation Measure category, mitigation or project design features are assigned point values that correspond to the minimum GHG emissions reduction that would result from each feature. Projects that yield at least 100 points are considered to be consistent with the GHG emissions reduction quantities anticipated in the County's GHG Technical Report and support the GHG emissions reduction targets established under the CAP Update. The potential for such projects to generate direct or indirect GHG emissions that would result in a significant impact on the environment; or conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of GHGs would be considered less than significant. However, since the RCWD is the lead agency for the Proposed Project, not the County, the County's CAP would not apply.

4.0 SETTING

4.1 CLIMATE/METEOROLOGY

Air quality in the planning area is affected not only by various emission sources (e.g., mobile and industry) but also by atmospheric conditions (e.g., wind speed, wind direction, temperature, and rainfall). The combination of topography, low mixing height, abundant sunshine, and emissions from the second-largest urban area in the United States gives the Basin some of the worst air pollution in the nation.

The annual average temperature varies little throughout the Basin, ranging from the low to middle 60s, measured in degrees Fahrenheit (°F). With a more pronounced oceanic influence, coastal areas show less variability in annual minimum and maximum temperatures than inland areas. The climatological station closest to the site with complete weather data is the Elsinore Station, which provides sufficient data for average temperatures in the Project area. The Elsinore Station (WRCC 2020) shows that the monthly average maximum temperature recorded ranged from 65.4°F in January to 98.1°F in August, with an annual average maximum of 80.6°F. The monthly average minimum temperature recorded at this station ranged from 36.4°F in January to 59.8°F in August, with an annual average minimum of 47.2°F. January is typically the coldest month, and July and August are typically the warmest months in this area of the Basin.

The majority of annual rainfall in the Basin occurs between November and April. Summer rainfall is minimal and is generally limited to scattered thundershowers in coastal regions and slightly heavier showers in the eastern portion of the Basin and along the coastal side of the mountains. Elsinore Station monitored precipitation shows that average monthly rainfall varied from 2.54 inches in February to 0.51 inch or less from May to October, with an annual total of 12.01 inches. Patterns in monthly and yearly rainfall totals are unpredictable due to fluctuations in the weather.

The Basin experiences a persistent temperature inversion (increasing temperature with increasing altitude) as a result of the Pacific high. This inversion limits the vertical dispersion of air contaminants, holding them relatively near the ground. As the sun warms the ground and the lower air layer, the temperature of the lower air layer approaches the temperature of the base of the inversion (upper) layer until the inversion layer finally breaks, allowing vertical mixing with the lower layer. This phenomenon is observed in mid-afternoon to late afternoon on hot summer days, when the smog appears to clear up suddenly. Winter inversions frequently break by mid-morning.

Winds in the vicinity of the Project area blow predominantly from the south-southwest, with relatively low velocities. Wind speeds in the Project area average about 3 miles per hour (mph). Summer wind speeds average slightly higher than winter wind speeds. Low average wind speeds, together with a persistent temperature inversion, limit the vertical dispersion of air pollutants throughout the Basin. Strong, dry, north, or northeasterly winds, known as Santa Ana winds, occur during the fall and winter months, dispersing air contaminants. The Santa Ana conditions tend to last for several days at a time.

The nearest representative meteorological station that provides American Meteorological Society/ Environmental Protection Agency Regulatory Model (AERMOD)-ready meteorological data is the Meteorological Station at Lake Elsinore, about 15 miles northwest from the Project site (SCAQMD 2018a). Figure 4-1 shows the windrose from data measured at this station and shows the wind patterns for the Project area. A wind rose is a graphic tool used by meteorologists to give a succinct view of how wind speed and direction are typically distributed at a particular location. The frequency of winds over a time period is plotted by wind direction, with color bands showing wind speed ranges. The direction of the longest spoke shows the wind direction with the greatest frequency. Low wind speeds are marked in red to yellow. Higher wind speeds are marked in green to blue. The Lake Elsinore wind rose indicated the dominant wind directions and the direction of strongest wind speeds are from the north-northwest direction.

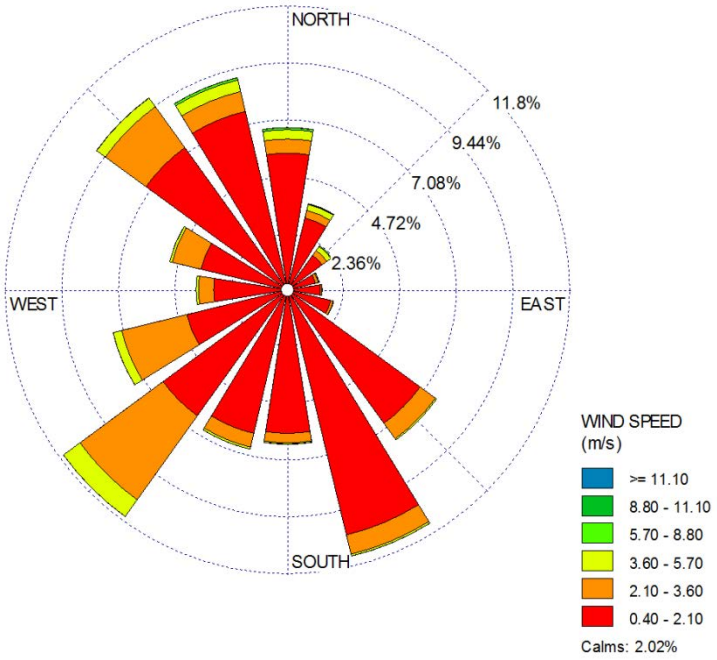


Figure 4-1: Project Area Wind Patterns

The combination of stagnant wind conditions and low inversions produces the greatest pollutant concentrations. On days of no inversion or high wind speeds, ambient air pollutant concentrations are the lowest. During periods of low inversions and low wind speeds, air pollutants generated in urbanized areas are transported predominantly on shore into Riverside and San Bernardino Counties. In the winter, the greatest pollution problems are CO and NO_X because of extremely low inversions and air stagnation during the night and early morning hours. In the summer, the longer daylight hours and the brighter sunshine combine to cause a reaction between hydrocarbons and NO_X to form photochemical smog.

4.2 AIR POLLUTION CONSTITUENTS AND ATTAINMENT STATUS

CARB oversees activities of local air quality management agencies and maintains air quality monitoring stations throughout the State in conjunction with the EPA and local air districts. CARB has divided the State into 15 air basins based on meteorological and topographical factors of air pollution. Data collected at these stations are used by CARB and the EPA to classify air basins as attainment, nonattainment, nonattainment-transitional, or unclassified, based on air quality data for the most recent 3 calendar years compared with the AAQS.

Attainment areas may be one of the following:

- *Attainment/unclassified ("unclassifiable" in some lists)* Such areas have never violated the air quality standard of interest or do not have enough monitoring data to establish attainment or nonattainment status.

- *Attainment/maintenance (NAAQS only).* Such areas had violated a NAAQS that is currently in use (were nonattainment) in or after 1990 but now attain the standard and are officially redesignated as attainment by the EPA with a maintenance State Implementation Plan (SIP).

- *Attainment (usually for CAAQS but sometimes for NAAQS).* Such areas have adequate monitoring data to show attainment, have never been nonattainment, or, for NAAQS, have completed the official maintenance period.

Nonattainment areas are imposed with additional restrictions as required by the EPA. The air quality data are also used to monitor progress in attaining air quality standards. Table 4.A lists the attainment status for the criteria pollutants in the Basin.

Table 4.A: Attainment Status of Criteria Pollutants in the South Coast Air Basin

Pollutant	State	Federal
O_3	Nonattainment (1-hour) Nonattainment (8-hour)	Extreme Nonattainment (1-hour) Extreme Nonattainment (8-hour)
PM_{10}	Nonattainment (24-hour & Annual)	Attainment/Maintenance (24-hour)
$PM_{2.5}$	Nonattainment (Annual)	Serious Nonattainment (24-hour) Serious Nonattainment (Annual)
CO	Attainment (1-hour & 8-hour)	Attainment/Maintenance (1-hour & 8-hour)
NO_2	Attainment (1-hour & Annual)	Attainment/Unclassified (1-hour) Attainment/Maintenance (Annual)
SO_2	Attainment (1-hour & 24-hour)	Designations Pending (1-hour) Attainment/Unclassified (24-hour & Annual)
Lead	Attainment[1] (30-day average)	Attainment[1] (3-month rolling)
All Others	Attainment/Unclassified	N/A

Source: State and Federal Area Designations (CARB 2019).

[1] Only in Los Angeles County. All other counties in California are in attainment.

CO = carbon monoxide
N/A = not applicable
NO_2 = nitrogen dioxide
O_3 = ozone
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
PM_{10} = particulate matter less than 10 microns in size
SO_2 = sulfur dioxide

4.3 LOCAL AIR QUALITY

The SCAQMD, together with CARB, maintains ambient air quality monitoring stations in the Basin. The air quality monitoring stations closest to the site are the Temecula Monitoring Station and Lake Elsinore Monitoring Station, which monitor criteria air pollutant data. The air quality trends from these stations are used to represent the ambient air quality in the Project area. The pollutants monitored are CO, O_3, PM_{10}, $PM_{2.5}$, NO_2, and SO_2 (EPA 2021b; CARB 2021b). The ambient air quality data in Table 4.B show that NO_2, SO_2, and CO levels are within the applicable State and federal standards. As detailed in Table 4.B, the State 1-hour O_3 standard was exceeded 2 times per year in the past 3 years. The State and federal 8-hour O_3 standard was exceeded 3 to 20 times per year in the past 3 years.

4.4 GREENHOUSE GAS EMISSIONS SOURCES AND INVENTORIES

An emissions inventory that identifies and quantifies the primary human-generated sources and sinks of GHGs is a well-recognized and useful tool for addressing climate change. This section summarizes the latest information on national, State, and local GHG emission inventories.

4.4.1 United States Emissions

In 2019, the United States emitted approximately 5.58 billion MT CO_2e. Total emissions have increased by 2.0 percent from 1990 to 2019, down from a high of 15.7 percent above 1990 levels in 2007. Emissions decreased from 2018 to 2019 by 1.7 percent. This decrease was largely driven by the decrease in CO_2 emissions from fossil fuel combustion. The decrease in CO_2 emissions from fossil fuel combustion was a result of a 1.3 percent decrease in total energy use and reflects a continued shift from coal to less carbon intensive natural gas and renewables (EPA 2021a).

4.4.2 State of California Emissions

According to CARB emission inventory estimates, the State emitted approximately 425.3 million MT CO_2e (MMT CO_2e) emissions in 2018. This is an increase of 0.8 MMT CO_2 e from 2017 and 6 MMT CO_2e below the 2020 target of 431 MMT CO_2e (CARB 2019). Statewide GHG emissions dropped below the 2020 GHG limit in 2016 and have remained below the 2020 GHG limit since then.

The transportation sector remains the largest source of GHG emissions, accounting for 39.9 percent (CARB 2019), followed by electricity generation (both in-state and out-of-state) at 14.8 percent and industrial sources at 21.0 percent. The remaining sources of GHG emissions were residential and commercial activities at 9.7 percent, agriculture at 7.7 percent, high-GWP gases at 4.8 percent, and recycling and waste at 2.1 percent (CARB 2019).

4.4.3 County of Riverside Emissions

Riverside County as a whole emitted 4,905,518 MT CO_2e in 2017 (County 2019). The largest portion of Riverside County's 2017 emissions were from transportation (36 percent), followed by agriculture (34 percent), and electricity and natural gas use in buildings (24 percent). In order to keep the County in line with the State's reduction goals, the following targets are set for Riverside County.

Table 4.B: Ambient Air Quality Monitored in the Project Vicinity

Pollutant	Standard	2019	2020	2021
Carbon Monoxide (CO)—Lake Elsinore Monitoring Station				
Maximum 1-hr concentration (ppm)		1.3	0.9	0.9
Number of days exceeded:	State: >20 ppm	0	0	0
	Federal: >35 ppm	0	0	0
Maximum 8-hr concentration (ppm)		0.7	0.7	0.8
Number of days exceeded:	State: ≥9.0 ppm	0	0	0
	Federal: ≥9.0 ppm	0	0	0
Ozone (O_3)—Temecula Monitoring Station				
Maximum 1-hour concentration (ppm)		0.085	0.104	0.087
Number of days exceeded:	State: >0.09 ppm	ND	2	0
Maximum 8-hr concentration (ppm)		0.075	0.080	0.078
Number of days exceeded:	State: >0.07 ppm	ND	20	3
	Federal: >0.07 ppm	3	20	3
Coarse Particulates (PM_{10})—Lake Elsinore Monitoring Station				
Maximum 24-hour concentration (µg/m³)		93.8	192.4	90.0
Number of days exceeded:	State: >50 µg/m³	ND	ND	ND
	Federal: >150 µg/m³	0	1	0
Annual arithmetic average concentration (µg/m³)		19.7	23.7	22.4
Exceeded for the year:	State: >20 µg/m³	ND	ND	ND
Fine Particulates ($PM_{2.5}$)— Lake Elsinore Monitoring Station				
Maximum 24-hour concentration (µg/m³)		17.6	41.6	28.8
Number of days exceeded:	Federal: >35 µg/m³	0	ND	0
Annual arithmetic average concentration (µg/m³)		ND	7.2	6.9
Exceeded for the year:	State: >12 µg/m³	ND	No	No
	Federal: >15 µg/m³	ND	No	No
Sulfur Dioxide (SO_2) —Riverside-Rubidoux Monitoring Station				
Maximum 1-hour concentration (ppm)		0.0018	0.0022	0.0021
Number of days exceeded:	State: >0.25 ppm	0	0	0
Maximum 24-hour concentration (ppm)		0.0009	0.001	0.0011
Number of days exceeded:	State: >0.04 ppm	0	0	0
	Federal: >0.014 ppm	0	0	0
Annual arithmetic average concentration (ppm)		0.00042	0.00034	0.00051
Exceeded for the year:	Federal: >0.030 ppm	No	No	No
Nitrogen Dioxide (NO_2)—Lake Elsinore Monitoring Station				
Maximum 1-hour concentration (ppb)		38.0	43.0	43.0
Number of days exceeded:	State: >180 ppb	0	0	0
Annual arithmetic average concentration (ppb)		6.0	7.0	7.0
Exceeded for the year:	State: >30 ppb	No	No	No
	Federal: >53 ppb	No	No	No

Sources: Air Data: Air Quality Data Collected at Outdoor Monitors across the U.S. (EPA 2021b); iADAM Air Quality Data Statistics (CARB 2021b).

µg/m³ = micrograms per cubic meter
CO = carbon monoxide
N/A = not applicable
NO_2 = nitrogen dioxide
O_3 = ozone
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
PM_{10} = particulate matter less than 10 microns in size
ppb = parts per billion
ppm = parts per million
SO_2 = sulfur dioxide

In the year 2020, the County would not need to make any additional CO_2e emissions reductions, as State and local policies will be sufficient to meet the targets. In the year 2030, the County would need to reduce emissions by 525,511 MT CO_2e annually below the 1990 scenario to meet the State-aligned target. In 2050, the County would need to reduce emissions by 2,982,947 MT CO_2e annually below the 1990 scenario to meet the State-aligned target (County 2019).

5.0 METHODOLOGY

5.1 CONSTRUCTION ACTIVITIES AND EMISSION SOURCES

The air quality and greenhouse gas emission analyses are based on the *Construction Information for the Vail Dam Rehabilitation Project* (AECOM 2020), which provides assumptions and estimates for heavy equipment use, personnel requirements, truck traffic, and grading, materials handling, import, and soil storage for each construction component and scenario. Project-specific data, including construction equipment lists and the construction schedule, were used to develop and evaluate the maximum daily and total construction emissions estimates for construction of the Proposed Project. For analysis purposes, construction for the Proposed Project was divided into 14 major construction phases, as follows:

- Phase 1: Mobilization Layout Work for the New Concrete Gravity Dam
- Phase 2: Access Road and Staging Areas
- Phase 3: Demolition of Facilities at the New Dam
- Phase 4: Foundation Excavation
- Phase 5: Temporary Energy Dissipation Vault
- Phase 6: Armor Spillway
- Phase 7: Foundation Treatment and Grouting
- Phase 8: Roller-Compacted Concrete Placement
- Phase 9: Outlet Tower
- Phase 10: Dam Drainage
- Phase 11: Dam Instrumentation
- Phase 12: Permanent Energy Dissipation Vault
- Phase 13: Demolition of the Existing Facilities
- Phase 14: Site Reclamation and Demobilization

Emission estimates have been prepared for the individual construction phases listed above to evaluate the maximum construction emissions. To evaluate the maximum daily and total construction emissions for the Project, the construction schedule, which provides month-by-month estimates of project construction and equipment requirements, was used to develop calculations of total emissions from the individual components of the Project that will be undergoing construction simultaneously. Each phase of construction would generate emissions associated with the following sources:

Equipment Operations includes, but is not limited to, the use of both heavy equipment and on-road vehicles to move material, perform road and dam work, provide dust control (e.g., use of a water truck), and conduct earthmoving activities.

Truck Trip Operations for deliveries of heavy equipment, cement, dirt, and rock materials generates mobile source emissions. Truck traffic related to delivery of supplies and construction equipment; and worker vehicle trips including the average trip distance from origin to the project site are described in the construction components in the impact section below.

Material Handling includes various activities that allow the excavation of soil and rocks, removal of dam concrete, installation of new dam concrete, storing soil material in piles, crushing rocks, and mixing concrete.

Stationary Sources include, but are not limited to, sources such as a concrete batch plant and rock crusher.

Fugitive Sources include, but are not limited to, fugitive dust from truck loading and unloading, excavation, rock blasting, rock crushers, wind erosion of soil stockpiles, and concrete batch plant.

The methodology for each of these emissions sources is discussed below.

5.1.1 Equipment Operations

Criteria pollutant and GHG emissions from dam demolition and construction activities for the new dam were calculated using the emission factors from the California Emission Factor Model, Version 2017 (EMFAC2017) and California Off-Road Emission Factor Model, Version 2017 (OFFROAD2017) models. Mobile-source emission burdens from worker vehicle trips and truck trips were calculated using VMT estimates and appropriate emission factors from EMFAC2017. The OFFROAD2017 model provides the latest emission factors for construction off-road equipment and accounts for equipment fleet population. The use of emission rates from OFFROAD2017 reflects the recommendation of CARB to capture the latest off-road construction assumptions. OFFROAD2017 default load factors (the ratio of average equipment horsepower utilized to maximum equipment horsepower) and useful life parameters were used for emission estimates. Fugitive dust emissions from dirt and aggregate handling were calculated using emission factors derived from equations from the EPA's Compilation of Air Pollutant Emission Factors (AP-42) (EPA 2011).

The emission factors that were developed for each piece of equipment are multiplied by maximum number of hours that a piece of equipment could operate in 1 day or in 1 year to estimate worst-case emissions. Peak daily and annual emissions were calculated based on the emission factors provided by the EPA, CARB, and the SCAQMD, and construction data was provided by the design engineers (AECOM 2020).

The quantity of emissions generated would depend on how much aggregate would be excavated, the equipment used, the dam construction area layout, and how far vehicles would travel to transport aggregate and concrete material. This analysis assumes maximum allowable quantities would be moved and is based on the estimated emissions for the equipment to be used.

The emission calculations were based on the assumption that equipment would be operating on site for an average of 8 hours per day, 5 days per week. For the roller compacted concrete placement activities, it is assumed that the equipment will be operating 16 hours per day, 6 days a week for up

to 12 weeks. Emission rates for employee vehicles and heavy truck operations were developed from SCAQMD references available at http://www.aqmd.gov/ceqa/hdbk.html.

EMFAC 2017 emission factors for the 2023 calendar year were assumed to be the worst-case emission rates for on-road vehicle emissions. For off-road equipment engines, consistent with the CARB's off-road emission regulations promulgated in the California Code of Regulations (CCR) Title 13 Section 2423, all off-road construction equipment would be required to meet the minimum application of EPA Tier 2 engines and install CARB-approved diesel particulate filter devices to control and minimize emissions.

5.1.2 Truck Trip Operations

Engine exhaust emissions would occur from several on-road trucks including dump trucks, concrete trucks, delivery trucks, gravel/paving trucks, and soil-hauling trucks. Water trucks, flatbed trucks, dump trucks, and various pickup trucks would also operate onsite during construction activities. Furthermore, emissions would also occur from construction workers commuting to the various construction sites within the Project area.

EMFAC2017 was used to estimate emission factors from on-road motor vehicles depending on the vehicle's gross vehicle weight rating provided in the construction details. Construction worker commuting emissions were estimated from the Basin's fleet mix for passenger automobiles and light-duty trucks. Both gasoline and diesel engines were assumed to be used by the construction workers. For purposes of this analysis the two relevant vehicle classes are: light duty truck (gasoline) and T6 instate construction heavy (diesel).

For the haul/delivery trucks and construction workers, emission factors were estimated from the aggregated speeds in the Basin (i.e., a "burden" model run), rather than a specific speed. The off-site trucks were assumed to operate at 40 mph, which is the default on-road speed for motor vehicles in the California Emissions Estimator Model (CalEEMod).[14] In addition to engine exhaust emissions, emission factors for tire wear, brake wear, and re-entrained paved road dust were also estimated. EMFAC2017 estimates tire wear and brake wear, but paved road dust emissions were estimated using AP-42 (EPA 2011).

The proposed project would also remove approximately 1,250 cubic yards of demolition debris, requiring 105 truck trips, which was evaluated in CalEEMod.

5.1.3 Material Handling

Emission rates for materials handling (truck loading/unloading of imported or exported material) were obtained from the *CEQA Air Quality Handbook* (SCAQMD 1993). The emission rates depend on

[14] South Coast Air Quality Management District (SCAQMD) Regulation XI (Rule 1186) states that operators should "limit the speed of vehicles traveling on uncontrolled unpaved access/haul roads within construction sites to a maximum of 15 miles per hour." Additionally, the SCAQMD limits traffic speeds on unpaved roads when necessary to mitigate the impact of particulate matter less than 10 microns in size (PM_{10}). However, because unmitigated emissions are less than the California Environmental Quality Act significance thresholds, it is not necessary to limit vehicular speeds.

the amount of materials being handled (in tons), the moisture content of the materials (in percent), and the mean wind speed (in mph). For this Proposed Project, it was assumed that excavated dirt had a moisture content of 5.7 percent. The wind speed was assumed to be 5 mph.

5.1.4 Stationary Sources

Emission factors for on-site stationary equipment such as the concrete batch plant and rock crusher were assumed to be in continuous daily use during the construction period.

5.1.5 Fugitive Sources

Emission rates for fugitive dust resulting from vehicle travel on unpaved roads were obtained from the *CEQA Air Quality Handbook* (SCAQMD 1993). The emission rates from a vehicle depend on the rainfall conditions of the project area, the number of wheels the vehicle has, the vehicle's weight, its speed of travel, and the silt loading of the road. For this Proposed Project, worst-case Basin/drought rainfall conditions (10 days per year) were assumed, as well as a maximum allowable vehicle speed of 25 mph and a silt loading of 7.4 percent. In addition, as identified above, fugitive sources include, but are not limited to, fugitive dust from truck loading and unloading, excavation, rock blasting, rock crushers, wind erosion of soil stockpiles, and concrete batch plant. These sources are described below.

5.1.5.1 Fugitive Dust from Excavation

Excavating aggregate materials during operations would generate fugitive dust. Frequent watering in the excavation area would reduce fugitive dust emissions.

5.1.5.2 Rock Blasting

Fugitive dust emissions would also occur during blasting activities at the dam foundation area. Fugitive dust emissions from this activity were estimated in accordance with Section 11.9 of AP-42 with the following equations (EPA 1998): E_{TSP} = 0.000014(A)1.5

Where: E_{TSP} = emission factor for total suspended particulates up to 30 microns (pounds per blast [lbs/blast]).
A = horizontal area (ft^2), with a blasting depth ≤ 70 ft. This is not for the vertical face of a bench.

To estimate PM_{10} and $PM_{2.5}$ emissions, the total suspended particulates (TSP) equation was multiplied by scaling factors of 0.52 and 0.03. The total amount of material assumed to be blasted was based on the "probable high estimate" of material to be crushed, as provided by the design engineer. The horizontal area of each blast was then estimated based on a maximum depth of 40 ft, a maximum of ten blasts per day, and a construction duration of 5 weeks.

Blasting operations would be conducted by a licensed blasting contractor, in strict compliance with pertinent federal, State, and County requirements. Some dust would result from the blasting. However, Mine Safety and Health Administration rules require the use of water injection when drilling to control drilling dust. Standard blasting practices using sequential delay timing schemes to generate effective rock fragmentation and vibration control will also minimize blasting dust.

Furthermore, aggregate quarry operators will invariably remove loose overburden to prevent dilution of mined rock, which lessens the amount of fine material that can become airborne by blasting. A common method of dust control for blasting operations is to wet down the entire blasting area prior to initiating the blast. This procedure minimizes dust being entrained into the air from the blasting activity by allowing it to adhere to the wet surfaces (NIOSH 2012). Because these standard practices would be applied, it is unlikely that airborne dust from blasting would be a cause of concern.

Following blasting, the rock resource would be fractured and could be moved with conventional earthmoving equipment. A front-end loader is used to load off highway rock trucks for transport of fractured rock to the aggregate processing area.

5.1.5.3 On-Site Equipment Exhaust

Bulldozers, loaders, and personnel transport vehicles run on internal combustion engines. Internal combustion engines generate NO_X, VOCs, CO, and PM_{10} from the combustion of gasoline or diesel fuel. Emissions in this category would include haul truck exhaust while on site but would not include emissions from the haul trucks once they are off site on public roadways.

5.1.5.4 Dust from On-Site Vehicle Activity

Various vehicles, such as excavating equipment and pickup trucks, would traverse unpaved gravel surfacing areas and generate dust. Factors affecting dust generation from these sources include the following: (1) trip length; (2) silt content of the road surface material; (3) moisture content of the surface; (4) weight of the vehicle traveling the road; and (5) number of trips per day. Watering or soil stabilizers would control the dust.

One of the key variables in determining particulate emissions from unpaved roads is the control efficiency that can be attained using biodegradable organic polymer suppressants, water, access road design and construction, and other techniques. For this analysis, it was assumed that an emission control efficiency of 98 percent could be attained. This was based on SCAQMD information from various dust suppressant vendors who confirmed that better than 98 percent reduction in airborne emissions from haul roads in a temporary construction setting is achievable.

5.1.5.5 Aggregate Processing

Excavated rock would be trucked from the dam construction area to the concrete batch processing plant. The following stationary sources are associated primarily with an aggregate processing facility: a feeder hopper, a portable duplex crusher, screens, conveyors, stacking conveyors, and an aggregate wash plant. At the processing area, rock would be screened and crushed to size. The transfer points between haul trucks, crushing, and screening would generate dust. The screens, crushers, and conveyors associated with those devices would be controlled with a combination of a water spray system, complete enclosure, and/or baghouse filters or similar devices.

5.1.5.6 Storage Piles and Product Loading

After aggregate is processed, the material is segregated by product type and stockpiled for concrete batch plant. Some fine material remains on the rock after processing. Wind blowing across the

stockpiles releases these fine particles and creates dust. Dust is also released when the rock is picked up and loaded onto haul trucks and/or hopper. Excess rock materials would be hauled out to the disposal area adjacent to the Canyon Access Road.

5.1.5.7 Concrete Batch Plant

The concrete batch plant would be capable of producing a maximum of 1,000 tons per hour and would be limited to a maximum concrete production of 163,200 tons. The concrete batch plant would generate PM_{10} and $PM_{2.5}$ dust. Emissions from these sources are minimized by use of water spray systems on the aggregate to reduce any fugitive dust generated. Compliance with SCAQMD permits would require the use of Best Available Control Technology (BACT), such as baghouse dust collectors, which would ensure a relatively emission- and dust-free operation. Baghouse dust collectors capture the PM in an airstream by forcing the airflow through filter bags.

5.2 OPERATIONAL ACTIVITIES AND EMISSION SOURCES

After the new dam is fully operational, potential air quality and GHG impacts would be associated with routine maintenance and operation of the reservoir, and recreational use at the site. Motor vehicles and boats would be the primary source of emissions associated with the new dam and reservoir operations. However, these activities at the new dam and reservoir would remain unchanged from existing conditions.

5.3 AIR DISPERSION MODELING

SCAQMD recommends using the Environmental Protection Agency's AERMOD model. For purposes of this analysis, the Lakes AERMOD View (Version 9.9.0) was used to calculate the particulate concentrations associated with construction activities. The analysis herein has been conducted in accordance with the guidelines in the *Health Risk Assessment Guidance for Analyzing Cancer Risks from Mobile Source Diesel Idling Emissions for CEQA Air Quality Analysis* (SCAQMD 2003). Lakes AERMOD View was utilized to incorporate the EPA's latest AERMOD Version 19191 Universal Transverse Mercator (UTM) coordinates for World Geodetic System (WGS) 84 were used to locate the Project site boundaries, each volume source locations, line source locations, and receptor locations in the Project construction site's vicinity. The AERMOD dispersion model summary output files for the Proposed Project are presented in Appendix A. Modeled sensitive receptors were placed at nearby residential and non-residential (off-site workers) locations within ¼ mile from the construction site boundaries. More detailed discussion of the dispersion modeling analysis is provided below.

5.3.1 Air Dispersion Modeling for Criteria Pollutants

In order to assess the dispersion of emissions associated with the Proposed Project, air dispersion modeling was performed using AERMOD. The model is approved by the EPA for estimating the air quality impacts associated with volume and line volume sources in elevated terrain. The model was used to calculate the annual average and short-duration (e.g., 1-hour) pollutant concentrations associated with each emitting source. Inputs for each emitting source were based on the characterizations referenced above. Appendix B shows details of these inputs.

For the line volume sources used to represent on-road mobile source activity, vertical (sigma z) dispersion parameters were developed by approximating mixing zone residence time and quantifying the initial vertical term as described in the EPA guidance. Horizontal (sigma y) dispersion parameters were generated by dividing the source separation distance by a standard deviation of 2.15, as described in the EPA guidance.

The model requires additional input parameters, including local meteorology. Due to the model's sensitivity to individual parameters (e.g., wind speed, temperature, and direction), the EPA recommends meteorological data used as input into dispersion models be selected on the basis of relative spatial and temporal conditions that exist in the area of concern. As such, 5 years of meteorological data from the Lake Elsinore Monitoring Station (the nearest station available from the SCAQMD) (SCAQMD 2018a) were used to represent local weather conditions and prevailing winds.

The modeling was conducted for PM_{10}, $PM_{2.5}$, CO, NO_2, SO_2, and potential air toxics emissions for the construction phases. O_3 is a regional pollutant that is not modeled on a source-specific basis.

Discrete variants for daily breathing rates, exposure frequency, and exposure duration were obtained from relevant distribution profiles presented in the Office of Environmental Health and Hazard Assessment (OEHHA) guidance document *Air Toxic Hot Spots Program Risk Assessment Guidelines Technical Support Document for Exposure Assessment and Stochastic Analysis*, (OEHHA 2015) and guidance from the SCAQMD.

5.3.2 Emission Estimates for Diesel Particulate Matter

Potential emissions of DPM from off-road equipment are included in the PM_{10} and $PM_{2.5}$ emission totals and are also included in the individual air toxic and summary air toxic emissions. The methodology and DPM emission factors are shown in Appendix C. It was assumed that the off-road equipment would meet Tier 2 standards (i.e., the engines would be newer than model year 2010 for equipment greater than or equal to 300 brake horsepower [bhp] and model year 2000 for equipment less than 300 bhp). It is likely some of the off-road equipment would actually meet Tier 3 or Tier 4 emission limits, thus this is a conservative (i.e., over-estimate) assumption for DPM emission factors. It was assumed that all DPM is $PM_{2.5}$ or smaller.

5.3.3 Blasting Emissions

During the dam foundation excavation phase, blasting of hard rock will occur as part of the excavation. Based on the information from AECOM, it was estimate approximately 34,000 cy of rock material that will need to be blasted. With the explosive factor of 1.0 pound of dynamite per cubic yard of rock blasted, it is assumed that approximately 17 tons of dynamite would be utilized. There will be no more than five blasts per day, up to 5 months period, and the acreage blasted at any one time can range from one-sixteenth of an acre to one-half of an acre. In order to assess the potential impacts on ambient air quality of blasting activities, the EPA AP-42 emission factors were used to assess the impact of gases released during the blast. The gaseous pollutants created by the explosives—, i.e., CO, NO_2, and SO_2 were calculated. Particulate emissions associated with blasting (i.e., dust created by physical agitation of soil and rock and combustion-related particulates) are already included in the on-site Project activities discussed in the preceding sections. Particulate

impacts from blasting were calculated with the AP-42 emission factors as discussed previously. The blasting emission results are contained in Appendix D.

Blasting at the site would be conducted using a dynamite. The EPA has published emission factors for dynamite explosives in AP-42, Chapter 13.3 Explosive Detonation (EPA 1995). The emission factors are 104 pounds of CO per ton of dynamite, 53 pounds of NO_X (assumed NO_2) per ton of dynamite, and 1 pound of SO_2 per ton of dynamite exploded. The Proposed Project's blasting activities would occur approximately eight times per day, and each blast will use 37.6 pounds of dynamite. (The value of 10 blasts per day is the maximum.)

The blasting impacts were not added to the point of maximum impacts (PMI) of operational activities because they occur at the dam construction location, approximately 12,000 feet (2.2 miles) east from the nearest sensitive receptor (i.e., NexStar Ranch).

There is also the possibility that some gases could be trapped below the surface and migrate through cracks or fissures below ground. Carefully designed blasting patterns would minimize the potential for trapped gases. In addition, the geology of the proposed quarry is not conducive to such migration. Finally, the blasting would occur at a considerable distance from any residences or other structures that could be impacted. Thus, there would not be potential adverse effects from potential underground migration of blasting gases.

In addition to the CO, NO_2, and SO_2 emissions identified by the EPA in AP-42, Chapter 13.3, there is a possibility of some of the dynamite not being completely combusted in the blast. However, none of the dynamite is listed as an air toxic in California or by the EPA. Furthermore, carefully designed blasts would consume all of the dynamite. Therefore, potential adverse impacts related to blasting combustion are considered to be less than significant.

A common method of dust control for blasting operations is to wet down the entire blasting area prior to initiating the blast. This procedure minimizes dust being entrained into the air from the blasting activity by allowing it to adhere to the wet surfaces (NIOSH 2012). Because these standard practices would be applied as control measures, it is unlikely that airborne dust from blasting would be a cause of concern.

5.3.4 Drilling Emissions

The annual, maximum daily, and hourly process rates for drilling blasting holes are calculated based on the number of blasts that are performed either annually, daily, and hourly and a drilling rate of 10 holes/blast.

5.3.4.1 Emission Factor

Uncontrolled PM_{10} and $PM_{2.5}$ emissions from drilling are calculated using the emission factor of 1.3 lb/hole, from AP-42, Table 11.9-4 (EPA 1998) for TSP from drilling of overburden rocks at western surface coal mines. The TSP emission factor is assumed to be applicable for PM. PM_{10} and $PM_{2.5}$ emissions from drilling are not listed in Table 11.9-4. PM_{10} emissions are assumed equal to 43 percent of PM emissions based on the ratio of PM_{10} to PM emissions for tertiary crushing of high moisture ore in AP-42, Table 11.24-2 (EPA 1998).

$PM_{2.5}$ emissions are estimated to be 18.5 percent of PM_{10} emissions based on the ratio of $PM_{2.5}$ to PM_{10} controlled emissions for tertiary crushing in AP-42, Table 11.19.2-2 (EPA 1998).

5.3.4.2 Control Efficiency

Potential fugitive particulate emissions from drilling may be controlled by the addition of water and by a dust collector to inhibit the escape of particulate emissions from the top of the hole during the drilling process. When calculating worst-case potential emissions from drilling, approximately 75 percent emission controls were applied. Based on the information from AP-42 5th Edition, Section 11.9, Table 11.9-1, control efficiency was estimated to be between 63 percent and 88 percent. A midpoint of range 75 percent was used.

5.3.5 Concrete Batch Plant Emissions

The concrete batch plant would consist of a feed hopper, feed conveyor, batching plant, cement storage silos, and an operations building. A conveyor would feed the required aggregate into the aggregate storage bins. The cement and aggregates would then be weighed and added to the mixer truck with water and additives. Trucks would be loaded under the batcher in an area that would be ducted to a baghouse; this process controls dust during loading. Once loaded, the trucks would deliver concrete to various locations. The highest point for this plant would be the 75-foot-high cement silos.

Cement and cement supplement (fly ash) powders are used in the processing of concrete. These two materials would be brought on site via powder trailers. Once on site, these materials would be unloaded into dry silos by means of blowers that effectively would pump the materials through 4-inch lines. The entire transfer process would be fully enclosed; therefore, any dry material spillage is unlikely. For example, fly ash (in powder-like form) is transferred from the fly ash silo via enclosed screw conveyors to an enclosed conditioning system (pug mill) where water is added to create conditioned ash (in sludge cake-like form). The conditioned ash is then gravity transferred directly into a concrete batch plant and/or cement mixing truck. Similar process is used for cement powder in a separate cement silo. Once in the silos, the material would be transferred to the concrete batch plant through similar piping.

Cement additives are necessary for creating a number of useful reactions (e.g., delaying concrete setting) within the concrete. These additives would be stored on site in contained areas. When more additives are required, new totes would be delivered, or a tanker truck from the vendor would come and fill up the tanks. The entire process of filling these tanks would occur in a fully contained area. Once in the tanks, the additives would be automatically metered into the plant via a computerized batch control system.

Once a concrete mix design is selected in the computer, it would be added to the truck via a conveyor and boot that transfers the materials into the mixer trucks. This would be a direct transfer process and no materials would be spilled outside of the truck.

Total production for this facility would be determined by market demand. For the purpose of the analysis, the hourly, daily, and annual process rates for the concrete batch plant are based on the processing rates of 1,000 tph, 10,000 tpd, and 163,200 tpy.

5.3.5.1 Emission Factor

Uncontrolled PM_{10} and $PM_{2.5}$ emission factors for the concrete batch plant were obtained from the AP-42, Section 11.12 Concrete Batching (EPA 2006).

5.3.5.2 Control Efficiency

Emissions of particulate matter resulting from the plant would be controlled by a baghouse filter system. Because a controlled emission factor is not provided in AP-42 Section 11.12, a control factor of 99 percent from the baghouse was applied to the uncontrolled emission factor (NIOSH 2012).

5.3.6 On-Site Emissions – Toxics

For diesel PM emissions from fuel combustion, it was assumed that all PM_{10} from diesel-fueled equipment was diesel exhaust. For crystalline silica emissions, PM_4 is used instead of PM_{10} because the health effects standard is based on PM_4. A three-step process was used to estimate emissions of PM_4 crystalline silica. The first step was to determine the PM_4 fraction of the PM_{10} emissions. This was accomplished by analyzing the size distribution of particulate emissions associated with aggregate handling and storage as reported by the EPA (EPA AP-42, Chapter 13, Section 2.4-3). The PM_4 to PM_{10} ratio of 40 percent was used to estimate PM_4 emissions. The second step was to apply the bulk percentage of crystalline silica in the rock at the proposed quarry to the PM_4 emission rates.

The third step is to apply the percentage of crystalline silica in PM_4 versus crystalline silica in bulk samples. The presence of crystalline silica in a bulk sample is indicative, not definitive, of potential crystalline silica exposure because it is difficult to mechanically grind. Crystalline silica (quartz) is very hard, and thus a relatively smaller percentage of crystalline silica would be ground into PM_4 than other rock/soil that is not crystalline silica. The three factors are combined to result in a PM_4 crystalline emission factor in terms of PM_{10} emissions.

The estimated on-site emissions include all of the emission controls and other emission reduction strategies as specified by SCAQMD BACT rules (including use of the required Tier engine diesel-fueled off-road equipment as planned by the Applicant). All heavy duty off-road equipment operating on the Project site would meet CARB's Off-road Vehicle Regulations with a minimum of Tier 2 engines.

5.4 HEALTH RISK ASSESSMENT

Hazardous air pollution emissions associated with the Proposed Project would occur from a variety of activities related to Project operations. Substantial amount of TACs known to be released from the Proposed Project are contained in the exhaust of Project-related truck trips and the concrete batch plant. There are no plans for other toxic substances on site that would result in TAC emissions. For the purposes of a Health Risk Assessment (HRA), short-term emissions are of concern for analyzing acute health impacts, and long-term emissions are of concern for analyzing chronic and carcinogenic health impacts.

In December 2018, in the case of *Sierra Club v. County of Fresno* (2018) 6 Cal.5th 502, California Supreme Court held that an EIR's air quality analysis must meaningfully connect the identified air quality impacts to the human health consequences of those impacts, or meaningfully explain why

that analysis cannot be provided. As noted in the Brief of Amicus Curiae by the SCAQMD in the Friant Ranch case (April 6, 2015, Appendix 3.4) (Brief), SCAQMD has among the most sophisticated air quality modeling and health impact evaluation capability of any of the air districts in the State, and thus it is uniquely situated to express an opinion on how lead agencies should correlate air quality impacts with specific health outcomes (SCAQMD 2015b).

The SCAQMD discusses that it may be infeasible to quantify health risks caused by projects similar to the proposed Project, due to many factors. It is necessary to have data regarding the sources and types of air toxic contaminants, location of emission points, velocity of emissions, the meteorology and topography of the area, and the location of receptors (worker and residence) (SCAQMD 2015b). The Brief states that it may not be feasible to perform a health risk assessment for airborne toxics that will be emitted by a generic industrial building that was built on "speculation" (i.e., without knowing the future tenant(s))[15] (SCAQMD 2015b). Even where a health risk assessment can be prepared, however, the resulting maximum health risk value is only a calculation of risk--it does not necessarily mean anyone will contract cancer as a result of the Project (SCAQMD 2015b). The Brief also cites the author of CARB methodology, which reported that a $PM_{2.5}$ methodology is not suited for small projects and may yield unreliable results (SCAQMD 2015b). Similarly, SCAQMD staff does not currently know of a way to accurately quantify O_3-related health impacts caused by NO_X or VOC emissions from relatively small projects, due to photochemistry and regional model limitations (SCAQMD 2015b). The Brief concludes, with respect to the Friant Ranch EIR, that although it may have been technically possible to plug the data into a methodology, the results would not have been reliable or meaningful (SCAQMD 2015b).

5.4.1 Emissions Sources

Project construction activities will generate emissions that will be transported outside of the physical boundaries of the Project, potentially impacting nearby residential areas. Methodologies to estimate concentrations resulting from Project emissions are provided below.

This HRA has been conducted using three models: CARB's EMFAC2017 for vehicle emissions factors and percentages of fuel type within the overall vehicle fleet, the EPA's AERMOD air dispersion model to determine how the TACs would move through the atmosphere after release from sources both on site and on surrounding roadways, and CARB's Hot Spots Analysis and Reporting Program, Version 2 (HARP 2) model to translate the pollutant concentrations from AERMOD into individual health risks at any sensitive receptor locations surrounding the Project site.

This HRA includes analyzing the inhalation, dermal soil, mother's milk, and homegrown produce pathways. This technique was chosen as recommended in the OEHHA Air Toxics Hot Spots Program. Risk Assessment Guidelines. Guidance Manual for Preparation of Health Risk Assessments (OEHHA 2015) and as prescribed in Supplemental Guidelines for Preparing Risk Assessments for the Air Toxics "Hot Spots" Information and Assessment Act (SCAQMD 2018b).

[15] It should also be noted that the actual occurrence of specific health conditions is based on numerous other factors that are infeasible to quantify, such as an individual's genetic predisposition, diet, exercise regiment, stress, and other behavioral characteristics.

The OEHHA has determined that long-term exposure to DPM poses the highest cancer risk of any TAC it has evaluated. Short-term exposure to diesel exhaust can also have immediate health effects. Diesel exhaust can irritate the eyes, nose, throat, and lungs and can cause coughs, headaches, lightheadedness, and nausea. In studies with human volunteers, DPM made people with allergies more susceptible to the materials to which they are allergic (e.g., dust and pollen). Short-term exposure to diesel exhaust also causes inflammation in the lungs, which may aggravate chronic respiratory symptoms and increase the frequency or intensity of asthma attacks.

For this HRA, the truck travel emissions were modeled as a series of volume sources along the paved De Portola Road northbound and southbound routes, along the unpaved Pond Access Roads eastbound and westbound routes, around the concrete batch plant staging area. The construction equipment operation is modeled as area sources within the 50-acre area. These sources cover the anticipated primary truck routes and construction equipment area source as shown in Figure 1-2. LSA assumed that vehicles traveling on site would maneuver slowly, averaging approximately 5 to 15 mph, and that vehicles traveling on roadways would average 40 mph.

The diesel truck idling emissions were modeled as individual volume sources at idling locations along the planned staging areas. While the idling times of trucks are regulated to be no more than 5 minutes, it is possible the diesel trucks will stop at the loading dock and one or two other areas on site during a single trip. Thus, for the purposes of this HRA, the idling times per trip were conservatively assumed to be 15 minutes per delivery.

EMFAC2017 was used to determine the emissions factors of idling and operating diesel trucks to determine the total emissions of PM_{10} from the Project-related trucks. This HRA conservatively assumes all emissions of PM_{10} are DPM. EMFAC2017 includes assumptions of technological and regulatory changes that will reduce emission rates over time. However, this HRA only allows for a single emission rate for the entire 30-year health risk evaluation period. The use of emissions factors for the year 2022 was selected to be conservative, even though it is expected that truck emissions regulations will continue to become more restrictive over the exposure periods considered for this HRA.

The tables in Appendix B show the development of the exhaust emission rates for the trucks while operating both on unpaved surfaces and on the roadways on which the trucks will travel. The tables show the annual average daily traffic for the entire Proposed Project on each stretch of road by vehicle category. The percentage within each vehicle category that is diesel powered (from EMFAC2017) and the PM_{10} and $PM_{2.5}$ emissions factors for each vehicle category at the average road speeds of 5 mph and 15 mph on site and 35 mph on roadways are also shown. Because the AERMOD dispersion model cannot use emission variables in grams per mile, emissions data are converted to grams per second. The same derivation is repeated for ROG emissions from gasoline-powered vehicles (all TAC emissions from gasoline exhaust are contained in the ROG emissions).

5.4.2 Hot Spots Analysis and Reporting Program Modeling

CARB's HARP 2 model is a tool that assists with the programmatic requirements of the Air Toxics "Hot Spots" Program (AB 2588). HARP 2 was used to translate the TAC concentrations from AERMOD into long-term carcinogenic health risk levels and chronic and short-term acute health risk

levels following the guidance in the SCAQMD AB2588 and Rule 1402 Supplemental Guidelines for Preparing Risk Assessments (SCAQMD 2018b). These guidelines specify the following: (1) residential cancer risks must assume a 30-year exposure and must include, at a minimum, the following pathways: homegrown produce, dermal absorption, soil ingestion, and mother's milk; (2) the noninhalation pathways must have a deposition velocity of 0.02 m per second; (3) the dermal pathway should assume a "warm" climate; and (4) the "Risk Management Policy Using the Derived Method" risk-calculation option should be used. To estimate chronic noncancer risks at residential receptors, the "OEHHA-Derived Method" risk-calculation option was used. Following the OEHHA guidance, 8-hour chronic noncancer risk was calculated for residential receptors because the Proposed Project would operate more than 8 hours per day and 5 days per week.

The dose-response relationship for a specific pollutant describes the association between exposure and the observed response (health effect). In other words, the relationship estimates how different levels of exposure to a pollutant change the likelihood and severity of health effects. The dose-response relationship (the response occurring with increasing dose) varies with pollutant, individual sensitivity, and type of health effect. Combining the results of the emission characterization and dispersion modeling described above with the dose-response assessment gives an estimate of the increased health risk for an individual exposed to the maximum predicted long-term concentrations of TACs.

Cancer, acute, and chronic health risks due to exposure to TACs were evaluated following the latest guidance outlined in the Air Toxics Hot Spots Program Risk Assessment Guidelines. CARB's HARP 2 was used for HRA modeling. The HARP Risk Module predicts health impacts terms of cancer risk, Acute Hazard Index (HIA), and Chronic Hazard Index (HIC) by factoring AERMOD-predicted pollutant concentrations by pollutant-specific cancer potency values and chronic/acute Reference Exposure Levels (RELs) obtained from OEHHA. The HARP average point estimate was used in the analysis. For residential exposure, it is assumed that the person is exposed continuously to the maximum concentration for 30 years. For workers' health risks, it was assumed that a worker is exposed 250 days per year for 25 years. HARP modeling was conducted for sensitive receptors near the Proposed Project area, including residents and representative locations of living communities. Nearby residents included in the HRA include the rural residential homes located within approximately 60 ft of the Project construction activities for the Pond Access Road #1, Pond Access Road #2, and temporary concrete batch plant area near De Portola Road.

The acute, chronic, and cancer risk modeling was applied to the air toxics that could be emitted during the construction of the Proposed Project for which RELs and unit risk factors (URFs) were published by OEHHA. The potential for health effects at actual receptors where there is a potential for exposure is termed a maximum exposed individual (MEI) analysis. For noncancer effects, the Hazard Index (HI) is calculated, and if the HI is less than 1.0, then there is no potential for noncancer health effects. The HI is normally calculated assuming that both workers and residences are exposed continuously for a lifetime. Thus, the annual average concentration is divided by the REL to calculate an HIC, with no adjustment for worker versus residential exposure. Because the HI is the ratio of the exposed concentration to the REL, the HI can be converted to a percentage of the REL by multiplying by 100. That is, an HI of 0.02 is two percent of the REL.

For potential carcinogenic effects, the incremental cancer risk as the result of the exposure is calculated. For residential exposure, it is assumed that the person is exposed continuously to the maximum concentration for 30 years. In actuality, people rarely reside at the same location for 30 years and are never continuously exposed to the maximum concentration. To calculate the incremental cancer risk, the URF is multiplied by the chronic (annual) concentration. The URF expresses the probability that a person could contract cancer if the person were exposed to 1 µg/m3 of the pollutant continually for a lifetime. The URFs are based on a 70-year exposure applicable to residences. In addition, NexStar Ranch and Rancho Pacifica Ranch are known to have equestrian yards on the properties. There may be several off-site equestrian workers on the properties, which were evaluated using the standard worker exposure duration of 25 years.

5.5 GREENHOUSE GAS EMISSIONS

Emissions estimates for the Proposed Project are discussed below. GHG emissions estimates are provided herein for informational purposes only, as there is no established quantified GHG emissions threshold. Bearing in mind that CEQA does not require "perfection" but instead "adequacy, completeness, and a good faith effort at full disclosure," the analysis below is based on methodologies and information available to RCWD at the time this analysis was prepared. Estimation of GHG emissions in the future does not account for all changes in technology that may reduce such emissions; therefore, the estimates are based on past performance and represent a scenario that is worse than that which is likely to be encountered (after energy-efficient technologies have been implemented). While information is presented below to assist the public and decision-makers in understanding the Proposed Project's potential contribution to GCC impacts, the information available to RCWD is not sufficiently detailed to allow a direct comparison between particular Project characteristics and particular climate change impacts or between any particular proposed mitigation measure and any reduction in climate change impacts.

Construction and operation of the Proposed Project would generate GHG emissions, with the majority of energy consumption (and associated generation of GHG emissions) occurring during the Project's operation (as opposed to during its construction). Typically, more than 80 percent of the total energy consumption takes place during operation, and less than 20 percent of energy is consumed during construction (UNEP 2007). Overall, the following activities associated with the Proposed Project could directly or indirectly contribute to the generation of GHG emissions:

- **Construction Activities:** During construction of the Proposed Project, GHGs would be emitted through the operation of construction equipment and from worker and vendor vehicles, each of which typically uses fossil-based fuels to operate. The combustion of fossil-based fuels creates GHGs (e.g., CO_2, CH_4, and N_2O). Furthermore, CH_4 is emitted during the fueling of heavy equipment.

- **Concrete Batch Plant:** During construction operation of the batch plant, GHGs would be emitted during the curing of the concrete. Since cement is only a fraction of the constituents in concrete, manufacturing 1 cy of concrete (about 3,900 pounds [lbs]) is responsible for emitting about 400 lbs of CO_2 emission (Climate Registry 2019). With an estimated production of 81,600 cy of concrete to be poured at the dam site, the Proposed Project would generate approximately 14,218 MT CO_2e.

- **Gas, Electricity, and Water Use:** Diesel gas use results in the emission of two GHGs—CH_4 and CO_2—from the combustion of diesel. Electricity use can result in GHG production if the electricity is generated by combusting fossil fuel. California's water conveyance system is energy-intensive. Water-related electricity use is 48 terawatt-hours (TWh) per year and accounts for nearly 20 percent of California's total electricity consumption (CEC 2018).

- **Solid Waste Disposal:** Solid waste generated by the Proposed Project could contribute to GHG emissions in a variety of ways. Landfilling and other methods of disposal use energy for transporting and managing the waste, and they produce additional GHGs to varying degrees. Landfilling, the most common waste management practice, results in the release of CH_4 from the anaerobic decomposition of organic materials. CH_4 is 25 times more potent a GHG than CO_2. However, landfill CH_4 can also be a source of energy. In addition, many materials in landfills do not decompose fully, and the carbon that remains is sequestered in the landfill and not released into the atmosphere.

- **Motor Vehicle Use:** Transportation associated with the Proposed Project would result in GHG emissions from the combustion of fossil fuels in daily construction equipment, automobile, and truck trips.

5.6 ENERGY

Fuel consumption (diesel fuel and gasoline) associated with construction trucks and construction worker vehicles traveling to the Project site was based on the estimated number of vehicle and truck trips, estimated trip distances, and equipment operating hours that Project construction would generate and using the assumptions from the Construction Information Memo with the Anticipated Equipment Application and Construction Schedule (AECOM 2020).

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6.0 THRESHOLDS OF SIGNIFICANCE

The SCAQMD has developed operational and construction-related thresholds of significance for air quality impacts of projects proposed in the Basin. These thresholds were set forth in the *CEQA Air Quality Handbook* (SCAQMD 1993), with associated updates, and are utilized for purposes of determining the significance of impacts to the ambient air quality as required under CEQA.

6.1 AIR QUALITY THRESHOLDS

The significance criteria described below were developed consistent with the *State CEQA Guidelines* and RCWD's 2020 CEQA Guidelines to determine the significance of potential impacts on air quality. Impacts on air quality would be considered potentially significant if the Proposed Project or alternatives would do any of the following:

- Conflict with or obstruct implementation of the applicable air quality plan
- Result in a cumulatively considerable net increase of any criteria pollutant for which the Project region is nonattainment under an applicable federal or State AAQS
- Expose sensitive receptors to substantial pollutant concentrations
- Result in other emissions (such as those leading to odors) affecting a substantial number of people

The *State CEQA Guidelines* define a significant effect on the environment as "a substantial, or potentially substantial, adverse change in the environment." To determine if a project would have a significant impact on air quality, the type, level, and impact of emissions generated by the project must be evaluated.

Changes in air quality are determined relative to existing conditions (for CEQA) and to the No Action/No Project Alternative (for NEPA). In addition to the general criteria provided above, individual air districts have established significance criteria that are used in the impact analysis. The significance criteria developed by the individual air districts are used to evaluate significance associated with the first three criteria summarized above. Additional significance criteria by air district are provided below.

The net increase in pollutant emissions determines the significance and impact on regional air quality as a result of the Proposed Project. The results also allow the local government to determine whether the Proposed Project will deter the region from achieving the goal of reducing pollutants in accordance with the AQMP in order to comply with the NAAQS and CAAQS.

6.1.1 Regional Thresholds for Construction and Operational Emissions

According to the SCAQMD, if an individual project results in emissions of criteria air pollutants that exceed the SCAQMD's recommended daily thresholds for project-specific impacts, then the project would also result in a cumulatively considerable net increase of these criteria pollutants.

The SCAQMD has established daily emissions thresholds for construction and operation of a project in the Basin. The emissions thresholds were established based on the attainment status of the Basin with regard to air quality standards for specific criteria pollutants. Because the concentration standards were set at a level that protects public health with an adequate margin of safety (by the EPA), these emissions thresholds are regarded as conservative and would overstate an individual project's contribution to health risks.

Projects in the Basin with operational emissions that exceed any of the SCAQMD's emission thresholds identified in Table 6.A are considered to be significant under SCAQMD guidelines. These thresholds, which apply throughout the Basin and were developed by the SCAQMD, apply as both project and cumulative thresholds. If a project exceeds these standards, it is considered to have a project-specific and cumulative impact.

6.1.2 Thresholds for Localized Impacts Analysis

The SCAQMD has developed a set of mass emissions rate lookup tables that can be used to evaluate localized impacts that may result from construction-period emissions. If the onsite emissions from proposed construction activities are below the localized significance threshold (LST) emission levels found in the LST mass rate lookup tables for the project site's source receptor area, then project emissions would not have the potential to cause a significant localized air quality impact (SCAQMD 2008c).

When mass emissions for LST analysis are quantified, only emissions that occur on site are considered. Consistent with SCAQMD LST guidelines, emissions related to offsite activity and truck trips are not considered in the evaluation of localized impacts. The use of SCAQMD LST analysis is applicable to projects that must undergo an environmental analysis pursuant to CEQA, that are 5 acres or less, and for which the nearest receptor distance is within 500 meters (m) (or 1,640 ft).

Because the size of the Proposed Project area is greater than 5 acres and the nearest receptors are located more than 500 m (1,640 ft) from the Vail Dam, the LST analysis is not applicable for the Proposed Project. Therefore, a Project specific modeling analysis was performed.

6.1.3 Toxic Air Contaminants Thresholds

The SCAQMD has established thresholds of significance to assess the significance of any increase in risk to nearby receptors. If the analysis indicates that the cancer risk at a nearby receptor location (i.e., an area where persons reside, work, or attend school—not including streets or sidewalks) is less than one case per million persons, the risk is considered less than significant, and no mitigation is required. If the analysis results indicate that the lifetime cancer risk is between 1 and 10 cases per million, the impact is considered less than significant with the application of the best available control technology for toxics (T-BACT). If the analysis indicates that the cancer risk is greater than 10 cases per million, the impact is considered significant, and the SCAQMD would further constrain the proposed project's operations in order to stay below a cancer risk of 10 cases in a million or for which the noncancer risk HI exceeds 1 for the maximally exposed individual.

Table 6.A: South Coast Air Quality Management District Significance Thresholds

Criteria Pollutants Mass Daily Thresholds		
Pollutant	**Construction**	**Operation**
NO_X	100 lbs/day	55 lbs/day
VOCs	75 lbs/day	55 lbs/day
PM_{10}	150 lbs/day	150 lbs/day
$PM_{2.5}$	55 lbs/day	55 lbs/day
SO_X	150 lbs/day	150 lbs/day
CO	550 lbs/day	550 lbs/day
Lead	3 lbs/day	3 lbs/day
Toxic Air Contaminants and Odor Thresholds		
TACs	Maximum Incremental Cancer Risk ≥10 in 1 million Cancer Burden >0.5 excess cancer cases (in areas ≥1 in 1 million) Chronic and Acute Hazard Index ≥1.0 (project increment)	
Odor	Project creates an odor nuisance pursuant to SCAQMD Rule 402	
GHGs	10,000 MT CO_2e/yr for industrial facilities	
Ambient Air Quality for Criteria Pollutants		
NO_2	The SCAQMD is in attainment; a project is significant if it causes or contributes to an exceedance of the following attainment standards:	
1-hour average	0.18 ppm (State)	
Annual average	0.03 ppm (State) and 0.0534 ppm (federal)	
PM_{10}		
24-hour average	10.4 µg/m³ (construction) & 2.5 µg/m³ (operation)	
Annual average	1.0 µg/m³	
$PM_{2.5}$		
24-hour average	10.4 µg/m³ (construction) & 2.5 µg/m³ (operation)	
SO_2		
1-hour average	0.25 ppm (State) & 0.075 ppm (federal—99th percentile)	
24-hour average	0.04 ppm (State)	
Sulfate		
24-hour average	25 µg/m³ (State)	
CO	The SCAQMD is in attainment; a project is significant if it causes or contributes to an exceedance of the following attainment standards:	
1-hour average	20 ppm (State) and 35 ppm (federal)	
8-hour average	9.0 ppm (State/federal)	
Lead		
30-day average	1.5 µg/m³ (State)	
Rolling 3-month average	0.15 µg/m³ (federal)	

Source: South Coast AQMD Air Quality Significance Thresholds (SCAQMD 2019b).

µg/m³ = micrograms per cubic meter
CO = carbon monoxide
GHGs = greenhouse gases
lbs/day = pounds per day
MT CO_2e/yr = metric tons of carbon dioxide equivalent per year
NO_2 = nitrogen dioxide
NO_X = nitrogen oxides
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
PM_{10} = particulate matter less than 10 microns in size
ppm = parts per million
SCAQMD = South Coast Air Quality Management District
SO_2 = sulfur dioxide
SO_X = sulfur oxides
VOCs = volatile organic compounds

6.1.4 Odor Thresholds

Impacts on air quality would be significant if implementing the construction activities would create nuisance odors affecting a substantial number of people in the short or long term. Specifically, this would be the case for construction work that would potentially generate odorous emissions near existing sensitive receptors or other land uses where people may congregate.

6.1.5 General Conformity *De Minimis* Threshold

According to 40 CFR § 93.159(d), the conformity analysis must reflect certain emission scenarios that are expected to occur under any of the following cases:

- The attainment year specified in the SIP or, if the SIP does not specify an attainment year, the latest attainment year possible under the Clean Air Act
- The last year for which emissions are projected in the maintenance plan.
- The year during which the total of direct and indirect emissions from the action is expected to be the greatest on an annual basis
- Any year for which the applicable SIP specifies an emissions budget

If the total of the direct or indirect emissions caused by the proposed action exceed or equal the conformity *de minimis* thresholds shown in Table 6.B, a conformity determination needs to be made. Only the pollutants that exceed these thresholds must undergo a full general conformity determination.

Table 6.B: General Conformity *De Minimis* Thresholds for the South Coast Air Basin

Criteria Pollutant and Quantified Precursors	Basin Attainment Status Designations	*De Minimis* Threshold (TPY)
Nitrogen Dioxide: NO_X	Attainment/Maintenance	— 100
Ozone: NO_X VOCs	Nonattainment/Extreme	— 10 10
Carbon Monoxide	Attainment/Maintenance	100
Particulate Matter PM_{10}	Attainment/Maintenance	100
Particulate Matter $PM_{2.5}$: Directly Emitted $PM_{2.5}$ SO_X NO_X VOCs	Nonattainment/Serious	— 70 70 70 70

Source: 40 CFR § 93.153(b)(1)
Basin = South Coast Air Basin
CFR = Code of Federal Regulations
NO_X = nitrogen oxides
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
PM_{10} = particulate matter less than 10 microns in size
SO_X = sulfur oxides
TPY = tons per year
VOCs = volatile organic compounds

6.2 ENERGY THRESHOLDS

The thresholds used to determine the level of significance for energy impacts used in this analysis are consistent with Appendix G of the *State CEQA Guidelines* and RCWD's 2020 CEQA Guidelines. The Proposed Project may be deemed to have a significant impact with respect to energy if it reaches either of these thresholds:

- Result in a potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?

- Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?

6.3 GREENHOUSE GAS THRESHOLDS

State CEQA Guidelines Section 15064(b) provides that the "determination of whether a project may have a significant effect on the environment calls for careful judgment on the part of the public agency involved, based to the extent possible on scientific and factual data," and further states that an "ironclad definition of significant effect is not always possible because the significance of an activity may vary with the setting."

For the purpose of this analysis, Appendix G of the *State CEQA Guidelines* and RCWD's 2020 CEQA Guidelines were used as the significance threshold for GHG emissions. A project would normally have a significant effect on the environment if the project would do either of the following:

- Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment

- Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs

The recommended approach for GHG analysis included in the California OPR June 2008 release is to do the following: (1) identify and quantify GHG emissions; (2) assess the significance of the impact on GHGs; and (3) if the impact is significant, identify alternatives and/or mitigation measures to reduce the impact to below a level of significance (OPR 2008). The June 2008 OPR guidance provides some additional direction regarding planning documents as follows:

> CEQA can be a more effective tool for GHG emissions analysis and mitigation if it is supported and supplemented by sound development policies and practices that will reduce GHG emissions on a broad planning scale and that can provide the basis for a programmatic approach to project-specific CEQA analysis and mitigation. For local government lead agencies, adoption of general plan policies and certification of general plan EIRs that analyze broad jurisdiction-wide impacts of GHG emissions can be part of an effective strategy for addressing cumulative impacts and for streamlining later project-specific CEQA reviews.

State CEQA Guidelines Section 15064(b) provides that the "determination of whether a project may have a significant effect on the environment calls for careful judgment on the part of the public

agency involved, based to the extent possible on scientific and factual data," and further states that an "ironclad definition of significant effect is not always possible because the significance of an activity may vary with the setting."

While individual projects are unlikely to measurably affect GHGs, each project incrementally contributes toward the potential for GHGs on a cumulative basis, in concert with all other past, present, and probable future projects. However, despite this, neither the CEQA statutes, the OPR guidelines, nor the draft proposed changes to the *State CEQA Guidelines* currently prescribe thresholds of significance or a particular methodology for performing an impact analysis. As with most environmental topics, significance criteria are left to the judgment and discretion of the Lead Agency. However, RCWD has not established specific quantitative significance thresholds for GHG emissions for construction projects.

The SCAQMD has adopted a significance threshold of 10,000 MT CO_2e/yr for permitted (stationary) sources of GHG emissions for which the SCAQMD is the designated lead agency. To provide guidance to local lead agencies on determining significance for GHG emissions in their CEQA documents, the SCAQMD convened a GHG CEQA Significance Threshold Working Group (Working Group). Based on the last Working Group meeting held in September 2010 (Meeting No. 15), the SCAQMD is proposing to adopt a tiered approach for evaluating GHG emissions for development projects where SCAQMD is not the lead agency:

- **Tier 1. Exemptions:** If a project is exempt from CEQA, project-level and cumulative GHG emissions are less than significant.

- **Tier 2. Consistency with a Locally Adopted GHG Reduction Plan:** If the project complies with a GHG emissions reduction plan or mitigation program that avoids or substantially reduces GHG emissions in the project's geographic area (i.e., city or county), project-level and cumulative GHG emissions are less than significant.

- **Tier 3. Numerical Screening-Level Threshold:** If GHG emissions are less than the numerical screening-level threshold, project-level and cumulative GHG emissions are less than significant.

  For projects that are not exempt or where no qualifying GHG reduction plans are directly applicable, the SCAQMD requires an assessment of GHG emissions. The SCAQMD, under Option 1, is proposing a "bright-line" screening-level threshold of 3,000 MT CO2e/yr for all land use types or, under Option 2, the following land-use-specific thresholds: 1,400 MT CO2e for commercial projects, 3,500 MT CO2e for residential projects, or 3,000 MT CO2e for mixed-use projects. This bright-line threshold is based on a review of the OPR database of CEQA projects. Based on the SCAQMD's review of 711 CEQA projects, 90 percent of CEQA projects would exceed the bright-line thresholds identified above. Therefore, projects that do not exceed the bright-line threshold would have a nominal and therefore less than cumulatively considerable impact on GHG emissions.

- **Tier 4. Performance Standards:** If emissions exceed the numerical screening threshold, a more detailed review of the project's GHG emissions is warranted. The SCAQMD has proposed an efficiency target for projects that exceed the bright-line threshold. The current recommended

approach is per capita efficiency targets. The SCAQMD is not recommending use of a percentage emissions reduction target. Instead, the SCAQMD proposes a 2020 efficiency target of 4.8 MT CO_2e per year per service population (MT CO_2e/yr/SP) for project-level analyses and 6.6 MT CO_2e/yr/SP for plan-level projects (e.g., program-level projects such as general plans). The GHG efficiency metric divides annualized GHG emissions by the service population (SP), which is the sum of residents and employees, per the following equation:

Rate of Emission: GHG Emissions (MT CO_2e/yr) ÷ SP

The efficiency evaluation consists of comparing the project's efficiency metric to efficiency targets. Efficiency targets represent the maximum quantity of emissions each resident and employee in the State could emit in various years based on emission levels necessary to achieve the statewide GHG emissions reduction goals. A project that results in a lower rate of emissions would be more efficient than a project with a higher rate of emissions, based on the same SP. The metric considers GHG reduction measures integrated into a project's design and operation (or through mitigation). The per capita efficiency targets are based on the AB 32 GHG reduction target and 2020 GHG emissions inventory prepared for CARB's 2008 Scoping Plan.

Because the project would begin operations in the post-2020 timeframe, the 2020 numerical screening threshold of 3,000 MT CO_2e and the efficiency target of 4.8 MT CO_2e per year per service population would need to be adjusted to reflect the State's post-2020 GHG reduction goals.

CARB has completed a Scoping Plan, which will be utilized by the SCAQMD to establish the 2030 GHG efficiency threshold. SCAQMD has yet to publish a quantified GHG efficiency threshold for the 2030 target. A scaled threshold consistent with State goals detailed in SB 32, Executive Order B-30-15, and Executive Order S-3-05 to reduce GHG emissions by 40 percent below 1990 levels by 2030 and 80 percent below 1990 levels by 2050, respectively, was developed for 2026, when construction of the Proposed Project would be completed. Though the SCAQMD has not published a quantified threshold beyond 2020, this assessment uses a threshold of 2,280 MT CO_2e per year or 3.6 MT CO_2e/yr/SP, which was calculated for the Project completion year of 2026 based on the GHG reduction goals of SB 32 and Executive Order B-30-15.

For the purpose of this analysis, the Proposed Project will first be compared to the adjusted screening-level Tier 3 Numerical Screening Threshold of 2,280 MT CO_2e per year for all land use types. If it is determined that the Proposed Project is estimated to exceed this screening threshold, it will then be compared to the efficiency-based threshold.

The proposed project will also be evaluated for compliance with SCAG's 2020–2045 RTP/SCS, which establishes an overall GHG target for the project region consistent with the post-2020 GHG reduction goals of SB 32.

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7.0 IMPACTS AND MITIGATION

This section identifies the air quality, energy, and GHG impacts associated with implementation of the Proposed Project. Mitigation measures are recommended, as appropriate, for significant impacts to eliminate or reduce them to a less than significant level. This section also identifies impacts that are considered to be less than significant.

7.1 AIR QUALITY ANALYSIS

This section describes the potential criteria pollutant emission impacts.

7.1.1 Consistency with Applicable Air Quality Plans

A consistency determination plays an essential role in local agency project review by linking local planning and unique individual projects to the air quality plans. A consistency determination fulfills the CEQA goal of fully informing local agency decision-makers of the environmental costs of the project under consideration at a stage early enough to ensure that air quality concerns are addressed. Only new or amended General Plan elements, Specific Plans, and significantly unique projects need to undergo a consistency review due to the air quality plan strategy being based on projections from local General Plans.

The AQMP is based on regional growth projections developed by SCAG. The Proposed Project would remediate seismic and hydrologic hazards associated with the existing Vail Dam, a concrete arch dam, by constructing a new straight-axis gravity concrete dam. The Proposed Project would not house any persons, occupy more than 40 ac of land, or encompass more than 650,000 sf of floor area. Thus, the Proposed Project would not be defined as a regionally significant project under CEQA; therefore, it does not meet SCAG's Intergovernmental Review criteria.

Pursuant to the methodology provided in the SCAQMD CEQA Air Quality Handbook, consistency with the Basin 2016 AQMP is affirmed when a project (1) would not increase the frequency or severity of an air quality standards violation or cause a new violation and (2) is consistent with the growth assumptions in the AQMP. Consistency review is presented as follows:

1. With mitigation, the proposed project would result in short-term construction and long-term operational pollutant emissions that are all less than the CEQA significance emissions thresholds established by the SCAQMD, as demonstrated below; therefore, with mitigation, the proposed project would not result in an increase in the frequency or severity of an air quality standards violation or cause a new air quality standard violation.

2. The CEQA Air Quality Handbook indicates that consistency with AQMP growth assumptions must be analyzed for new or amended General Plan elements, Specific Plans, and significant projects. Significant projects include airports, electrical generating facilities, petroleum and gas refineries, designation of oil drilling districts, water ports, solid waste disposal sites, and offshore drilling facilities. RCWD proposes to remediate seismic and hydrologic hazards associated with the existing Vail Dam, a concrete arch dam, by constructing a new straight-axis

gravity concrete dam[16] immediately downstream of the existing dam. The Proposed Project is not defined as a significant project as defined by the SCAQMD CEQA Air Quality Handbook.

Based on the consistency analysis presented above, the Proposed Project would be consistent with the regional AQMP. Impacts would be less than significant, and no mitigation is required.

7.1.2 Construction Air Quality Impacts

Due to the nature of the Proposed Project, most air quality impacts would occur during construction due to the release of particulate emissions generated by material handling activities and fugitive sources. Emissions from construction equipment are also anticipated and would include VOCs, NO_X, CO, sulfur oxides (SO_x), $PM_{2.5}$, and PM_{10}.

As detailed in Section 5.0, Methodology, construction of the Proposed Project would occur in 14 phases, including the following: Phase 1: Mobilization Layout Work for the New Concrete Gravity Dam; Phase 2: Access Road and Staging Areas; Phase 3: Demolition of Facilities at the New Dam; Phase 4: Foundation Excavation; Phase 5: Temporary Energy Dissipation Vault; Phase 6: Armor Spillway; Phase 7: Foundation Treatment and Grouting; Phase 8: Roller-Compacted Concrete Placement; Phase 9: Outlet Tower; Phase 10: Dam Drainage; Phase 11: Dam Instrumentation; Phase 12: Permanent Energy Dissipation Vault; Phase 13: Demolition of the Existing Facilities; and Phase 14: Site Reclamation and Demobilization. Each phase of construction would generate emissions associated with equipment operations, truck traffic, material handling, stationary sources, and fugitive dust emissions.

Fugitive dust emissions are generally associated with land clearing and exposure of soils to the air and wind, as well as cut-and-fill grading operations. Dust generated during construction varies substantially on a project-by-project basis, depending on the level of activity, the specific operations, and weather conditions at the time of construction. The Proposed Project would be required to comply with SCAQMD Rule 403 to control fugitive dust. During construction of the Proposed Project, best available control measures identified in the Rule 403 would be required to minimize fugitive dust emissions from proposed earth-moving and grading activities. These measures would include site prewatering and rewatering as necessary to maintain sufficient soil moisture content. All access roads, including the Primary Entry Road, Secondary Entry Road, Pond Access Road, and Canyon Access Road, would be watered at least 3 times daily during active construction to reduce dust impact to nearby sensitive receptors, including nearby residential units and horse ranches. The dust-control methods for the Proposed Project would be specified in the dust-control plan that must be submitted to the SCAQMD per Rule 403.

In addition to dust-related PM_{10} emissions, heavy trucks and construction equipment powered by gasoline and diesel engines would generate VOCs, NO_x, CO, SO_x, and some soot particulate ($PM_{2.5}$ and PM_{10}) in exhaust emissions. If construction activities were to increase traffic congestion in the area, CO and other emissions from traffic would increase slightly while those vehicles idle in traffic.

[16] A gravity dam is designed to hold back water primarily by using the weight of the dam material to resist the horizontal water pressure. Each gravity dam section is designed to be stable and independent of any other dam section.

These emissions would be temporary in nature and limited to the immediate area surrounding the construction site.

RCWD has developed a detailed Project construction schedule that provides heavy equipment estimates, personnel requirements, truck traffic estimates, and estimates of required grading/materials handling/import/export for each of the individual construction stages of the Proposed Project. Emission estimates have been prepared for each phase of construction listed above to evaluate the maximum construction emissions. To evaluate the maximum daily and total construction emissions for the project, the construction schedule, which provides month-by-month estimates of project construction and equipment requirements, was used to develop calculations of total emissions from the individual components of the project that will be undergoing construction simultaneously.

As described in Section 5.0, Methodology, emission estimates were based on emission factors from CARB's OFFROAD2017 model and equipment ratings and load factors from the SCAQMD's *CEQA Air Quality Handbook* (SCAQMD 1993). The analysis utilizes emission factors from CARB's OFFROAD model and EMFAC2017 for off-road equipment and on-road vehicles, respectively. In addition, emission factors for aggregate processing, rock blasting, and additional sources of fugitive dust were determined based on methodology found in the EPA's AP-42 (EPA 2011), and the *CEQA Air Quality Handbook* (SCAQMD 1993).

The emission factors that were developed for each piece of equipment are multiplied by maximum number of hours that a piece of equipment could operate in 1 day or in 1 year to estimate worst-case emissions. Peak daily and annual emissions were calculated based on the emission factors provided by the EPA, CARB, and the SCAQMD, and construction data was provided by the design engineers (AECOM 2020).

The quantity of emissions generated would depend on how much aggregate would be excavated, the equipment used, the dam construction area layout, and how far vehicles would travel to transport aggregate and concrete material. This analysis assumes maximum allowable quantities would be moved and is based on the estimated emissions for the equipment to be used.

The emission calculations were based on the assumption that equipment would be operating on site for an average of 8 hours per day, 5 days per week. For the roller compacted concrete placement activities, it is assumed that the equipment will be operating 16 hours per day, 6 days a week for up to 12 weeks. Emission rates for employee vehicles and heavy truck operations were developed from SCAQMD references available at http://www.aqmd.gov/ceqa/hdbk.html.

EMFAC2017 emission factors for 2023 calendar year were assumed to be the worst-case emission rates for on-road vehicle emissions. For off-road equipment engines, consistent with the CARB's off-road emission regulations promulgated in the CCR Title 13 Section 2423, all off-road construction equipment would be required to meet the minimum application of EPA Tier 2 engines and install CARB-approved diesel particulate filter devices to control and minimize emissions.

Project-specific construction emission analysis is broken into subsections and is detailed in Table 7.A below. In addition, analysis is provided for overlapping phases.

Table 7.A: Estimated Construction Equipment and Fugitive Dust Emissions (lbs/day)

Emission Source	VOCs	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$
Phase 1 —Mobilization - Months 1 and 4						
Fugitive Dust—Material Handling	–	–	–	–	0.00	0.00
Fugitive Dust—Unpaved Roads	–	–	–	–	3.70	2.11
Vehicle, Equipment, and Truck Emissions	0.05	0.53	1.21	0.01	0.01	0.01
TOTAL	**0.05**	**0.53**	**1.21**	**0.01**	**3.71**	**2.12**
Significance Threshold	75	550	100	150	150	55
Above Threshold?	*No*	*No*	*No*	*No*	*No*	*No*
Phase 2 —Access Roads and Staging Areas - Months 2 to 8						
Fugitive Dust—Material Handling	–	–	–	–	0.49	0.10
Fugitive Dust—Unpaved Roads	–	–	–	–	10.56	6.02
Vehicle, Equipment, and Truck Emissions	2.57	17.32	28.92	0.08	0.86	0.81
TOTAL	**2.57**	**17.32**	**28.92**	**0.08**	**11.91**	**6.93**
Significance Threshold	75	550	100	150	150	55
Above Threshold?	*No*	*No*	*No*	*No*	*No*	*No*
Phase 3 —Demolition of Facilities at the New Dam - Months 5 to 9						
Fugitive Dust—Material Handling	–	–	–	–	9.40	0.82
Fugitive Dust—Unpaved Roads	–	–	–	–	5.81	3.31
Vehicle, Equipment, and Truck Emissions	1.96	14.01	18.44	0.05	0.66	0.60
Dam Demolition Haul Trucks	0.03	0.52	1.89	<0.01	2.15	0.37
TOTAL	**1.99**	**14.53**	**20.33**	**0.05**	**18.02**	**5.10**
Significance Threshold	75	550	100	150	150	55
Above Threshold?	*No*	*No*	*No*	*No*	*No*	*No*
Phase 4 —Foundation Excavation - Months 5 to 16						
Fugitive Dust—Material Handling	–	–	–	–	1.33	0.56
Fugitive Dust—Unpaved Roads	–	–	–	–	6.34	3.61
Vehicle, Equipment, and Truck Emissions	2.74	21.83	27.12	0.07	0.96	0.90
TOTAL	**2.74**	**21.83**	**27.12**	**0.07**	**8.63**	**5.07**
Significance Threshold	75	550	100	150	150	55
Above Threshold?	*No*	*No*	*No*	*No*	*No*	*No*
Phase 5 —Temporary Energy Dissipation Vault - Months 5 to 9						
Fugitive Dust—Material Handling	–	–	–	–	0	0
Fugitive Dust—Unpaved Roads	–	–	–	–	6.34	3.61
Vehicle, Equipment, and Truck Emissions	0.77	4.41	9.95	0.02	0.30	0.27
TOTAL	**0.77**	**4.41**	**9.95**	**0.02**	**6.64**	**3.88**
Significance Threshold	75	550	100	150	150	55
Above Threshold?	*No*	*No*	*No*	*No*	*No*	*No*
Phase 6 —Armor Spillway - Months 8 to 10						
Fugitive Dust—Material Handling	–	–	–	–	0.84	0.46
Fugitive Dust—Unpaved Roads	–	–	–	–	6.86	3.91
Vehicle, Equipment, and Truck Emissions	0.98	7.65	12.07	0.03	0.38	0.35
TOTAL	**0.98**	**7.65**	**12.07**	**0.03**	**8.08**	**4.72**
Significance Threshold	75	550	100	150	150	55
Above Threshold?	*No*	*No*	*No*	*No*	*No*	*No*

Table 7.A: Estimated Construction Equipment and Fugitive Dust Emissions (lbs/day)

Emission Source	VOCs	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$
Phase 7 —Foundation Treatment and Grouting - Months 10 to 15						
Fugitive Dust—Material Handling	–	–	–	–	0.84	0.46
Fugitive Dust—Unpaved Roads	–	–	–	–	5.28	3.01
Vehicle, Equipment, and Truck Emissions	1.76	15.39	17.42	0.05	0.67	0.63
TOTAL	**1.76**	**15.39**	**17.42**	**0.05**	**6.79**	**4.1**
Significance Threshold	75	550	100	150	150	55
Above Threshold?	*No*	*No*	*No*	*No*	*No*	*No*
Phase 8 —Roller-Compacted Concrete Placement - Months 13 to 20						
Fugitive Dust—Material Handling	–	–	–	–	20.33	4.13
Fugitive Dust—Unpaved Roads	–	–	–	–	91.88	52.37
Vehicle, Equipment, and Truck Emissions	11.30	81.82	97.79	0.29	3.87	3.61
TOTAL	**11.30**	**81.82**	**97.79**	**0.29**	**116.08**	**60.11**
Significance Threshold	75	550	100	150	150	55
Above Threshold?	*No*	*No*	*No*	*No*	*No*	*No*
Phase 9 —Outlet Tower - Months 17 to 23						
Fugitive Dust—Material Handling	–	–	–	–	0	0
Fugitive Dust—Unpaved Roads	–	–	–	–	7.39	4.21
Vehicle, Equipment, and Truck Emissions	0.85	4.70	12.03	0.03	0.32	0.29
TOTAL	**0.85**	**4.70**	**12.03**	**0.03**	**7.71**	**4.5**
Significance Threshold	75	550	100	150	150	55
Above Threshold?	*No*	*No*	*No*	*No*	*No*	*No*
Phase 10 —Dam Drainage - Months 18 to 22						
Fugitive Dust—Material Handling	–	–	–	–	0	0
Fugitive Dust—Unpaved Roads	–	–	–	–	3.70	2.11
Vehicle, Equipment, and Truck Emissions	1.27	10.07	13.35	0.04	0.50	0.46
TOTAL	**1.27**	**10.07**	**13.35**	**0.04**	**4.20**	**2.57**
Significance Threshold	75	550	100	150	150	55
Above Threshold?	*No*	*No*	*No*	*No*	*No*	*No*
Phase 11 —Dam Instrumentation - Months 22 to 24						
Fugitive Dust—Material Handling	–	–	–	–	0	0
Fugitive Dust—Unpaved Roads	–	–	–	–	2.11	1.20
Vehicle, Equipment, and Truck Emissions	1.26	9.85	13.33	0.03	0.50	0.46
TOTAL	**1.26**	**9.85**	**13.33**	**0.03**	**2.61**	**1.66**
Significance Threshold	75	550	100	150	150	55
Above Threshold?	*No*	*No*	*No*	*No*	*No*	*No*
Phase 12 —Permanent Energy Dissipation Vault - Months 23 to 25						
Fugitive Dust—Material Handling	–	–	–	–	0	0
Fugitive Dust—Unpaved Roads	–	–	–	–	6.86	3.91
Vehicle, Equipment, and Truck Emissions	0.85	4.7	12.03	0.03	0.32	0.29
TOTAL	**0.85**	**4.7**	**12.03**	**0.03**	**0.32**	**0.29**
Significance Threshold	75	550	100	150	150	55
Above Threshold?	*No*	*No*	*No*	*No*	*No*	*No*
Phase 13 —Demolition of the Existing Facilities - Months 25 to 29						
Fugitive Dust—Material Handling	–	–	–	–	9.40	0.82
Fugitive Dust—Unpaved Roads	–	–	–	–	9.51	5.42
Vehicle, Equipment, and Truck Emissions	0.10	2.20	5.87	8.48	0.03	0.34
TOTAL	**0.10**	**2.20**	**5.87**	**8.48**	**7.18**	**4.2**
Significance Threshold	75	550	100	150	150	55
Above Threshold?	*No*	*No*	*No*	*No*	*No*	*No*

Table 7.A: Estimated Construction Equipment and Fugitive Dust Emissions (lbs/day)

Emission Source	VOCs	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$
Phase 14 —Site Reclamation and Demobilization - Months 30 to 31						
Fugitive Dust—Material Handling	–	–	–	–	0	0
Fugitive Dust—Unpaved Roads	–	–	–	–	4.75	2.71
Vehicle, Equipment, and Truck Emissions	0.91	6.05	10.97	0.02	0.36	0.33
TOTAL	**0.91**	**6.05**	**10.97**	**0.02**	**18.94**	**6.58**
Significance Threshold	75	550	100	150	150	55
Above Threshold?	*No*	*No*	*No*	*No*	*No*	*No*

Source: Compiled by LSA.
CO = carbon monoxide
lbs/day = pounds per day
NO_X = nitrogen oxides
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
PM_{10} = particulate matter less than 10 microns in size
SO_X = sulfur oxides
VOCs = volatile organic compounds

Table 7.A presents a summary of construction emissions (i.e., equipment and fugitive dust) for each individual phase of the Proposed Project. To evaluate the maximum daily and total annual construction emissions for the Proposed Project, the construction schedule, which provides week-by-week estimates of Project construction and equipment requirements, was used to develop calculations of total emissions from the individual Phases of the Proposed Project that would be undergoing construction simultaneously.

The construction schedule drafted by AECOM indicated which construction phases would likely be conducted simultaneously. Because it is necessary to estimate maximum daily construction activity to estimate maximum daily emissions associated with Project construction, the construction schedule was consulted to identify the time period in which the maximum simultaneous construction activity would occur. Based on the construction contractor's proposed schedule, the maximum activity would occur during Phases 8, 9, and 10 of construction, assumed to be in the year 2023. To address a maximum daily emissions scenario, the schedule was reviewed and the maximum construction scenario was identified, in which the following construction phases would overlap and occur during Phases 8, 9, and 10:

- Phase 8: Roller-Compacted Concrete Placement
- Phase 9: Outlet Tower
- Phase 10: Dam Drainage

Table 7.B presents a summary of maximum peak daily construction emissions.

As shown in Tables 7.A and 7.B, construction emissions associated with the proposed project would not exceed the SCAQMD thresholds for VOC, CO, SO_x, PM_{10}, and $PM_{2.5}$. However, as identified in Table 7.B below, daily regional construction emissions would exceed the daily SCAQMD thresholds for NO_X during overlapping phases of Project construction. Therefore, construction of the Proposed Project could result in emissions that would result in a cumulatively considerable net increase of any criteria pollutant for which the project is in nonattainment under an applicable federal or State ambient air quality standard. Therefore, construction-related air quality impacts would be potentially significant, and mitigation would be required.

Table 7.B: Maximum Peak Daily Construction Equipment and Fugitive Dust Emissions (lbs/day)

Emission Source	VOCs	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$
Phase 8 —Roller-Compacted Concrete Placement - Months 13 to 20						
Fugitive Dust—Material Handling	–	–	–	–	20.33	4.13
Fugitive Dust—Unpaved Roads	–	–	–	–	63.37	36.12
Vehicle, Equipment, and Truck Emissions	11.3	81.82	97.79	0.29	3.87	3.61
Phase 9 —Outlet Tower - Months 17 to 23						
Fugitive Dust—Material Handling	–	–	–	–	0	0
Fugitive Dust—Unpaved Roads	–	–	–	–	7.39	4.21
Vehicle, Equipment, and Truck Emissions	0.85	4.7	12.03	0.03	0.32	0.29
Phase 10 —Dam Drainage - Months 18 to 22						
Fugitive Dust—Material Handling	–	–	–	–	0	0
Fugitive Dust—Unpaved Roads	–	–	–	–	3.70	2.11
Vehicle, Equipment, and Truck Emissions	1.27	10.07	13.35	0.04	0.50	0.46
TOTAL	**13.42**	**96.59**	**123.17**	**0.36**	**99.48**	**50.93**
Significance Threshold	75	550	100	150	150	55
Above Threshold?	*No*	*No*	***Yes***	*No*	*No*	*No*

Source: Compiled by LSA.
CO = carbon monoxide
lbs/day = pounds per day
NO_X = nitrogen oxides
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
PM_{10} = particulate matter less than 10 microns in size
SO_X = sulfur oxides
VOCs = volatile organic compounds

7.1.2.1 Fugitive Dust Emissions

In addition to the construction period thresholds of significance, the Proposed Project is required to comply with regional rules that assist in reducing short-term air pollutant emissions. SCAQMD Rule 403 requires that fugitive dust be controlled with best-available control measures so that the presence of such dust does not remain visible in the atmosphere beyond the property line of the emission source. In addition, SCAQMD Rule 403 requires implementation of dust suppression techniques to prevent fugitive dust from creating a nuisance off site. With compliance with SCAQMD Rule 403, fugitive dust impacts to nearby sensitive receptors, including nearby residential units and horse ranches, would be reduced to a less-than-significant level.

7.1.2.2 Blasting Emissions

During the dam foundation excavation phase, blasting of hard rock will occur as part of the excavation. Based on the information from AECOM, it was estimated that approximately 34,000 cy of rock material that will need to be blasted. With the explosive factor of 1.0 pound of dynamite per cubic yard of rock blasted, it is assumed that approximately 17 tons of dynamite would be utilized. There will be no more than five blasts per day, up to 5 months period, and the acreage blasted at any one time can range from one-sixteenth of an acre to one-half of an acre. In order to assess the potential impacts on ambient air quality of blasting activities, the EPA AP-42 emission factors were used to assess the impact of gases released during the blast. The gaseous pollutants created by the explosives—, i.e., CO, NO_2, and SO_2 were calculated. Particulate emissions associated with blasting (i.e., dust created by physical agitation of soil and rock and combustion-related particulates) are already included in the on-site Project activities discussed in the preceding sections. Particulate

impacts from blasting were calculated with the AP-42 emission factors as discussed previously. The blasting emission results are contained in Appendix D.

Blasting at the site would be conducted using a dynamite. The EPA has published emission factors for dynamite explosives in AP-42, Chapter 13.3 Explosive Detonation (EPA 1995). The emission factors are 104 pounds of CO per ton of dynamite, 53 pounds of NO_X (assumed NO_2) per ton of dynamite, and 1 pound of SO_2 per ton of dynamite exploded. The Proposed Project's blasting activities would occur approximately eight times per day, and each blast will use 37.6 pounds of dynamite. (The value of 10 blasts per day is the maximum.)

The blasting impacts were not added to the point of maximum impacts (PMI) of operational activities because they occur at the dam construction location, approximately 12,000 feet (2.2 miles) east from the nearest sensitive receptor (i.e., NexStar Ranch).

There is also the possibility that some gases could be trapped below the surface and migrate through cracks or fissures below ground. Carefully designed blasting patterns would minimize the potential for trapped gases. In addition, the geology of the proposed quarry is not conducive to such migration. Finally, the blasting would occur at a considerable distance from any residences or other structures that could be impacted. Thus, there would not be potential adverse effects from potential underground migration of blasting gases.

In addition to the CO, NO_2, and SO_2 emissions identified by the EPA in AP-42, Chapter 13.3, there is a possibility of some of the dynamite not being completely combusted in the blast. However, none of the dynamite is listed as an air toxic in California or by the EPA. Furthermore, carefully designed blasts would consume all of the dynamite. Therefore, potential adverse impacts related to blasting combustion are considered to be less than significant.

A common method of dust control for blasting operations is to wet down the entire blasting area prior to initiating the blast. This procedure minimizes dust being entrained into the air from the blasting activity by allowing it to adhere to the wet surfaces (NIOSH 2012). Because these standard practices would be applied as control measures, it is unlikely that airborne dust from blasting would be a cause of concern.

7.1.3 Operational Air Quality Impacts

Long-term air pollutant emission impacts are those associated with mobile sources (e.g., vehicle trips), energy sources (e.g., electricity), and area sources (e.g., landscape maintenance equipment use). Once the new dam is fully operational, potential air quality impacts would be associated with routine maintenance and operation of the Vail Dam reservoir, and recreational use at the site. Motor vehicles and boats would be the primary source of emissions associated with reservoir operations. Operational and maintenance activities would include monitoring reservoir levels and outlet discharges, monitoring dam instrumentation, maintaining appropriate records, and maintaining mechanical and electrical equipment according to the equipment manufacturers' requirements. Power would be used for lighting, security cameras, gate actuators, trash rack hoists, and monitoring and control systems. However, energy emissions would be minimal and would not exceed thresholds established by the SCAQMD. In addition, these activities would not result in

additional employees or maintenance requirements compared to operation of the existing dam. Employee traffic for reservoir operations would not be appreciably different than the existing condition scenario.

Therefore, once operational, implementation of the Proposed Project would not result in an increase in air pollutant emissions. Operation of the Proposed Project would not result in emissions that would result in a cumulatively considerable net increase of any criteria pollutant for which the project is in nonattainment under an applicable federal or State ambient air quality standard. Therefore, no air quality impacts associated with Project operation would occur.

7.1.4 Long-Term Microscale (Carbon Monoxide Hot Spot) Analysis

Construction-related vehicular trips associated with the Proposed Project would contribute to congestion at intersections and along roadway segments in the Project vicinity. Localized air quality impacts could occur when emissions from vehicular traffic increase as a result of the Proposed Project. The primary mobile-source pollutant of local concern is CO, a direct function of vehicle idling time and, thus, of traffic flow conditions. CO transport is extremely limited; under normal meteorological conditions, it disperses rapidly with distance from the source. However, under certain extreme meteorological conditions, CO concentrations near a congested roadway or intersection may reach unhealthful levels, affecting local sensitive receptors (e.g., residents, schoolchildren, the elderly, and hospital patients). Typically, high CO concentrations are associated with roadways or intersections operating at unacceptable levels of service or with extremely high traffic volumes. In areas with high ambient background CO concentrations, modeling is recommended to determine a project's effect on local CO levels.

An assessment of Project-related impacts on localized ambient air quality requires that future ambient air quality levels be projected. Existing CO concentrations in the immediate Project vicinity are not available. Ambient CO levels monitored at the Lake Elsinore Monitoring Station, the closest station with complete monitored CO data, showed a highest recorded 1-hour concentration of 1.6 ppm (the State standard is 20 ppm) and a highest 8-hour concentration of 0.8 ppm (the State standard is 9 ppm) during the past 3 years (Table 4.B). The highest CO concentrations would normally occur during peak traffic hours; hence, CO impacts calculated under peak traffic conditions represent a worst-case analysis.

In 2007, the SCAQMD was designated as in attainment for CO under both the CAAQS and NAAQS. As identified within the SCAQMD's 2003 AQMP and the 1992 Federal Attainment Plan for Carbon Monoxide, peak CO concentrations in the Basin were a result of unusual meteorological and topographical conditions and not a result of congestion at a particular intersection. A CO hot spot analysis was conducted at four busy intersections in the Basin at the peak morning and afternoon periods and did not predict a violation of CO standards.[17] Since the SCAQMD modeled intersections do not exceed the CO standards, all intersections within the Proposed Project with less volumes of

[17] The four intersections were Long Beach Boulevard/Imperial Highway, Wilshire Boulevard/Veteran Avenue, Sunset Boulevard/Highland Avenue, and La Cienega Boulevard/Century Boulevard. The busiest intersection evaluated (Wilshire Boulevard/Veteran Avenue) had a daily traffic volume of approximately 100,000 vehicles and level of service (LOS) E in the morning peak hour and LOS F in the evening peak hour.

traffic and under less extreme conditions would not exceed the CO standards. Conditions with implementation of the Proposed Project are expected to be similar to those under existing conditions, as the project would not result in additional employees or maintenance requirements. Therefore, implementation of the Proposed Project would not increase the volume of traffic required to generate a CO hot spot. Given the extremely low level of CO concentrations in the Project area and the lack of traffic impacts at any surrounding intersections, the Project is not expected to contribute significantly to CO concentrations exceeding the State or federal CO standards. Because no CO hot spot would occur, Project-related impacts on CO concentrations would be less than significant.

7.1.5 General Conformity Review

Because the proposed action is subject to SCAQMD Rule 1901, Conformity of General Federal Actions, an evaluation of the applicability of the rule to the proposed action was conducted. The general conformity regulations applicability to the federal action was evaluated by comparing the emissions to the *de minimis* emission rates. The maximum annual construction scenario was identified based on an evaluation of the construction schedule to determine which construction phases would be constructed in a single year. The year 2023 was identified as the maximum construction scenario. The peak year of construction emissions was found to be 2023; therefore, the 2023 construction emissions were compared to the *de minimis* thresholds, as shown in Table 7.C. The total amount of direct and indirect emissions for that year were calculated and are presented in Appendix C.

Table 7.C presents a summary of the estimated annual construction emissions for the Project construction, along with an evaluation of construction emissions versus the federal *de minimis* thresholds for nonattainment and maintenance pollutants in the Basin (i.e., NO_X and VOCs as extreme nonattainment O_3 precursors, CO maintenance, SO_X as a $PM_{2.5}$ precursor, PM_{10} maintenance, and $PM_{2.5}$ nonattainment/serious).

The total of direct and indirect emissions of VOCs, CO, NO_X, SO_X, PM_{10}, and $PM_{2.5}$ from the federal action is less than the general conformity *de minimis* threshold emission rates shown in Table 7.C. Therefore, the general conformity regulations do not apply to these pollutants, and no additional conformity evaluation need be made for these pollutants.

7.1.6 Health Risk on Nearby Sensitive Receptors

Cancer risk probability is often expressed as the number of cases of cancer that could occur if 1 million persons were exposed. This is calculated by multiplying the cancer risk times 1 million. Cancer risks less than 1 in 1 million, or 10 in 1 million with T-BACT, are considered acceptable by the SCAQMD under Rule 1401.

Table 7.C: Maximum Annual Construction Equipment and Fugitive Dust Emissions (TPY)

Emission Source	VOCs	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$
Construction Analysis Year 2022						
Phase 1 - Mobilization	0.00	0.02	0.01	0.00	0.04	0.02
Phase 2 - Access Roads and Staging Areas	0.04	0.55	0.24	0.00	0.21	**0.09**
TOTAL	**0.04**	**0.56**	**0.25**	**0.00**	**0.25**	**0.11**
Conformity *de minimis* Threshold	10	100	10	70	100	70
Above Threshold?	*No*	*No*	*No*	*No*	*No*	*No*
Construction Analysis Year 2023						
Phase 2- Access Road and Staging Areas	0.04	0.55	0.24	0.00	0.21	0.09
Phase 3 -Demolition of Facilities at the New Dam	0.03	0.30	0.06	0.00	1.70	**0.18**
Phase 4- Foundation Excavation	0.06	0.88	0.11	0.00	0.30	0.14
Phase 5 -Temporary Energy Dissipation Vault	0.01	0.12	0.04	0.00	0.07	**0.04**
Phase 6 - Armor Spillway	0.01	0.09	0.03	0.00	0.23	0.13
Phase 7 - Foundation Treatment and Grouting	0.04	0.67	0.10	0.00	0.21	**0.12**
Phase 8 - Roller-Compacted Concrete Placement	0.18	2.28	0.78	0.01	4.61	**1.34**
TOTAL	**0.36**	**4.89**	**1.35**	**0.02**	**7.35**	**2.06**
Conformity *de minimis* Threshold	10	100	10	70	100	70
Above Threshold?	*No*	*No*	*No*	*No*	*No*	*No*
Construction Analysis Year 2024						
Phase 13 - Demolition of the Existing Facilities	0.00	0.04	0.12	0.02	1.74	0.20
Phase 14 - Site Reclamation and Demobilization	0.01	0.08	0.02	0.00	0.06	**0.03**
TOTAL	**0.01**	**0.13**	**0.14**	**0.02**	**1.80**	**0.23**
Conformity *de minimis* Threshold	10	100	10	70	100	70
Above Threshold?	*No*	*No*	*No*	*No*	*No*	*No*

Source: Compiled by LSA.
CO = carbon monoxide
NO_X = nitrogen oxides
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
PM_{10} = particulate matter less than 10 microns in size
SO_X = sulfur oxides
tons/yr = tons per year
VOCs = volatile organic compounds

Table 7.D shows the results of the conservative modeling for carcinogenic and chronic inhalation health risks at the maximum individual sensitive receptor. Even with the conservative modeling technique used (assuming that an adult stays outdoors at his or her residence 24 hours per day for 30 years and a child stays outdoors at his or her residence 24 hours per day for 9 years, which are the State-required periods of time that all HRAs must assess), model results indicate that no sensitive receptor would be exposed to an unmitigated inhalation cancer risk greater than 0.03 in 1 million, which is less than the threshold of 10 in 1 million Modeled sensitive receptors, shown in Figure 7-1 as orange dots, were placed at discrete residential locations for the applicable residential scenarios. . Figure 7-1 shows the area's 30-year residential exposure carcinogenic risk levels. The 9-year child exposure risk levels would all be lower than the 30-year levels; thus, they would cover an area smaller than shown in Figure 7-1. Appendix E provides the HARP modeling reports and Appendix A provides the AERMOD information.

Table 7.D: Maximum Long-Term Health Risk Impact from Project Construction

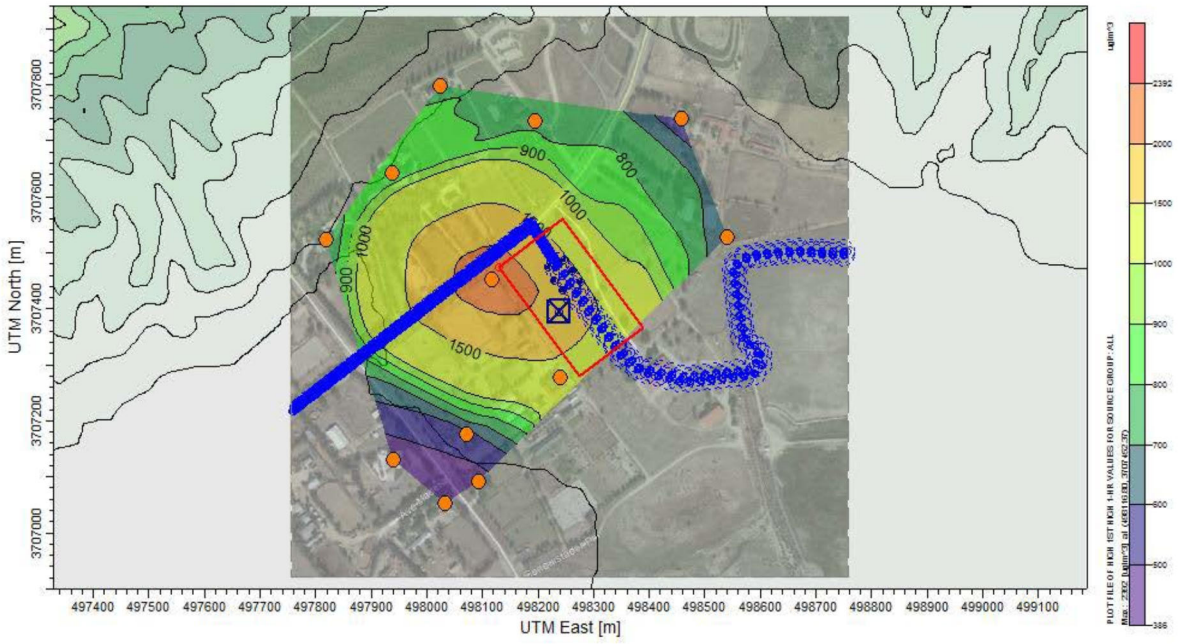
Risk	Maximum Cancer Risk (risk per million)	Maximum and 8-hour Chronic Risk (Hazard Index[1])	Maximum Acute Risk (Hazard Index[1])
SCAQMD Threshold	10.0	1.0	1.0
9-Year Child Exposure	0.03	2.7×10^{-5}	1.6×10^{-6}
30-Year Residential Exposure	0.02		
25-Year Worker Exposure	0.008		
Significant?	*No*	*No*	*No*

Source: Compiled by LSA (2020).

[1] The Hazard Index is the unitless ratio of the estimated long-term level of exposure to a toxic air contaminant for a potential maximum exposed individual to its reference exposure level.

SCAQMD = South Coast Air Quality Management District

Figure 7-1: Location of Discrete Sensitive Receptors



The results for concrete batch plant activities are shown in Table 7.D for HI and for cancer risk. The chronic and acute HIs are less than 1.0, and the cancer risk is much less 10 in 1 million. The results in Table 7.D for the MEI off-site worker are overstated by a very large margin, as the maximum impacted receptors, NexStar Ranch and Rancho Pacifica Ranch, are not continuously operated. Therefore, the worker exposure adjustment factor is much less than 0.20.

As shown in Table 7.D, the greatest chronic HI at a sensitive receptor would be 2.7×10^{-5}, which is below the threshold of 1.0. These are conservative health risk levels, meaning they are much higher than are reasonably expected to occur. In addition, Table 7.D shows the noncancer acute inhalation health risks from all Project-related sources to the nearest residents and shows that the maximum acute HI from the Proposed Project's on-site truck activity and roadway traffic would be 1.6×10^{-6},

which is also below the threshold of 1.0. Therefore, the potential for short-term chronic and acute exposure would be less than significant.

In addition, once operational, potential air quality impacts would be associated with routine maintenance and operation of the Vail Dam reservoir, and recreational use at the site. Motor vehicles and boats would be the primary source of emissions associated with reservoir operations. Operational and maintenance activities would include monitoring reservoir levels and outlet discharges, monitoring dam instrumentation, maintaining appropriate records, and maintaining mechanical and electrical equipment according to the equipment manufacturers' requirements. These activities would not result in additional employees or maintenance requirements compared to operation of the existing dam. Employee traffic for reservoir operations would not be appreciably different than the existing condition scenario. As such, the proposed project would not be a significant source of long-term operational emissions.

As such, all health risk levels to the nearest residents from Project construction and operational emissions of TACs would be well below SCAQMD's thresholds. No significant health risk would occur from Project-related activities, and no mitigation is necessary.

7.1.7 Naturally Occurring Asbestos

The Proposed Project is located in Riverside County, which is among the counties found to have serpentine and ultramafic rock in their soils (CDC 2019). However, according to the California Geological Survey, no such rock has been identified in the Project vicinity. Therefore, the potential risk for naturally occurring asbestos during Project construction is negligible. No impact would occur.

7.1.8 Odors

Heavy-duty equipment in the Project area during construction would emit odors, primarily from equipment exhaust. However, the construction activity would cease to occur after individual construction is completed. No other sources of objectionable odors have been identified for the Proposed Project, and no mitigation measures are required.

SCAQMD Rule 402 regarding nuisances states the following: "A person shall not discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which endanger the comfort, repose, health or safety of any such persons or the public, or which cause, or have a natural tendency to cause, injury or damage to business or property." The proposed uses are not anticipated to emit any objectionable odors. Therefore, objectionable odors posing a health risk to potential on-site and existing off-site uses would not occur as a result of the Proposed Project. No mitigation is required.

7.2 ENERGY ANALYSIS

The Proposed Project would have the potential increase the demand for energy through day-to-day operations and fuel consumption associated with Project construction.

7.2.1 Construction Energy Use

Construction of the Proposed Project would require energy for the manufacture and transportation of aggregate materials, preparation of the site for excavation and rock blasting activities, and construction of the dam. All or most of this energy would be derived from nonrenewable resources. Petroleum fuels (e.g., diesel and gasoline) would be the primary sources of energy for these activities. Fossil fuels are nonrenewable materials extracted from the earth and burned to produce heat or power. Petroleum products derived from fossil fuel (crude oil) are typically used to power construction equipment. Crude oil, a complex mixture of hydrocarbons, can be refined for use as a fuel for internal combustion engines (e.g., gasoline or diesel fuel). Fossil fuels, specifically diesel fuel, are evaluated because they are the means by which most of the construction equipment used to raise the dam and build other components would be powered. Construction of the Proposed Project could require approximately 31 months total using a variety of heavy equipment and vehicles. In addition, electrical energy will be supplied to the construction site during construction activities through the operation of diesel-fired generators.

Transportation energy represents the largest energy use during construction and would occur from the transport and use of construction equipment, delivery vehicles and haul trucks, and construction worker vehicles that would use petroleum fuels (e.g., diesel fuel and/or gasoline). Therefore, the analysis of energy use during construction focuses on fuel consumption. The use of energy resources would fluctuate according to the phase of construction. Most construction equipment would be gasoline-powered or diesel-powered, and the later construction phases would be electricity-powered. Construction trucks and vendor trucks hauling materials to and from the Project site would be anticipated to use diesel fuel, whereas construction workers traveling to and from the Project site would be anticipated to use gasoline-powered vehicles. Fuel consumption from transportation uses depends on the type and number of trips, VMT, fuel efficiency of vehicles, and travel modes.

Fuel use from construction trucks and construction worker vehicles traveling to the Project site was based on the estimated number of vehicle and truck trips and equipment operating hours that Project construction would generate and using the assumptions from the Construction Information Memo with the Anticipated Equipment Application and Construction Schedule (AECOM 2020). The length of the trip distances was previously discussed in the Project Description section above.

During the construction period, an estimated 866,816 gal of fuel would be consumed. As shown in Table 7.E, estimated diesel fuel consumption would be 849,376 gal from construction-related equipment and truck activities. For the construction worker vehicles, an estimated 17,920 gal of gasoline fuel would be consumed.

As previously stated, in 2019, 2.7 billion gal of fuel were consumed from vehicle trips in Riverside County based on EMFAC2017. Therefore, the peak annual fuel demand generated during construction would be less than 0.001 percent of the total annual gasoline and diesel fuel consumption in Riverside County.

Table 7.E: Construction Worker Vehicle Gasoline Fuel Use

Equipment Description	Estimated Hourly Fuel Consumption (gal)	Estimated Operating Hours	Total Fuel Consumption (gal)
Excavator	14	3,280	45,920
Front-End Loader	12	8,320	99,840
Tractor with Dozer Motor Grader	14	3,640	50,960
Motor Grader	10	2,600	26,000
Compactor	9	2,160	19,440
Truck Articulated Off Highway	14	10,360	145,040
Truck Trailer for Equipment/Materials	7	3,680	25,760
Truck Trailer for Aggregates	7	22,296	156,072
Truck Trailer for Cement of Fly Ash	7	2,268	15,876
Truck Trailer for Removal of Dam Debris	7	840	5,880
Truck Water	7	6,040	42,280
Truck Service	7	8,080	56,560
Truck Ready Mix Concrete	7	1,364	9,548
Rock Drills	7	5,040	35,280
Generator Sets	9	4,000	36,000
Crane	10	5,800	58,000
Cone Crush and Screen Plant (Electric)	0	720	0
Concrete Batch Plant	9	1,080	9,720
Grout Mix and Pump	4	2,240	8,960
Chipper	4	560	2,240
Pickup	1	17,920	17,920
Total Diesel Fuel Consumption			**849,376**
Total Gasoline Fuel Consumption			**17,920**

Source: *Construction Information Memo with the Anticipated Equipment Application and Construction Schedule* (AECOM 2020), adjusted for 90% Design.
gal = gallon/gallons

Impacts related to energy use during construction would be temporary and would be relatively small in comparison to Riverside County's overall usage and the State's available energy sources. For these reasons, Project construction would not result in the wasteful, inefficient, or unnecessary consumption of energy resources. Impacts would be less than significant, and no mitigation is required.

7.2.2 Operational Energy Use

Typically, energy consumption is associated with fuel used for vehicle trips and electricity and natural gas use. Once the new dam is fully operational, potential energy usage would be associated with routine maintenance and operation of the Vail Dam reservoir, and recreational use at the site. Motor vehicles and boats would be the primary source of emissions associated with reservoir operations. Operational and maintenance activities would include monitoring reservoir levels and outlet discharges, monitoring dam instrumentation, maintaining appropriate records, and maintaining mechanical and electrical equipment according to the equipment manufacturers' requirements. Operation of the Proposed Project would not result in a substantial increase in

electricity or natural gas use. Operation and maintenance activities would result in fuel demand associated with worker trips to the reservoir. However, employee traffic for reservoir operations would not be appreciably different than the existing condition scenario. Routine maintenance and operational activities at the dam and reservoir, and the use of the marina and reservoir, would result in negligible fuel demand.

Therefore, once operational, implementation of the Proposed Project would not result in an increase in energy usage. Operation of the Proposed Project would not result in energy demand that would be considered inefficient, wasteful, or unnecessary. Therefore, impacts would be less than significant, and no mitigation is required.

7.2.3 Conflict with or Obstruct a State or Local Plan for Renewable Energy or Energy Efficiency

The CEC adopted the 2022 Integrated Energy Policy Report Update, which provides the results of the CEC's assessments of a variety of energy issues facing California. RCWD relies on the State integrated energy plan and does not have its own plan to address renewable energy or energy efficiency.

As indicated above, energy usage on the project site during construction would be temporary in nature and would be relatively small in comparison to the overall use in the County. In addition, energy usage associated with operation of the proposed project would be relatively small in comparison to the overall use in Riverside County, and the State's available energy source. Therefore, energy impacts at the regional level would be negligible. Because California's energy conservation planning actions are conducted at a regional level, and because the proposed project's total impact on regional energy supplies would be minor, the proposed project would not conflict with or obstruct California's energy conservation plans as described in the CEC's Integrated Energy Policy Report. Additionally, as demonstrated above, the proposed project would not result in the inefficient, wasteful, and unnecessary consumption of energy. Therefore, the proposed project would not conflict with or obstruct a State or local plan for renewable energy or energy efficiency. Impacts would be less than significant, and no mitigation is required.

7.3 GREENHOUSE GAS EMISSION ANALYSIS

This section evaluates potential significant impacts related to GHGs that could result from implementation of the Proposed Project.

7.3.1 Construction Greenhouse Gas Emissions

During construction of the Proposed Project, GHGs would be emitted through the operation of construction equipment and from worker and vendor vehicles, each of which typically uses fossil-based fuels to operate. The combustion of fossil-based fuels creates GHGs (e.g., CO_2, CH_4, and N_2O). Furthermore, CH_4 is emitted during the fueling of heavy equipment. The GHG emissions from construction activity would be temporary and would cease when construction is complete. Table 7.F lists the annual CO_2e emissions for each of the planned construction phases based on the results from CalEEMod.

Table 7.F: Construction Greenhouse Gas Emissions

Construction Activities	Emissions (MT)				Total Emissions (MT/CO_2e)
	CO_2	CH_4	N_2O	CO_2e	
Construction Analysis Year 2022					
Phase 1 - Mobilization	8.18	0.00	0.13	8.31	131.72
Phase 2 - Access Roads and Staging Areas	121.53	0.60	1.28	123.41	
Construction Analysis Year 2023					
Phase 2 - Access Road and Staging Areas	121.53	0.60	1.28	123.41	1,318.38
Phase 3 - Demolition of Facilities at the New Dam	121.93	0.86	0.55	123.34	
Phase 4 - Foundation Excavation	298.84	2.05	0.89	301.78	
Phase 5 - Temporary Energy Dissipation Vault	55.14	0.30	0.39	55.83	
Phase 6 - Armor Spillway	30.89	0.17	0.27	31.32	
Phase 7 - Foundation Treatment and Grouting	219.91	1.38	0.72	222.00	
Phase 8 - Roller-Compacted Concrete Placement	454.54	2.54	3.62	460.70	
Construction Analysis Year 2024					
Phase 8 - Roller-Compacted Concrete Placement	454.54	2.54	3.62	460.70	1,619.24
Phase 9 - Outlet Tower	161.18	0.67	2.22	164.07	
Phase 10 - Dam Drainage	153.60	1.15	0.39	155.14	
Phase 11 - Dam Instrumentation	79.40	0.61	0.20	80.21	
Phase 12 - Permanent Energy Dissipation Vault	35.15	0.19	0.29	35.64	
Phase 13 - Demolition of the Existing Facilities	16.47	704.90	2.11	723.48	
Construction Analysis Year 2025					
Phase 13 - Demolition of the Existing Facilities	4.12	176.23	0.53	180.87	210.33
Phase 14 - Site Reclamation and Demobilization	29.12	0.19	0.16	29.46	
Construction Phase Totals					
Subtotal Construction Exhaust Emissions					3,279.67
Concrete Production GHG Emissions					14,217.74
Amortized over 30 Years					583.24
SCAQMD Interim GHG Threshold					3,000
Exceedance?					*No*

Source: Compiled by LSA (August 2020).

CH_4 = methane
CO_2 = carbon dioxide
CO_2e = carbon dioxide equivalent
GHG = greenhouse gas
MT = metric tons
MT/CO_2e = metric tons of carbon dioxide equivalent
N_2O = nitrous oxide
SCAQMD = South Coast Air Quality Management District

As shown in Table 7.F, the Proposed Project would generate 3,280 MT CO_2e from construction equipment and vehicle exhaust activity and 14,218 MT CO_2e from the concrete process. With the amortized CO_2e, the Proposed Project would generate a total of 583.24 MT CO_2e/yr. The Proposed Project's emissions are less than the County screening threshold of 3,000 MT CO_2e/yr. Based on this GHG analysis, the Proposed Project's construction impacts would be less than significant.

7.3.2 Operational Greenhouse Gas Emissions

Long-term GHG emissions are typically generated from mobile and area sources as well as indirect emissions from sources associated with energy consumption. Mobile-source GHG emissions include project-generated vehicle trips to and from a project. Area-source emissions would be associated with activities such as landscaping and maintenance on a project site. Energy source emissions are typically generated at off-site utility providers as a result of increased electricity demand generated by a project. Waste source emissions include energy generated by land filling and other methods of

disposal related to transporting and managing project-generated waste. In addition, water source emissions are generated by water supply and conveyance, water treatment, water distribution, and wastewater treatment.

Once the new dam is fully operational, potential GHG impacts would be associated with routine maintenance and operation of the Vail Dam reservoir, and recreational use at the site. Motor vehicles and boats would be the primary source of emissions associated with reservoir operations. Operational and maintenance activities would include monitoring reservoir levels and outlet discharges, monitoring dam instrumentation, maintaining appropriate records, and maintaining mechanical and electrical equipment according to the equipment manufacturers' requirements. Power would be used for lighting, security cameras, gate actuators, trash rack hoists, and monitoring and control systems. However, energy emissions would be minimal and would not exceed thresholds established by the SCAQMD. In addition, these activities would not result in additional employees or maintenance requirements compared to operation of the existing dam. Employee traffic for reservoir operations would not be appreciably different than the existing condition scenario. As such, routine maintenance and operational activities at the dam and reservoir, and the use of the marina and reservoir, would result in negligible GHG emissions. Therefore, the Proposed Project's operational impacts related to GHG emissions would result in no impact, and no mitigation would be required.

7.3.3 Consistency with Greenhouse Gas Reduction Plans

7.3.3.1 CARB Scoping Plan

California's major initiative for reducing GHG emissions is AB 32, passed by the State legislature on August 31, 2006. AB 32 is aimed at reducing GHG emissions to 1990 levels by 2020. AB 32 requires CARB to prepare a Scoping Plan that outlines the main State strategies for meeting the 2020 deadline and to reduce GHGs that contribute to GCC. The AB 32 Scoping Plan has a range of GHG reduction actions, which include direct regulations, alternative compliance mechanisms, monetary and nonmonetary incentives, voluntary actions, market-based mechanisms (e.g., a cap-and-trade system), and an AB 32 implementation fee to fund the program.

EO B-30-15 added the immediate target of reducing GHG emissions to 40 percent below 1990 levels by 2030. CARB released a second update to the Scoping Plan, the 2017 Scoping Plan (CARB 2017b), to reflect the 2030 target set by EO B-30-15 and codified by SB 32. SB 32 affirms the importance of addressing climate change by codifying into statute the GHG emissions reduction target of at least 40 percent below 1990 levels by 2030 contained in EO B-30-15. SB 32 builds on AB 32 and keeps us on the path toward achieving the State's 2050 objective of reducing emissions to 80 percent below 1990 levels. The companion bill to SB 32 (i.e., AB 197) provides additional direction to CARB related to the adoption of strategies to reduce GHG emissions. Additional direction in AB 197 that is intended to provide easier public access to air emissions data collected by CARB was posted in December 2016.

As identified above, the AB 32 Scoping Plan contains GHG reduction measures that work toward reducing GHG emissions, consistent with the targets set by AB 32 and EO B-30-15 and codified by SB 32 and AB 197. The measures applicable to the Proposed Project include energy efficiency

measures, water conservation and efficiency measures, and transportation and motor vehicle measures, as discussed below.

Energy efficient measures are intended to maximize energy efficiency building and appliance standards, pursue additional efficiency efforts (including new technologies and new policy and implementation mechanisms), and pursue comparable investment in energy efficiency from all retail providers of electricity in California. In addition, these measures are designed to expand the use of green building practices to reduce the carbon footprint of California's new and existing inventory of buildings. The existing dam facilities have overhead electrical service provided by SCE. The existing overhead service would need to be rerouted to accommodate the footprint of the new dam and outlet works facilities. New power poles would be provided to route the existing service up the downstream side of the right abutment to the new Dam Control Building. All new electrical utility facilities would be designed per SCE standards. Power is used for lighting, security cameras, gate actuators, trash rack hoists, and monitoring and control systems. The operation of the Dam Control Building would continue after Project construction; however, energy emissions would be minimal and would not conflict with any of the energy efficient measures.

Water conservation and efficiency measures are intended to continue efficiency programs and use cleaner energy sources to move and treat water. Increasing the efficiency of water transport and reducing water use would reduce GHG emissions. The Proposed Project would remediate seismic and hydrologic hazards associated with the existing Vail Dam, a concrete arch dam, by constructing a new straight-axis gravity concrete dam immediately downstream of the existing dam. The Proposed Project would improve the existing dam and would not conflict with any of the water conservation and efficiency measures.

The goal of transportation and motor vehicle measures is to develop regional GHG emission reduction targets for passenger vehicles. Specific regional targets for transportation emissions would not directly apply to the proposed project. In addition, once operational, the Proposed Project is not expected to generate new vehicle trips. Therefore, the Proposed Project would not conflict with the identified transportation and motor vehicle measures.

Therefore, the Proposed Project would not conflict with existing State regulations adopted to achieve the overall GHG emissions reduction goals identified in AB 32 and would be consistent with applicable plans and programs designed to reduce GHG emissions. Therefore, the Proposed Project would not conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs and impacts would be less than significant.

7.3.3.2 SCAG's Regional Transportation Plan/Sustainable Communities Strategy

SCAG's 2020–2045 RTP/SCS was adopted September 3, 2020. SCAG's RTP/SCS identifies that land use strategies that focus on new housing and job growth in areas served by high-quality transit and other opportunity areas would be consistent with a land use development pattern that supports and complements the proposed transportation network. The core vision in the 2020–2045 RTP/SCS is to better manage the existing transportation system through design management strategies, integrate land use decisions and technological advancements, create complete streets that are safe to all roadway users, preserve the transportation system, and expand transit and foster development in

transit-oriented communities. The 2020–2045 RTP/SCS contains transportation projects to help more efficiently distribute population, housing, and employment growth, as well as a forecasted development pattern that is generally consistent with regional-level General Plan data. The forecasted development pattern, when integrated with the financially constrained transportation investments identified in the 2020–2045 RTP/SCS, would reach the regional target of reducing GHG emissions from autos and light-duty trucks by 8 percent per capita by 2020 and 19 percent by 2035 (compared to 2005 levels). The 2020–2045 RTP/SCS does not require that local General Plans, Specific Plans, or zoning be consistent with the 2020–2045 RTP/SCS but provides incentives for consistency for governments and developers.

Implementing SCAG's RTP/SCS will greatly reduce the regional GHG emissions from transportation, helping to achieve statewide emission reduction targets. The Proposed Project would remediate seismic and hydrologic hazards associated with the existing Vail Dam, a concrete arch dam, by constructing a new straight-axis gravity concrete dam immediately downstream of the existing dam. The Proposed Project would not conflict with the stated goals of the RTP/SCS; therefore, the Proposed Project would not interfere with SCAG's ability to achieve the region's GHG reduction targets at 8 percent below 2005 per capita emissions levels by 2020 and 19 percent below 2005 per capita emissions levels by 2035, and it can be assumed that regional mobile emissions will decrease in line with the goals of the RTP/SCS. Furthermore, the Proposed Project is not regionally significant per *State CEQA Guidelines* Section 15206, and, as such, it would not conflict with the SCAG RTP/SCS targets, since those targets were established and are applicable on a regional level.

Based on the nature of the Proposed Project, it is anticipated that implementation of the Proposed Project would not interfere with SCAG's ability to implement the regional strategies outlined in the RTP/SCS. Therefore, the Proposed Project would not conflict with an adopted plan, policy, or regulation pertaining to GHG emissions and impacts would be less than significant.

7.4 MITIGATION MEASURES

Implementation of Mitigation Measure AQ-1 would be required to reduce Project construction-related NO_x emissions:

Mitigation Measure AQ-1 During construction of Phase 8, Phase 9, and Phase 10, all off-road construction equipment shall meet the minimum application of EPA Tier 4 engine standards or equivalent.

7.4.1 Level of Significance after Mitigation

Table 7.G presents a summary of mitigated peak daily construction emissions.

With the utilization of Tier 4 diesel-powered construction equipment during construction of the Proposed Project, all criteria pollutants would be below the SCAQMD thresholds.

Accordingly, implementation of the Tier 4 mitigation would reduce the Proposed Project's construction-related impacts to below a level of significance. Construction-related emissions would not exceed the SCAQMD thresholds for any criteria pollutant during construction after mitigation.

Table 7.G: Mitigated Peak Daily Construction Equipment and Fugitive Dust Emissions (lbs/day)

Emission Source	VOCs	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$
Phase 8 —Roller-Compacted Concrete Placement - Months 13 to 20						
Fugitive Dust—Material Handling	–	–	–	–	20.33	4.13
Fugitive Dust—Unpaved Roads	–	–	–	–	63.37	36.12
Vehicle, Equipment, and Truck Emissions	5.01	65.35	19.60	0.26	0.41	0.38
Phase 9 —Outlet Tower - Months 17 to 23						
Fugitive Dust—Material Handling	–	–	–	–	0	0
Fugitive Dust—Unpaved Roads	–	–	–	–	7.39	4.21
Vehicle, Equipment, and Truck Emissions	0.52	4.19	5.46	0.03	0.07	0.07
Phase 10 —Dam Drainage - Months 18 to 22						
Fugitive Dust—Material Handling	–	–	–	–	0	0
Fugitive Dust—Unpaved Roads	–	–	–	–	3.70	2.11
Vehicle, Equipment, and Truck Emissions	0.61	8.94	1.11	0.04	0.05	0.04
TOTAL	**6.14**	**78.48**	**26.17**	**0.33**	**95.31**	**47.06**
Significance Threshold	75	550	100	150	150	55
Above Threshold?	*No*	*No*	*No*	*No*	*No*	*No*

Source: Compiled by LSA.
CO = carbon monoxide
lbs/day = pounds per day
NO_X = nitrogen oxides
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
PM_{10} = particulate matter less than 10 microns in size
SO_X = sulfur oxides
VOCs = volatile organic compounds

7.5 CUMULATIVE IMPACTS

In the South Coast Air Basin, the CAAQS designate the project site as nonattainment for O_3, PM_{10}, and $PM_{2.5}$ while the NAAQS designate the project site as nonattainment for O_3 and $PM_{2.5}$.

The SCAQMD published a report on how to address cumulative impacts from air pollution: *White Paper on Potential Control Strategies to Address Cumulative Impacts from Air Pollution* (SCAQMD 2003c). In this report, the SCAQMD clearly states (Page D-3):

> "…the SCAQMD uses the same significance thresholds for project specific and cumulative impacts for all environmental topics analyzed in an Environmental Assessment or Environmental Impact Report (EIR). The only case where the significance thresholds for project specific and cumulative impacts differ is the Hazard Index (HI) significance threshold for TAC emissions. The project specific (project increment) significance threshold is HI > 1.0 while the cumulative (facility-wide) is HI > 3.0. It should be noted that the HI is only one of three TAC emission significance thresholds considered (when applicable) in a CEQA analysis. The other two are the maximum individual cancer risk (MICR) and the cancer burden, both of which use the same significance thresholds (MICR of 10 in 1 million and cancer burden of 0.5) for project specific and cumulative impacts.
>
> Projects that exceed the project-specific significance thresholds are considered by the SCAQMD to be cumulatively considerable. This is the reason project-specific and

> cumulative significance thresholds are the same. Conversely, projects that do not exceed the project-specific thresholds are generally not considered to be cumulatively significant."

The Proposed Project would not generate operational or construction emissions that exceed the SCAQMD's recommended daily thresholds for project-specific impacts and would also not cause a cumulatively considerable increase in emissions for those pollutants for which the Basin is in nonattainment, and, therefore, would not be considered to have a cumulatively significant, adverse air quality impact.

The potential for cumulative impacts to energy resources was assessed based upon consideration of the proposed project in combination with all projects within the SCE and SoCalGas planning areas. Cumulative construction and building development activities throughout the Southern California region are likely to result in the demand for new systems or supplies or substantial alternations to the existing power or natural gas utilities. However, the Proposed Project is consistent with long range planning in the County of Riverside and the region as a whole, the County has policies that require coordination of new development with both SCE and SoCalGas, and both providers have indicated that they can serve the region. Future projects will undergo similar environmental review and coordination with the service providers to determine the extent of power demand. This continual coordination process, coupled with energy use reduction strategies designed to address GHG emissions, will ensure that the types of development considered are consistent with the service plans of both SCE and SoCalGas. As this Proposed Project is consistent with the County's long range plans such as the County's General Plan, and included in both the SCE and SoCalGas service area plans, the Project's incremental contribution to cumulative energy impacts would be less than cumulatively considerable.

Cumulative impacts are the collective impacts of one or more past, present, or future projects that, when combined, result in adverse changes to the environment. Climate change is a global environmental problem in which the following situations are the case: (1) any given development project contributes only a small portion of any net increase in GHGs; and (2) global growth is continuing to contribute large amounts of GHGs across the world. Land use projects may contribute to the phenomenon of GCC in ways that would be experienced worldwide, and with some specific effects felt in California. However, no scientific study has established a direct causal link between individual land use project impacts and global warming.

The analysis of impacts related to GHG emissions is inherently cumulative. The Proposed Project would not conflict with applicable statewide, regional, and local climate action measures. Therefore, GHG emissions impacts associated with the proposed project would be less than significant.

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APPENDIX A

AERMOD OUTPUT DATA

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*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

                                        ***   MODEL SETUP OPTIONS SUMMARY   ***
- - - -

```
**Output Options Selected:
        Model Outputs Tables of PERIOD Averages by Receptor
        Model Outputs Tables of Highest Short Term Values by Receptor (RECTABLE Keyword)
        Model Outputs External File(s) of High Values for Plotting (PLOTFILE Keyword)
        Model Outputs Separate Summary File of High Ranked Values (SUMMFILE Keyword)

**NOTE:  The Following Flags May Appear Following CONC Values:  c for Calm Hours
                                                                m for Missing Hours
                                                                b for Both Calm and Missing Hours

**Misc. Inputs:  Base Elev. for Pot. Temp. Profile (m MSL) =   406.00 ;  Decay Coef. =    0.000     ;  Rot. Angle =     0.0
                 Emission Units = GRAMS/SEC                              ;  Emission Rate Unit Factor =   0.10000E+07
                 Output Units   = MICROGRAMS/M**3

**Approximate Storage Requirements of Model =      3.8 MB of RAM.

**Input Runstream File:          aermod.inp
**Output Print File:             aermod.out

**Detailed Error/Message File:   Vail Dam Concrete Batch Plant Staging Area.err
**File for Summary of Results:   Vail Dam Concrete Batch Plant Staging Area.sum
```

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** VOLUME SOURCE DATA ***

SOURCE ID	NUMBER PART. CATS.	EMISSION RATE (GRAMS/SEC)	X (METERS)	Y (METERS)	BASE ELEV. (METERS)	RELEASE HEIGHT (METERS)	INIT. SY (METERS)	INIT. SZ (METERS)	URBAN SOURCE	EMISSION RATE SCALAR VARY BY
L0011630	0	0.64935E-02	497762.7	3707219.2	379.1	0.25	1.86	0.93	YES	
L0011631	0	0.64935E-02	497765.9	3707221.6	379.1	0.25	1.86	0.93	YES	
L0011632	0	0.64935E-02	497769.1	3707224.0	379.1	0.25	1.86	0.93	YES	
L0011633	0	0.64935E-02	497772.3	3707226.5	379.1	0.25	1.86	0.93	YES	
L0011634	0	0.64935E-02	497775.4	3707228.9	379.1	0.25	1.86	0.93	YES	
L0011635	0	0.64935E-02	497778.6	3707231.3	379.2	0.25	1.86	0.93	YES	
L0011636	0	0.64935E-02	497781.8	3707233.8	379.2	0.25	1.86	0.93	YES	
L0011637	0	0.64935E-02	497785.0	3707236.2	379.2	0.25	1.86	0.93	YES	
L0011638	0	0.64935E-02	497788.1	3707238.6	379.2	0.25	1.86	0.93	YES	
L0011639	0	0.64935E-02	497791.3	3707241.1	379.3	0.25	1.86	0.93	YES	
L0011640	0	0.64935E-02	497794.5	3707243.5	379.3	0.25	1.86	0.93	YES	
L0011641	0	0.64935E-02	497797.6	3707245.9	379.3	0.25	1.86	0.93	YES	
L0011642	0	0.64935E-02	497800.8	3707248.4	379.4	0.25	1.86	0.93	YES	
L0011643	0	0.64935E-02	497804.0	3707250.8	379.4	0.25	1.86	0.93	YES	
L0011644	0	0.64935E-02	497807.2	3707253.3	379.4	0.25	1.86	0.93	YES	
L0011645	0	0.64935E-02	497810.3	3707255.7	379.4	0.25	1.86	0.93	YES	
L0011646	0	0.64935E-02	497813.5	3707258.1	379.5	0.25	1.86	0.93	YES	
L0011647	0	0.64935E-02	497816.7	3707260.6	379.5	0.25	1.86	0.93	YES	
L0011648	0	0.64935E-02	497819.9	3707263.0	379.5	0.25	1.86	0.93	YES	
L0011649	0	0.64935E-02	497823.0	3707265.4	379.5	0.25	1.86	0.93	YES	
L0011650	0	0.64935E-02	497826.2	3707267.9	379.5	0.25	1.86	0.93	YES	
L0011651	0	0.64935E-02	497829.4	3707270.3	379.5	0.25	1.86	0.93	YES	
L0011652	0	0.64935E-02	497832.6	3707272.7	379.6	0.25	1.86	0.93	YES	
L0011653	0	0.64935E-02	497835.7	3707275.2	379.6	0.25	1.86	0.93	YES	
L0011654	0	0.64935E-02	497838.9	3707277.6	379.6	0.25	1.86	0.93	YES	
L0011655	0	0.64935E-02	497842.1	3707280.0	379.6	0.25	1.86	0.93	YES	
L0011656	0	0.64935E-02	497845.3	3707282.5	379.6	0.25	1.86	0.93	YES	
L0011657	0	0.64935E-02	497848.4	3707284.9	379.6	0.25	1.86	0.93	YES	
L0011658	0	0.64935E-02	497851.6	3707287.3	379.6	0.25	1.86	0.93	YES	
L0011659	0	0.64935E-02	497854.8	3707289.8	379.7	0.25	1.86	0.93	YES	
L0011660	0	0.64935E-02	497858.0	3707292.2	379.7	0.25	1.86	0.93	YES	
L0011661	0	0.64935E-02	497861.1	3707294.6	379.7	0.25	1.86	0.93	YES	
L0011662	0	0.64935E-02	497864.3	3707297.1	379.7	0.25	1.86	0.93	YES	
L0011663	0	0.64935E-02	497867.5	3707299.5	379.7	0.25	1.86	0.93	YES	
L0011664	0	0.64935E-02	497870.6	3707301.9	379.8	0.25	1.86	0.93	YES	
L0011665	0	0.64935E-02	497873.8	3707304.4	379.8	0.25	1.86	0.93	YES	
L0011666	0	0.64935E-02	497877.0	3707306.8	379.9	0.25	1.86	0.93	YES	
L0011667	0	0.64935E-02	497880.2	3707309.2	379.9	0.25	1.86	0.93	YES	
L0011668	0	0.64935E-02	497883.3	3707311.7	380.0	0.25	1.86	0.93	YES	
L0011669	0	0.64935E-02	497886.5	3707314.1	380.0	0.25	1.86	0.93	YES	

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** VOLUME SOURCE DATA ***

SOURCE ID	NUMBER PART. CATS.	EMISSION RATE (GRAMS/SEC)	X (METERS)	Y (METERS)	BASE ELEV. (METERS)	RELEASE HEIGHT (METERS)	INIT. SY (METERS)	INIT. SZ (METERS)	URBAN SOURCE	EMISSION RATE SCALAR VARY BY
L0011670	0	0.64935E-02	497889.7	3707316.5	380.0	0.25	1.86	0.93	YES	
L0011671	0	0.64935E-02	497892.9	3707319.0	379.9	0.25	1.86	0.93	YES	
L0011672	0	0.64935E-02	497896.0	3707321.4	379.9	0.25	1.86	0.93	YES	
L0011673	0	0.64935E-02	497899.2	3707323.8	379.9	0.25	1.86	0.93	YES	
L0011674	0	0.64935E-02	497902.4	3707326.3	379.9	0.25	1.86	0.93	YES	
L0011675	0	0.64935E-02	497905.6	3707328.7	380.0	0.25	1.86	0.93	YES	
L0011676	0	0.64935E-02	497908.7	3707331.1	380.0	0.25	1.86	0.93	YES	
L0011677	0	0.64935E-02	497911.9	3707333.6	380.0	0.25	1.86	0.93	YES	
L0011678	0	0.64935E-02	497915.1	3707336.0	380.0	0.25	1.86	0.93	YES	
L0011679	0	0.64935E-02	497918.3	3707338.5	380.0	0.25	1.86	0.93	YES	
L0011680	0	0.64935E-02	497921.4	3707340.9	379.9	0.25	1.86	0.93	YES	
L0011681	0	0.64935E-02	497924.6	3707343.3	379.9	0.25	1.86	0.93	YES	
L0011682	0	0.64935E-02	497927.8	3707345.8	380.0	0.25	1.86	0.93	YES	
L0011683	0	0.64935E-02	497931.0	3707348.2	380.0	0.25	1.86	0.93	YES	
L0011684	0	0.64935E-02	497934.1	3707350.6	380.1	0.25	1.86	0.93	YES	
L0011685	0	0.64935E-02	497937.3	3707353.1	380.1	0.25	1.86	0.93	YES	
L0011686	0	0.64935E-02	497940.5	3707355.5	380.1	0.25	1.86	0.93	YES	
L0011687	0	0.64935E-02	497943.6	3707357.9	380.2	0.25	1.86	0.93	YES	
L0011688	0	0.64935E-02	497946.8	3707360.4	380.3	0.25	1.86	0.93	YES	
L0011689	0	0.64935E-02	497950.0	3707362.8	380.4	0.25	1.86	0.93	YES	
L0011690	0	0.64935E-02	497953.2	3707365.2	380.5	0.25	1.86	0.93	YES	
L0011691	0	0.64935E-02	497956.3	3707367.7	380.6	0.25	1.86	0.93	YES	
L0011692	0	0.64935E-02	497959.5	3707370.1	380.6	0.25	1.86	0.93	YES	
L0011693	0	0.64935E-02	497962.7	3707372.5	380.7	0.25	1.86	0.93	YES	
L0011694	0	0.64935E-02	497965.9	3707375.0	380.7	0.25	1.86	0.93	YES	
L0011695	0	0.64935E-02	497969.0	3707377.4	380.7	0.25	1.86	0.93	YES	
L0011696	0	0.64935E-02	497972.2	3707379.8	380.8	0.25	1.86	0.93	YES	
L0011697	0	0.64935E-02	497975.4	3707382.3	380.8	0.25	1.86	0.93	YES	
L0011698	0	0.64935E-02	497978.6	3707384.7	380.9	0.25	1.86	0.93	YES	
L0011699	0	0.64935E-02	497981.7	3707387.1	381.0	0.25	1.86	0.93	YES	
L0011700	0	0.64935E-02	497984.9	3707389.6	381.1	0.25	1.86	0.93	YES	
L0011701	0	0.64935E-02	497988.1	3707392.0	381.2	0.25	1.86	0.93	YES	
L0011702	0	0.64935E-02	497991.3	3707394.4	381.4	0.25	1.86	0.93	YES	
L0011703	0	0.64935E-02	497994.4	3707396.9	381.5	0.25	1.86	0.93	YES	
L0011704	0	0.64935E-02	497997.6	3707399.3	381.7	0.25	1.86	0.93	YES	
L0011705	0	0.64935E-02	498000.8	3707401.7	381.8	0.25	1.86	0.93	YES	
L0011706	0	0.64935E-02	498004.0	3707404.2	381.8	0.25	1.86	0.93	YES	
L0011707	0	0.64935E-02	498007.1	3707406.6	381.9	0.25	1.86	0.93	YES	
L0011708	0	0.64935E-02	498010.3	3707409.0	381.9	0.25	1.86	0.93	YES	
L0011709	0	0.64935E-02	498013.5	3707411.5	381.9	0.25	1.86	0.93	YES	

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** VOLUME SOURCE DATA ***

SOURCE ID	NUMBER PART. CATS.	EMISSION RATE (GRAMS/SEC)	X (METERS)	Y (METERS)	BASE ELEV. (METERS)	RELEASE HEIGHT (METERS)	INIT. SY (METERS)	INIT. SZ (METERS)	URBAN SOURCE	EMISSION RATE SCALAR VARY BY
L0011710	0	0.64935E-02	498016.7	3707413.9	382.0	0.25	1.86	0.93	YES	
L0011711	0	0.64935E-02	498019.8	3707416.3	382.0	0.25	1.86	0.93	YES	
L0011712	0	0.64935E-02	498023.0	3707418.8	382.1	0.25	1.86	0.93	YES	
L0011713	0	0.64935E-02	498026.2	3707421.2	382.1	0.25	1.86	0.93	YES	
L0011714	0	0.64935E-02	498029.3	3707423.7	382.1	0.25	1.86	0.93	YES	
L0011715	0	0.64935E-02	498032.5	3707426.1	382.1	0.25	1.86	0.93	YES	
L0011716	0	0.64935E-02	498035.7	3707428.5	382.1	0.25	1.86	0.93	YES	
L0011717	0	0.64935E-02	498038.9	3707431.0	382.1	0.25	1.86	0.93	YES	
L0011718	0	0.64935E-02	498042.0	3707433.4	382.1	0.25	1.86	0.93	YES	
L0011719	0	0.64935E-02	498045.2	3707435.8	382.1	0.25	1.86	0.93	YES	
L0011720	0	0.64935E-02	498048.4	3707438.3	382.1	0.25	1.86	0.93	YES	
L0011721	0	0.64935E-02	498051.6	3707440.7	382.1	0.25	1.86	0.93	YES	
L0011722	0	0.64935E-02	498054.7	3707443.1	382.1	0.25	1.86	0.93	YES	
L0011723	0	0.64935E-02	498057.9	3707445.6	382.1	0.25	1.86	0.93	YES	
L0011724	0	0.64935E-02	498061.1	3707448.0	382.1	0.25	1.86	0.93	YES	
L0011725	0	0.64935E-02	498064.3	3707450.4	382.1	0.25	1.86	0.93	YES	
L0011726	0	0.64935E-02	498067.4	3707452.9	382.1	0.25	1.86	0.93	YES	
L0011727	0	0.64935E-02	498070.6	3707455.3	382.1	0.25	1.86	0.93	YES	
L0011728	0	0.64935E-02	498073.8	3707457.7	382.2	0.25	1.86	0.93	YES	
L0011729	0	0.64935E-02	498077.0	3707460.2	382.2	0.25	1.86	0.93	YES	
L0011730	0	0.64935E-02	498080.1	3707462.6	382.2	0.25	1.86	0.93	YES	
L0011731	0	0.64935E-02	498083.3	3707465.0	382.2	0.25	1.86	0.93	YES	
L0011732	0	0.64935E-02	498086.5	3707467.5	382.2	0.25	1.86	0.93	YES	
L0011733	0	0.64935E-02	498089.7	3707469.9	382.2	0.25	1.86	0.93	YES	
L0011734	0	0.64935E-02	498092.8	3707472.3	382.2	0.25	1.86	0.93	YES	
L0011735	0	0.64935E-02	498096.0	3707474.8	382.2	0.25	1.86	0.93	YES	
L0011736	0	0.64935E-02	498099.2	3707477.2	382.2	0.25	1.86	0.93	YES	
L0011737	0	0.64935E-02	498102.4	3707479.6	382.3	0.25	1.86	0.93	YES	
L0011738	0	0.64935E-02	498105.5	3707482.1	382.3	0.25	1.86	0.93	YES	
L0011739	0	0.64935E-02	498108.7	3707484.5	382.3	0.25	1.86	0.93	YES	
L0011740	0	0.64935E-02	498111.9	3707486.9	382.4	0.25	1.86	0.93	YES	
L0011741	0	0.64935E-02	498115.0	3707489.4	382.4	0.25	1.86	0.93	YES	
L0011742	0	0.64935E-02	498118.2	3707491.8	382.4	0.25	1.86	0.93	YES	
L0011743	0	0.64935E-02	498121.4	3707494.2	382.5	0.25	1.86	0.93	YES	
L0011744	0	0.64935E-02	498124.6	3707496.7	382.6	0.25	1.86	0.93	YES	
L0011745	0	0.64935E-02	498127.7	3707499.1	382.6	0.25	1.86	0.93	YES	
L0011746	0	0.64935E-02	498130.9	3707501.5	382.7	0.25	1.86	0.93	YES	
L0011747	0	0.64935E-02	498134.1	3707504.0	382.7	0.25	1.86	0.93	YES	
L0011748	0	0.64935E-02	498137.3	3707506.4	382.7	0.25	1.86	0.93	YES	
L0011749	0	0.64935E-02	498140.4	3707508.9	382.8	0.25	1.86	0.93	YES	

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*** VOLUME SOURCE DATA ***

SOURCE ID	NUMBER PART. CATS.	EMISSION RATE (GRAMS/SEC)	X (METERS)	Y (METERS)	BASE ELEV. (METERS)	RELEASE HEIGHT (METERS)	INIT. SY (METERS)	INIT. SZ (METERS)	URBAN SOURCE	EMISSION RATE SCALAR VARY BY
L0011750	0	0.64935E-02	498143.6	3707511.3	382.8	0.25	1.86	0.93	YES	
L0011751	0	0.64935E-02	498146.8	3707513.7	382.9	0.25	1.86	0.93	YES	
L0011752	0	0.64935E-02	498150.0	3707516.2	382.9	0.25	1.86	0.93	YES	
L0011753	0	0.64935E-02	498153.1	3707518.6	383.0	0.25	1.86	0.93	YES	
L0011754	0	0.64935E-02	498156.3	3707521.0	383.0	0.25	1.86	0.93	YES	
L0011755	0	0.64935E-02	498159.5	3707523.5	383.1	0.25	1.86	0.93	YES	
L0011756	0	0.64935E-02	498162.7	3707525.9	383.1	0.25	1.86	0.93	YES	
L0011757	0	0.64935E-02	498165.8	3707528.3	383.1	0.25	1.86	0.93	YES	
L0011758	0	0.64935E-02	498169.0	3707530.8	383.2	0.25	1.86	0.93	YES	
L0011759	0	0.64935E-02	498172.2	3707533.2	383.2	0.25	1.86	0.93	YES	
L0011760	0	0.64935E-02	498175.4	3707535.6	383.2	0.25	1.86	0.93	YES	
L0011761	0	0.64935E-02	498178.5	3707538.1	383.2	0.25	1.86	0.93	YES	
L0011762	0	0.64935E-02	498181.7	3707540.5	383.2	0.25	1.86	0.93	YES	
L0011763	0	0.64935E-02	498184.9	3707542.9	383.2	0.25	1.86	0.93	YES	
L0011764	0	0.64935E-02	498187.8	3707543.9	383.2	0.25	1.86	0.93	YES	
L0011765	0	0.64935E-02	498189.9	3707540.5	383.2	0.25	1.86	0.93	YES	
L0011766	0	0.64935E-02	498192.0	3707537.1	383.2	0.25	1.86	0.93	YES	
L0011767	0	0.64935E-02	498194.2	3707533.7	383.2	0.25	1.86	0.93	YES	
L0011768	0	0.64935E-02	498196.3	3707530.3	383.2	0.25	1.86	0.93	YES	
L0011769	0	0.64935E-02	498198.4	3707526.9	383.1	0.25	1.86	0.93	YES	
L0011770	0	0.64935E-02	498200.5	3707523.6	383.1	0.25	1.86	0.93	YES	
L0011771	0	0.64935E-02	498202.7	3707520.2	383.1	0.25	1.86	0.93	YES	
L0011772	0	0.64935E-02	498204.8	3707516.8	383.1	0.25	1.86	0.93	YES	
L0011773	0	0.64935E-02	498206.9	3707513.4	383.0	0.25	1.86	0.93	YES	
L0011774	0	0.64935E-02	498209.0	3707510.0	383.0	0.25	1.86	0.93	YES	
L0011775	0	0.64935E-02	498211.2	3707506.6	382.9	0.25	1.86	0.93	YES	
L0011776	0	0.64935E-02	498213.3	3707503.2	382.8	0.25	1.86	0.93	YES	
L0011777	0	0.64935E-02	498215.4	3707499.8	382.8	0.25	1.86	0.93	YES	
L0011778	0	0.64935E-02	498217.5	3707496.4	382.8	0.25	1.86	0.93	YES	
L0011779	0	0.64935E-02	498219.7	3707493.1	382.8	0.25	1.86	0.93	YES	
L0011780	0	0.64935E-02	498221.8	3707489.7	382.8	0.25	1.86	0.93	YES	
L0011781	0	0.64935E-02	498223.9	3707486.3	382.7	0.25	1.86	0.93	YES	
L0011782	0	0.64935E-02	498226.0	3707482.9	382.7	0.25	1.86	0.93	YES	
L0011783	0	0.64935E-02	498228.2	3707479.5	382.7	0.25	1.86	0.93	YES	
L0012259	0	0.15152E-01	497762.1	3707219.3	379.1	9.84	3.83	1.79	YES	
L0012260	0	0.15152E-01	497768.7	3707224.3	379.1	9.84	3.83	1.79	YES	
L0012261	0	0.15152E-01	497775.2	3707229.3	379.2	9.84	3.83	1.79	YES	
L0012262	0	0.15152E-01	497781.8	3707234.2	379.2	9.84	3.83	1.79	YES	
L0012263	0	0.15152E-01	497788.3	3707239.2	379.2	9.84	3.83	1.79	YES	
L0012264	0	0.15152E-01	497794.9	3707244.2	379.3	9.84	3.83	1.79	YES	

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*** VOLUME SOURCE DATA ***

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L0012265	0	0.15152E-01	497801.4	3707249.2	379.4	9.84	3.83	1.79	YES	
L0012266	0	0.15152E-01	497808.0	3707254.2	379.4	9.84	3.83	1.79	YES	
L0012267	0	0.15152E-01	497814.5	3707259.2	379.5	9.84	3.83	1.79	YES	
L0012268	0	0.15152E-01	497821.1	3707264.1	379.5	9.84	3.83	1.79	YES	
L0012269	0	0.15152E-01	497827.6	3707269.1	379.5	9.84	3.83	1.79	YES	
L0012270	0	0.15152E-01	497834.2	3707274.1	379.6	9.84	3.83	1.79	YES	
L0012271	0	0.15152E-01	497840.7	3707279.1	379.6	9.84	3.83	1.79	YES	
L0012272	0	0.15152E-01	497847.3	3707284.1	379.6	9.84	3.83	1.79	YES	
L0012273	0	0.15152E-01	497853.8	3707289.1	379.7	9.84	3.83	1.79	YES	
L0012274	0	0.15152E-01	497860.4	3707294.0	379.7	9.84	3.83	1.79	YES	
L0012275	0	0.15152E-01	497866.9	3707299.0	379.7	9.84	3.83	1.79	YES	
L0012276	0	0.15152E-01	497873.5	3707304.0	379.8	9.84	3.83	1.79	YES	
L0012277	0	0.15152E-01	497880.0	3707309.0	379.9	9.84	3.83	1.79	YES	
L0012278	0	0.15152E-01	497886.6	3707314.0	380.0	9.84	3.83	1.79	YES	
L0012279	0	0.15152E-01	497893.1	3707319.0	379.9	9.84	3.83	1.79	YES	
L0012280	0	0.15152E-01	497899.7	3707323.9	379.9	9.84	3.83	1.79	YES	
L0012281	0	0.15152E-01	497906.2	3707328.9	380.0	9.84	3.83	1.79	YES	
L0012282	0	0.15152E-01	497912.8	3707333.9	380.0	9.84	3.83	1.79	YES	
L0012283	0	0.15152E-01	497919.3	3707338.9	379.9	9.84	3.83	1.79	YES	
L0012284	0	0.15152E-01	497925.9	3707343.9	380.0	9.84	3.83	1.79	YES	
L0012285	0	0.15152E-01	497932.4	3707348.8	380.0	9.84	3.83	1.79	YES	
L0012286	0	0.15152E-01	497939.0	3707353.8	380.1	9.84	3.83	1.79	YES	
L0012287	0	0.15152E-01	497945.5	3707358.8	380.3	9.84	3.83	1.79	YES	
L0012288	0	0.15152E-01	497952.1	3707363.8	380.4	9.84	3.83	1.79	YES	
L0012289	0	0.15152E-01	497958.6	3707368.8	380.6	9.84	3.83	1.79	YES	
L0012290	0	0.15152E-01	497965.2	3707373.8	380.7	9.84	3.83	1.79	YES	
L0012291	0	0.15152E-01	497971.7	3707378.7	380.8	9.84	3.83	1.79	YES	
L0012292	0	0.15152E-01	497978.3	3707383.7	380.9	9.84	3.83	1.79	YES	
L0012293	0	0.15152E-01	497984.8	3707388.7	381.1	9.84	3.83	1.79	YES	
L0012294	0	0.15152E-01	497991.4	3707393.7	381.4	9.84	3.83	1.79	YES	
L0012295	0	0.15152E-01	497997.9	3707398.7	381.6	9.84	3.83	1.79	YES	
L0012296	0	0.15152E-01	498004.5	3707403.7	381.8	9.84	3.83	1.79	YES	
L0012297	0	0.15152E-01	498011.0	3707408.6	381.9	9.84	3.83	1.79	YES	
L0012298	0	0.15152E-01	498017.6	3707413.6	382.0	9.84	3.83	1.79	YES	
L0012299	0	0.15152E-01	498024.1	3707418.6	382.1	9.84	3.83	1.79	YES	
L0012300	0	0.15152E-01	498030.7	3707423.6	382.1	9.84	3.83	1.79	YES	
L0012301	0	0.15152E-01	498037.2	3707428.6	382.1	9.84	3.83	1.79	YES	
L0012302	0	0.15152E-01	498043.8	3707433.6	382.1	9.84	3.83	1.79	YES	
L0012303	0	0.15152E-01	498050.3	3707438.5	382.1	9.84	3.83	1.79	YES	
L0012304	0	0.15152E-01	498056.9	3707443.5	382.1	9.84	3.83	1.79	YES	

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** VOLUME SOURCE DATA ***

SOURCE ID	NUMBER PART. CATS.	EMISSION RATE (GRAMS/SEC)	X (METERS)	Y (METERS)	BASE ELEV. (METERS)	RELEASE HEIGHT (METERS)	INIT. SY (METERS)	INIT. SZ (METERS)	URBAN SOURCE	EMISSION RATE SCALAR VARY BY
L0012305	0	0.15152E-01	498063.4	3707448.5	382.1	9.84	3.83	1.79	YES	
L0012306	0	0.15152E-01	498070.0	3707453.5	382.1	9.84	3.83	1.79	YES	
L0012307	0	0.15152E-01	498076.5	3707458.5	382.2	9.84	3.83	1.79	YES	
L0012308	0	0.15152E-01	498083.1	3707463.5	382.2	9.84	3.83	1.79	YES	
L0012309	0	0.15152E-01	498089.6	3707468.4	382.2	9.84	3.83	1.79	YES	
L0012310	0	0.15152E-01	498096.2	3707473.4	382.2	9.84	3.83	1.79	YES	
L0012311	0	0.15152E-01	498102.7	3707478.4	382.3	9.84	3.83	1.79	YES	
L0012312	0	0.15152E-01	498109.3	3707483.4	382.3	9.84	3.83	1.79	YES	
L0012313	0	0.15152E-01	498115.8	3707488.4	382.4	9.84	3.83	1.79	YES	
L0012314	0	0.15152E-01	498122.4	3707493.4	382.5	9.84	3.83	1.79	YES	
L0012315	0	0.15152E-01	498128.9	3707498.3	382.6	9.84	3.83	1.79	YES	
L0012316	0	0.15152E-01	498135.5	3707503.3	382.7	9.84	3.83	1.79	YES	
L0012317	0	0.15152E-01	498142.0	3707508.3	382.8	9.84	3.83	1.79	YES	
L0012318	0	0.15152E-01	498148.6	3707513.3	382.9	9.84	3.83	1.79	YES	
L0012319	0	0.15152E-01	498155.1	3707518.3	383.0	9.84	3.83	1.79	YES	
L0012320	0	0.15152E-01	498161.7	3707523.3	383.1	9.84	3.83	1.79	YES	
L0012321	0	0.15152E-01	498168.2	3707528.2	383.2	9.84	3.83	1.79	YES	
L0012322	0	0.15152E-01	498174.8	3707533.2	383.2	9.84	3.83	1.79	YES	
L0012323	0	0.15152E-01	498181.3	3707538.2	383.2	9.84	3.83	1.79	YES	
L0012324	0	0.15152E-01	498187.9	3707543.2	383.2	9.84	3.83	1.79	YES	
L0011850	0	0.63694E-02	498232.4	3707485.2	382.7	0.25	1.86	0.93	YES	
L0011851	0	0.63694E-02	498230.3	3707488.6	382.8	0.25	1.86	0.93	YES	
L0011852	0	0.63694E-02	498228.2	3707492.0	382.8	0.25	1.86	0.93	YES	
L0011853	0	0.63694E-02	498226.1	3707495.4	382.9	0.25	1.86	0.93	YES	
L0011854	0	0.63694E-02	498224.0	3707498.9	382.9	0.25	1.86	0.93	YES	
L0011855	0	0.63694E-02	498221.9	3707502.3	382.9	0.25	1.86	0.93	YES	
L0011856	0	0.63694E-02	498219.7	3707505.7	382.9	0.25	1.86	0.93	YES	
L0011857	0	0.63694E-02	498217.6	3707509.1	383.0	0.25	1.86	0.93	YES	
L0011858	0	0.63694E-02	498215.5	3707512.5	383.1	0.25	1.86	0.93	YES	
L0011859	0	0.63694E-02	498213.4	3707515.9	383.1	0.25	1.86	0.93	YES	
L0011860	0	0.63694E-02	498211.3	3707519.3	383.1	0.25	1.86	0.93	YES	
L0011861	0	0.63694E-02	498209.2	3707522.7	383.1	0.25	1.86	0.93	YES	
L0011862	0	0.63694E-02	498207.1	3707526.1	383.1	0.25	1.86	0.93	YES	
L0011863	0	0.63694E-02	498205.0	3707529.5	383.2	0.25	1.86	0.93	YES	
L0011864	0	0.63694E-02	498202.9	3707532.9	383.2	0.25	1.86	0.93	YES	
L0011865	0	0.63694E-02	498200.8	3707536.3	383.2	0.25	1.86	0.93	YES	
L0011866	0	0.63694E-02	498198.7	3707539.7	383.2	0.25	1.86	0.93	YES	
L0011867	0	0.63694E-02	498196.6	3707543.1	383.2	0.25	1.86	0.93	YES	
L0011868	0	0.63694E-02	498194.5	3707546.5	383.2	0.25	1.86	0.93	YES	
L0011869	0	0.63694E-02	498192.4	3707549.9	383.2	0.25	1.86	0.93	YES	

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*** VOLUME SOURCE DATA ***

SOURCE ID	NUMBER PART. CATS.	EMISSION RATE (GRAMS/SEC)	X (METERS)	Y (METERS)	BASE ELEV. (METERS)	RELEASE HEIGHT (METERS)	INIT. SY (METERS)	INIT. SZ (METERS)	URBAN SOURCE	EMISSION RATE SCALAR VARY BY
L0011870	0	0.63694E-02	498190.3	3707553.3	383.3	0.25	1.86	0.93	YES	
L0011871	0	0.63694E-02	498188.0	3707556.0	383.3	0.25	1.86	0.93	YES	
L0011872	0	0.63694E-02	498184.9	3707553.6	383.3	0.25	1.86	0.93	YES	
L0011873	0	0.63694E-02	498181.7	3707551.1	383.3	0.25	1.86	0.93	YES	
L0011874	0	0.63694E-02	498178.5	3707548.7	383.3	0.25	1.86	0.93	YES	
L0011875	0	0.63694E-02	498175.4	3707546.3	383.3	0.25	1.86	0.93	YES	
L0011876	0	0.63694E-02	498172.2	3707543.8	383.3	0.25	1.86	0.93	YES	
L0011877	0	0.63694E-02	498169.0	3707541.4	383.3	0.25	1.86	0.93	YES	
L0011878	0	0.63694E-02	498165.9	3707539.0	383.2	0.25	1.86	0.93	YES	
L0011879	0	0.63694E-02	498162.7	3707536.5	383.2	0.25	1.86	0.93	YES	
L0011880	0	0.63694E-02	498159.5	3707534.1	383.2	0.25	1.86	0.93	YES	
L0011881	0	0.63694E-02	498156.3	3707531.6	383.2	0.25	1.86	0.93	YES	
L0011882	0	0.63694E-02	498153.2	3707529.2	383.1	0.25	1.86	0.93	YES	
L0011883	0	0.63694E-02	498150.0	3707526.8	383.1	0.25	1.86	0.93	YES	
L0011884	0	0.63694E-02	498146.8	3707524.3	383.1	0.25	1.86	0.93	YES	
L0011885	0	0.63694E-02	498143.7	3707521.9	383.0	0.25	1.86	0.93	YES	
L0011886	0	0.63694E-02	498140.5	3707519.4	383.0	0.25	1.86	0.93	YES	
L0011887	0	0.63694E-02	498137.3	3707517.0	382.9	0.25	1.86	0.93	YES	
L0011888	0	0.63694E-02	498134.2	3707514.6	382.9	0.25	1.86	0.93	YES	
L0011889	0	0.63694E-02	498131.0	3707512.1	382.8	0.25	1.86	0.93	YES	
L0011890	0	0.63694E-02	498127.8	3707509.7	382.8	0.25	1.86	0.93	YES	
L0011891	0	0.63694E-02	498124.6	3707507.2	382.7	0.25	1.86	0.93	YES	
L0011892	0	0.63694E-02	498121.5	3707504.8	382.6	0.25	1.86	0.93	YES	
L0011893	0	0.63694E-02	498118.3	3707502.4	382.6	0.25	1.86	0.93	YES	
L0011894	0	0.63694E-02	498115.1	3707499.9	382.6	0.25	1.86	0.93	YES	
L0011895	0	0.63694E-02	498112.0	3707497.5	382.5	0.25	1.86	0.93	YES	
L0011896	0	0.63694E-02	498108.8	3707495.0	382.4	0.25	1.86	0.93	YES	
L0011897	0	0.63694E-02	498105.6	3707492.6	382.4	0.25	1.86	0.93	YES	
L0011898	0	0.63694E-02	498102.5	3707490.2	382.4	0.25	1.86	0.93	YES	
L0011899	0	0.63694E-02	498099.3	3707487.7	382.3	0.25	1.86	0.93	YES	
L0011900	0	0.63694E-02	498096.1	3707485.3	382.3	0.25	1.86	0.93	YES	
L0011901	0	0.63694E-02	498092.9	3707482.8	382.2	0.25	1.86	0.93	YES	
L0011902	0	0.63694E-02	498089.8	3707480.4	382.2	0.25	1.86	0.93	YES	
L0011903	0	0.63694E-02	498086.6	3707478.0	382.2	0.25	1.86	0.93	YES	
L0011904	0	0.63694E-02	498083.4	3707475.5	382.2	0.25	1.86	0.93	YES	
L0011905	0	0.63694E-02	498080.3	3707473.1	382.2	0.25	1.86	0.93	YES	
L0011906	0	0.63694E-02	498077.1	3707470.7	382.2	0.25	1.86	0.93	YES	
L0011907	0	0.63694E-02	498073.9	3707468.2	382.2	0.25	1.86	0.93	YES	
L0011908	0	0.63694E-02	498070.8	3707465.8	382.2	0.25	1.86	0.93	YES	
L0011909	0	0.63694E-02	498067.6	3707463.3	382.2	0.25	1.86	0.93	YES	

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*** VOLUME SOURCE DATA ***

SOURCE ID	NUMBER PART. CATS.	EMISSION RATE (GRAMS/SEC)	X (METERS)	Y (METERS)	BASE ELEV. (METERS)	RELEASE HEIGHT (METERS)	INIT. SY (METERS)	INIT. SZ (METERS)	URBAN SOURCE	EMISSION RATE SCALAR VARY BY
L0011910	0	0.63694E-02	498064.4	3707460.9	382.2	0.25	1.86	0.93	YES	
L0011911	0	0.63694E-02	498061.2	3707458.5	382.2	0.25	1.86	0.93	YES	
L0011912	0	0.63694E-02	498058.1	3707456.0	382.2	0.25	1.86	0.93	YES	
L0011913	0	0.63694E-02	498054.9	3707453.6	382.2	0.25	1.86	0.93	YES	
L0011914	0	0.63694E-02	498051.7	3707451.1	382.2	0.25	1.86	0.93	YES	
L0011915	0	0.63694E-02	498048.6	3707448.7	382.2	0.25	1.86	0.93	YES	
L0011916	0	0.63694E-02	498045.4	3707446.3	382.2	0.25	1.86	0.93	YES	
L0011917	0	0.63694E-02	498042.2	3707443.8	382.2	0.25	1.86	0.93	YES	
L0011918	0	0.63694E-02	498039.1	3707441.4	382.2	0.25	1.86	0.93	YES	
L0011919	0	0.63694E-02	498035.9	3707438.9	382.2	0.25	1.86	0.93	YES	
L0011920	0	0.63694E-02	498032.7	3707436.5	382.1	0.25	1.86	0.93	YES	
L0011921	0	0.63694E-02	498029.5	3707434.1	382.1	0.25	1.86	0.93	YES	
L0011922	0	0.63694E-02	498026.4	3707431.6	382.1	0.25	1.86	0.93	YES	
L0011923	0	0.63694E-02	498023.2	3707429.2	382.2	0.25	1.86	0.93	YES	
L0011924	0	0.63694E-02	498020.0	3707426.7	382.2	0.25	1.86	0.93	YES	
L0011925	0	0.63694E-02	498016.9	3707424.3	382.2	0.25	1.86	0.93	YES	
L0011926	0	0.63694E-02	498013.7	3707421.9	382.1	0.25	1.86	0.93	YES	
L0011927	0	0.63694E-02	498010.5	3707419.4	382.1	0.25	1.86	0.93	YES	
L0011928	0	0.63694E-02	498007.3	3707417.0	382.0	0.25	1.86	0.93	YES	
L0011929	0	0.63694E-02	498004.2	3707414.5	381.9	0.25	1.86	0.93	YES	
L0011930	0	0.63694E-02	498001.0	3707412.1	381.9	0.25	1.86	0.93	YES	
L0011931	0	0.63694E-02	497997.8	3707409.7	381.8	0.25	1.86	0.93	YES	
L0011932	0	0.63694E-02	497994.7	3707407.2	381.7	0.25	1.86	0.93	YES	
L0011933	0	0.63694E-02	497991.5	3707404.8	381.7	0.25	1.86	0.93	YES	
L0011934	0	0.63694E-02	497988.3	3707402.4	381.6	0.25	1.86	0.93	YES	
L0011935	0	0.63694E-02	497985.2	3707399.9	381.4	0.25	1.86	0.93	YES	
L0011936	0	0.63694E-02	497982.0	3707397.5	381.2	0.25	1.86	0.93	YES	
L0011937	0	0.63694E-02	497978.8	3707395.0	381.1	0.25	1.86	0.93	YES	
L0011938	0	0.63694E-02	497975.6	3707392.6	381.0	0.25	1.86	0.93	YES	
L0011939	0	0.63694E-02	497972.5	3707390.2	380.9	0.25	1.86	0.93	YES	
L0011940	0	0.63694E-02	497969.3	3707387.7	380.8	0.25	1.86	0.93	YES	
L0011941	0	0.63694E-02	497966.1	3707385.3	380.8	0.25	1.86	0.93	YES	
L0011942	0	0.63694E-02	497963.0	3707382.8	380.7	0.25	1.86	0.93	YES	
L0011943	0	0.63694E-02	497959.8	3707380.4	380.7	0.25	1.86	0.93	YES	
L0011944	0	0.63694E-02	497956.6	3707378.0	380.7	0.25	1.86	0.93	YES	
L0011945	0	0.63694E-02	497953.5	3707375.5	380.6	0.25	1.86	0.93	YES	
L0011946	0	0.63694E-02	497950.3	3707373.1	380.5	0.25	1.86	0.93	YES	
L0011947	0	0.63694E-02	497947.1	3707370.6	380.4	0.25	1.86	0.93	YES	
L0011948	0	0.63694E-02	497943.9	3707368.2	380.3	0.25	1.86	0.93	YES	
L0011949	0	0.63694E-02	497940.8	3707365.8	380.2	0.25	1.86	0.93	YES	

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*** VOLUME SOURCE DATA ***

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L0011950	0	0.63694E-02	497937.6	3707363.3	380.1	0.25	1.86	0.93	YES	
L0011951	0	0.63694E-02	497934.4	3707360.9	380.1	0.25	1.86	0.93	YES	
L0011952	0	0.63694E-02	497931.3	3707358.4	380.0	0.25	1.86	0.93	YES	
L0011953	0	0.63694E-02	497928.1	3707356.0	380.0	0.25	1.86	0.93	YES	
L0011954	0	0.63694E-02	497924.9	3707353.6	380.0	0.25	1.86	0.93	YES	
L0011955	0	0.63694E-02	497921.8	3707351.1	379.9	0.25	1.86	0.93	YES	
L0011956	0	0.63694E-02	497918.6	3707348.7	379.9	0.25	1.86	0.93	YES	
L0011957	0	0.63694E-02	497915.4	3707346.2	380.0	0.25	1.86	0.93	YES	
L0011958	0	0.63694E-02	497912.2	3707343.8	380.0	0.25	1.86	0.93	YES	
L0011959	0	0.63694E-02	497909.1	3707341.4	380.0	0.25	1.86	0.93	YES	
L0011960	0	0.63694E-02	497905.9	3707338.9	380.0	0.25	1.86	0.93	YES	
L0011961	0	0.63694E-02	497902.7	3707336.5	379.9	0.25	1.86	0.93	YES	
L0011962	0	0.63694E-02	497899.6	3707334.1	379.9	0.25	1.86	0.93	YES	
L0011963	0	0.63694E-02	497896.4	3707331.6	379.9	0.25	1.86	0.93	YES	
L0011964	0	0.63694E-02	497893.2	3707329.2	379.9	0.25	1.86	0.93	YES	
L0011965	0	0.63694E-02	497890.1	3707326.7	379.9	0.25	1.86	0.93	YES	
L0011966	0	0.63694E-02	497886.9	3707324.3	379.9	0.25	1.86	0.93	YES	
L0011967	0	0.63694E-02	497883.7	3707321.9	379.9	0.25	1.86	0.93	YES	
L0011968	0	0.63694E-02	497880.5	3707319.4	379.9	0.25	1.86	0.93	YES	
L0011969	0	0.63694E-02	497877.4	3707317.0	379.8	0.25	1.86	0.93	YES	
L0011970	0	0.63694E-02	497874.2	3707314.5	379.8	0.25	1.86	0.93	YES	
L0011971	0	0.63694E-02	497871.0	3707312.1	379.7	0.25	1.86	0.93	YES	
L0011972	0	0.63694E-02	497867.9	3707309.7	379.7	0.25	1.86	0.93	YES	
L0011973	0	0.63694E-02	497864.7	3707307.2	379.7	0.25	1.86	0.93	YES	
L0011974	0	0.63694E-02	497861.5	3707304.8	379.7	0.25	1.86	0.93	YES	
L0011975	0	0.63694E-02	497858.4	3707302.3	379.7	0.25	1.86	0.93	YES	
L0011976	0	0.63694E-02	497855.2	3707299.9	379.7	0.25	1.86	0.93	YES	
L0011977	0	0.63694E-02	497852.0	3707297.5	379.6	0.25	1.86	0.93	YES	
L0011978	0	0.63694E-02	497848.8	3707295.0	379.6	0.25	1.86	0.93	YES	
L0011979	0	0.63694E-02	497845.7	3707292.6	379.6	0.25	1.86	0.93	YES	
L0011980	0	0.63694E-02	497842.5	3707290.1	379.6	0.25	1.86	0.93	YES	
L0011981	0	0.63694E-02	497839.3	3707287.7	379.6	0.25	1.86	0.93	YES	
L0011982	0	0.63694E-02	497836.2	3707285.3	379.6	0.25	1.86	0.93	YES	
L0011983	0	0.63694E-02	497833.0	3707282.8	379.6	0.25	1.86	0.93	YES	
L0011984	0	0.63694E-02	497829.8	3707280.4	379.5	0.25	1.86	0.93	YES	
L0011985	0	0.63694E-02	497826.6	3707278.0	379.5	0.25	1.86	0.93	YES	
L0011986	0	0.63694E-02	497823.5	3707275.5	379.5	0.25	1.86	0.93	YES	
L0011987	0	0.63694E-02	497820.3	3707273.1	379.5	0.25	1.86	0.93	YES	
L0011988	0	0.63694E-02	497817.1	3707270.6	379.5	0.25	1.86	0.93	YES	
L0011989	0	0.63694E-02	497814.0	3707268.2	379.5	0.25	1.86	0.93	YES	

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** VOLUME SOURCE DATA ***

SOURCE ID	NUMBER PART. CATS.	EMISSION RATE (GRAMS/SEC)	X (METERS)	Y (METERS)	BASE ELEV. (METERS)	RELEASE HEIGHT (METERS)	INIT. SY (METERS)	INIT. SZ (METERS)	URBAN SOURCE	EMISSION RATE SCALAR VARY BY
L0011990	0	0.63694E-02	497810.8	3707265.8	379.4	0.25	1.86	0.93	YES	
L0011991	0	0.63694E-02	497807.6	3707263.3	379.4	0.25	1.86	0.93	YES	
L0011992	0	0.63694E-02	497804.5	3707260.9	379.4	0.25	1.86	0.93	YES	
L0011993	0	0.63694E-02	497801.3	3707258.4	379.4	0.25	1.86	0.93	YES	
L0011994	0	0.63694E-02	497798.1	3707256.0	379.4	0.25	1.86	0.93	YES	
L0011995	0	0.63694E-02	497794.9	3707253.6	379.4	0.25	1.86	0.93	YES	
L0011996	0	0.63694E-02	497791.8	3707251.1	379.3	0.25	1.86	0.93	YES	
L0011997	0	0.63694E-02	497788.6	3707248.7	379.3	0.25	1.86	0.93	YES	
L0011998	0	0.63694E-02	497785.4	3707246.2	379.3	0.25	1.86	0.93	YES	
L0011999	0	0.63694E-02	497782.3	3707243.8	379.2	0.25	1.86	0.93	YES	
L0012000	0	0.63694E-02	497779.1	3707241.4	379.2	0.25	1.86	0.93	YES	
L0012001	0	0.63694E-02	497775.9	3707238.9	379.2	0.25	1.86	0.93	YES	
L0012002	0	0.63694E-02	497772.8	3707236.5	379.2	0.25	1.86	0.93	YES	
L0012003	0	0.63694E-02	497769.6	3707234.0	379.2	0.25	1.86	0.93	YES	
L0012004	0	0.63694E-02	497766.4	3707231.6	379.2	0.25	1.86	0.93	YES	
L0012005	0	0.63694E-02	497763.2	3707229.2	379.2	0.25	1.86	0.93	YES	
L0012006	0	0.63694E-02	497760.1	3707226.7	379.1	0.25	1.86	0.93	YES	
L0012007	0	0.13158E-01	498232.3	3707485.8	382.8	9.84	3.83	1.79	YES	
L0012008	0	0.13158E-01	498227.7	3707492.6	382.8	9.84	3.83	1.79	YES	
L0012009	0	0.13158E-01	498223.0	3707499.4	382.9	9.84	3.83	1.79	YES	
L0012010	0	0.13158E-01	498218.4	3707506.2	382.9	9.84	3.83	1.79	YES	
L0012011	0	0.13158E-01	498213.8	3707513.1	383.1	9.84	3.83	1.79	YES	
L0012012	0	0.13158E-01	498209.2	3707519.9	383.1	9.84	3.83	1.79	YES	
L0012013	0	0.13158E-01	498204.6	3707526.7	383.1	9.84	3.83	1.79	YES	
L0012014	0	0.13158E-01	498200.0	3707533.5	383.2	9.84	3.83	1.79	YES	
L0012015	0	0.13158E-01	498195.4	3707540.3	383.2	9.84	3.83	1.79	YES	
L0012016	0	0.13158E-01	498190.7	3707547.1	383.2	9.84	3.83	1.79	YES	
L0012017	0	0.13158E-01	498186.1	3707553.9	383.3	9.84	3.83	1.79	YES	
L0012018	0	0.13158E-01	498179.6	3707549.0	383.3	9.84	3.83	1.79	YES	
L0012019	0	0.13158E-01	498173.1	3707543.9	383.3	9.84	3.83	1.79	YES	
L0012020	0	0.13158E-01	498166.6	3707538.9	383.2	9.84	3.83	1.79	YES	
L0012021	0	0.13158E-01	498160.1	3707533.9	383.2	9.84	3.83	1.79	YES	
L0012022	0	0.13158E-01	498153.6	3707528.8	383.1	9.84	3.83	1.79	YES	
L0012023	0	0.13158E-01	498147.1	3707523.8	383.1	9.84	3.83	1.79	YES	
L0012024	0	0.13158E-01	498140.6	3707518.8	383.0	9.84	3.83	1.79	YES	
L0012025	0	0.13158E-01	498134.1	3707513.7	382.9	9.84	3.83	1.79	YES	
L0012026	0	0.13158E-01	498127.5	3707508.7	382.8	9.84	3.83	1.79	YES	
L0012027	0	0.13158E-01	498121.0	3707503.7	382.6	9.84	3.83	1.79	YES	
L0012028	0	0.13158E-01	498114.5	3707498.6	382.5	9.84	3.83	1.79	YES	
L0012029	0	0.13158E-01	498108.0	3707493.6	382.4	9.84	3.83	1.79	YES	

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*** VOLUME SOURCE DATA ***

SOURCE ID	NUMBER PART. CATS.	EMISSION RATE (GRAMS/SEC)	X (METERS)	Y (METERS)	BASE ELEV. (METERS)	RELEASE HEIGHT (METERS)	INIT. SY (METERS)	INIT. SZ (METERS)	URBAN SOURCE	EMISSION RATE SCALAR VARY BY
L0012030	0	0.13158E-01	498101.5	3707488.6	382.3	9.84	3.83	1.79	YES	
L0012031	0	0.13158E-01	498095.0	3707483.5	382.2	9.84	3.83	1.79	YES	
L0012032	0	0.13158E-01	498088.5	3707478.5	382.2	9.84	3.83	1.79	YES	
L0012033	0	0.13158E-01	498082.0	3707473.4	382.2	9.84	3.83	1.79	YES	
L0012034	0	0.13158E-01	498075.5	3707468.4	382.2	9.84	3.83	1.79	YES	
L0012035	0	0.13158E-01	498069.0	3707463.4	382.2	9.84	3.83	1.79	YES	
L0012036	0	0.13158E-01	498062.5	3707458.3	382.2	9.84	3.83	1.79	YES	
L0012037	0	0.13158E-01	498055.9	3707453.3	382.2	9.84	3.83	1.79	YES	
L0012038	0	0.13158E-01	498049.4	3707448.3	382.2	9.84	3.83	1.79	YES	
L0012039	0	0.13158E-01	498042.9	3707443.2	382.2	9.84	3.83	1.79	YES	
L0012040	0	0.13158E-01	498036.4	3707438.2	382.2	9.84	3.83	1.79	YES	
L0012041	0	0.13158E-01	498029.9	3707433.2	382.1	9.84	3.83	1.79	YES	
L0012042	0	0.13158E-01	498023.4	3707428.1	382.2	9.84	3.83	1.79	YES	
L0012043	0	0.13158E-01	498016.9	3707423.1	382.2	9.84	3.83	1.79	YES	
L0012044	0	0.13158E-01	498010.4	3707418.1	382.0	9.84	3.83	1.79	YES	
L0012045	0	0.13158E-01	498003.9	3707413.0	381.9	9.84	3.83	1.79	YES	
L0012046	0	0.13158E-01	497997.4	3707408.0	381.8	9.84	3.83	1.79	YES	
L0012047	0	0.13158E-01	497990.8	3707402.9	381.6	9.84	3.83	1.79	YES	
L0012048	0	0.13158E-01	497984.3	3707397.9	381.3	9.84	3.83	1.79	YES	
L0012049	0	0.13158E-01	497977.8	3707392.9	381.0	9.84	3.83	1.79	YES	
L0012050	0	0.13158E-01	497971.3	3707387.8	380.8	9.84	3.83	1.79	YES	
L0012051	0	0.13158E-01	497964.8	3707382.8	380.8	9.84	3.83	1.79	YES	
L0012052	0	0.13158E-01	497958.3	3707377.8	380.7	9.84	3.83	1.79	YES	
L0012053	0	0.13158E-01	497951.8	3707372.7	380.5	9.84	3.83	1.79	YES	
L0012054	0	0.13158E-01	497945.3	3707367.7	380.3	9.84	3.83	1.79	YES	
L0012055	0	0.13158E-01	497938.8	3707362.7	380.2	9.84	3.83	1.79	YES	
L0012056	0	0.13158E-01	497932.3	3707357.6	380.0	9.84	3.83	1.79	YES	
L0012057	0	0.13158E-01	497925.8	3707352.6	380.0	9.84	3.83	1.79	YES	
L0012058	0	0.13158E-01	497919.2	3707347.6	379.9	9.84	3.83	1.79	YES	
L0012059	0	0.13158E-01	497912.7	3707342.5	380.0	9.84	3.83	1.79	YES	
L0012060	0	0.13158E-01	497906.2	3707337.5	380.0	9.84	3.83	1.79	YES	
L0012061	0	0.13158E-01	497899.7	3707332.4	379.9	9.84	3.83	1.79	YES	
L0012062	0	0.13158E-01	497893.2	3707327.4	379.9	9.84	3.83	1.79	YES	
L0012063	0	0.13158E-01	497886.7	3707322.4	379.9	9.84	3.83	1.79	YES	
L0012064	0	0.13158E-01	497880.2	3707317.3	379.9	9.84	3.83	1.79	YES	
L0012065	0	0.13158E-01	497873.7	3707312.3	379.8	9.84	3.83	1.79	YES	
L0012066	0	0.13158E-01	497867.2	3707307.3	379.7	9.84	3.83	1.79	YES	
L0012067	0	0.13158E-01	497860.7	3707302.2	379.7	9.84	3.83	1.79	YES	
L0012068	0	0.13158E-01	497854.1	3707297.2	379.7	9.84	3.83	1.79	YES	
L0012069	0	0.13158E-01	497847.6	3707292.2	379.6	9.84	3.83	1.79	YES	

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*** VOLUME SOURCE DATA ***

SOURCE ID	NUMBER PART. CATS.	EMISSION RATE (GRAMS/SEC)	X (METERS)	Y (METERS)	BASE ELEV. (METERS)	RELEASE HEIGHT (METERS)	INIT. SY (METERS)	INIT. SZ (METERS)	URBAN SOURCE	EMISSION RATE SCALAR VARY BY
L0012070	0	0.13158E-01	497841.1	3707287.1	379.6	9.84	3.83	1.79	YES	
L0012071	0	0.13158E-01	497834.6	3707282.1	379.6	9.84	3.83	1.79	YES	
L0012072	0	0.13158E-01	497828.1	3707277.1	379.5	9.84	3.83	1.79	YES	
L0012073	0	0.13158E-01	497821.6	3707272.0	379.5	9.84	3.83	1.79	YES	
L0012074	0	0.13158E-01	497815.1	3707267.0	379.5	9.84	3.83	1.79	YES	
L0012075	0	0.13158E-01	497808.6	3707261.9	379.4	9.84	3.83	1.79	YES	
L0012076	0	0.13158E-01	497802.1	3707256.9	379.4	9.84	3.83	1.79	YES	
L0012077	0	0.13158E-01	497795.6	3707251.9	379.4	9.84	3.83	1.79	YES	
L0012078	0	0.13158E-01	497789.1	3707246.8	379.3	9.84	3.83	1.79	YES	
L0012079	0	0.13158E-01	497782.5	3707241.8	379.2	9.84	3.83	1.79	YES	
L0012080	0	0.13158E-01	497776.0	3707236.8	379.2	9.84	3.83	1.79	YES	
L0012081	0	0.13158E-01	497769.5	3707231.7	379.2	9.84	3.83	1.79	YES	
L0012082	0	0.13158E-01	497763.0	3707226.7	379.1	9.84	3.83	1.79	YES	
L0012214	0	0.22222E-01	498231.8	3707473.8	382.7	8.36	9.12	7.78	YES	
L0012215	0	0.22222E-01	498243.5	3707458.0	382.8	8.36	9.12	7.78	YES	
L0012216	0	0.22222E-01	498255.2	3707442.3	382.7	8.36	9.12	7.78	YES	
L0012217	0	0.22222E-01	498266.9	3707426.6	382.7	8.36	9.12	7.78	YES	
L0012218	0	0.22222E-01	498278.6	3707410.9	382.6	8.36	9.12	7.78	YES	
L0012219	0	0.22222E-01	498290.3	3707395.1	382.6	8.36	9.12	7.78	YES	
L0012220	0	0.22222E-01	498302.1	3707379.4	382.5	8.36	9.12	7.78	YES	
L0012221	0	0.22222E-01	498313.8	3707363.7	382.6	8.36	9.12	7.78	YES	
L0012222	0	0.22222E-01	498325.5	3707348.0	382.5	8.36	9.12	7.78	YES	
L0012223	0	0.22222E-01	498337.2	3707332.2	382.4	8.36	9.12	7.78	YES	
L0012224	0	0.22222E-01	498348.9	3707316.5	382.4	8.36	9.12	7.78	YES	
L0012225	0	0.22222E-01	498364.1	3707304.2	382.4	8.36	9.12	7.78	YES	
L0012226	0	0.22222E-01	498379.6	3707292.3	382.3	8.36	9.12	7.78	YES	
L0012227	0	0.22222E-01	498397.5	3707285.1	382.4	8.36	9.12	7.78	YES	
L0012228	0	0.22222E-01	498416.5	3707280.2	382.6	8.36	9.12	7.78	YES	
L0012229	0	0.22222E-01	498435.5	3707275.3	382.7	8.36	9.12	7.78	YES	
L0012230	0	0.22222E-01	498454.5	3707270.4	382.7	8.36	9.12	7.78	YES	
L0012231	0	0.22222E-01	498473.8	3707270.1	382.7	8.36	9.12	7.78	YES	
L0012232	0	0.22222E-01	498493.3	3707272.0	382.8	8.36	9.12	7.78	YES	
L0012233	0	0.22222E-01	498512.8	3707274.0	382.9	8.36	9.12	7.78	YES	
L0012234	0	0.22222E-01	498532.3	3707275.9	383.1	8.36	9.12	7.78	YES	
L0012235	0	0.22222E-01	498551.8	3707277.9	383.2	8.36	9.12	7.78	YES	
L0012236	0	0.22222E-01	498571.3	3707279.8	383.5	8.36	9.12	7.78	YES	
L0012237	0	0.22222E-01	498589.8	3707283.7	383.6	8.36	9.12	7.78	YES	
L0012238	0	0.22222E-01	498601.7	3707298.8	383.6	8.36	9.12	7.78	YES	
L0012239	0	0.22222E-01	498600.9	3707318.4	383.6	8.36	9.12	7.78	YES	
L0012240	0	0.22222E-01	498590.3	3707333.3	383.4	8.36	9.12	7.78	YES	

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*** VOLUME SOURCE DATA ***

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L0012241	0	0.22222E-01	498575.5	3707346.3	383.4	8.36	9.12	7.78	YES	
L0012242	0	0.22222E-01	498569.8	3707364.1	383.4	8.36	9.12	7.78	YES	
L0012243	0	0.22222E-01	498567.1	3707383.5	383.4	8.36	9.12	7.78	YES	
L0012244	0	0.22222E-01	498564.4	3707402.9	383.5	8.36	9.12	7.78	YES	
L0012245	0	0.22222E-01	498561.7	3707422.3	383.5	8.36	9.12	7.78	YES	
L0012246	0	0.22222E-01	498559.0	3707441.7	383.6	8.36	9.12	7.78	YES	
L0012247	0	0.22222E-01	498556.3	3707461.1	383.7	8.36	9.12	7.78	YES	
L0012248	0	0.22222E-01	498559.5	3707478.1	383.8	8.36	9.12	7.78	YES	
L0012249	0	0.22222E-01	498575.2	3707489.9	383.9	8.36	9.12	7.78	YES	
L0012250	0	0.22222E-01	498594.1	3707493.3	384.0	8.36	9.12	7.78	YES	
L0012251	0	0.22222E-01	498613.6	3707495.4	384.1	8.36	9.12	7.78	YES	
L0012252	0	0.22222E-01	498633.1	3707497.4	384.2	8.36	9.12	7.78	YES	
L0012253	0	0.22222E-01	498652.6	3707499.4	384.3	8.36	9.12	7.78	YES	
L0012254	0	0.22222E-01	498672.1	3707500.5	384.4	8.36	9.12	7.78	YES	
L0012255	0	0.22222E-01	498691.7	3707499.2	384.5	8.36	9.12	7.78	YES	
L0012256	0	0.22222E-01	498711.3	3707498.0	384.5	8.36	9.12	7.78	YES	
L0012257	0	0.22222E-01	498730.8	3707496.7	384.6	8.36	9.12	7.78	YES	
L0012258	0	0.22222E-01	498750.4	3707495.4	384.6	8.36	9.12	7.78	YES	
L0012325	0	0.22727E-01	498750.4	3707502.1	384.7	8.36	9.20	7.78	YES	
L0012326	0	0.22727E-01	498730.6	3707502.7	384.6	8.36	9.20	7.78	YES	
L0012327	0	0.22727E-01	498710.8	3707503.2	384.5	8.36	9.20	7.78	YES	
L0012328	0	0.22727E-01	498691.0	3707503.7	384.5	8.36	9.20	7.78	YES	
L0012329	0	0.22727E-01	498671.3	3707504.2	384.4	8.36	9.20	7.78	YES	
L0012330	0	0.22727E-01	498651.5	3707503.0	384.3	8.36	9.20	7.78	YES	
L0012331	0	0.22727E-01	498631.8	3707501.2	384.2	8.36	9.20	7.78	YES	
L0012332	0	0.22727E-01	498612.2	3707499.3	384.1	8.36	9.20	7.78	YES	
L0012333	0	0.22727E-01	498592.5	3707497.4	384.0	8.36	9.20	7.78	YES	
L0012334	0	0.22727E-01	498573.9	3707492.3	383.9	8.36	9.20	7.78	YES	
L0012335	0	0.22727E-01	498557.3	3707481.5	383.8	8.36	9.20	7.78	YES	
L0012336	0	0.22727E-01	498551.3	3707465.9	383.7	8.36	9.20	7.78	YES	
L0012337	0	0.22727E-01	498553.9	3707446.3	383.6	8.36	9.20	7.78	YES	
L0012338	0	0.22727E-01	498556.6	3707426.7	383.5	8.36	9.20	7.78	YES	
L0012339	0	0.22727E-01	498559.2	3707407.1	383.5	8.36	9.20	7.78	YES	
L0012340	0	0.22727E-01	498561.9	3707387.5	383.4	8.36	9.20	7.78	YES	
L0012341	0	0.22727E-01	498564.5	3707367.9	383.4	8.36	9.20	7.78	YES	
L0012342	0	0.22727E-01	498567.3	3707348.3	383.3	8.36	9.20	7.78	YES	
L0012343	0	0.22727E-01	498582.2	3707335.3	383.4	8.36	9.20	7.78	YES	
L0012344	0	0.22727E-01	498595.1	3707321.3	383.5	8.36	9.20	7.78	YES	
L0012345	0	0.22727E-01	498592.5	3707302.6	383.6	8.36	9.20	7.78	YES	
L0012346	0	0.22727E-01	498578.6	3707291.0	383.5	8.36	9.20	7.78	YES	

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** VOLUME SOURCE DATA ***

SOURCE ID	NUMBER PART. CATS.	EMISSION RATE (GRAMS/SEC)	X (METERS)	Y (METERS)	BASE ELEV. (METERS)	RELEASE HEIGHT (METERS)	INIT. SY (METERS)	INIT. SZ (METERS)	URBAN SOURCE	EMISSION RATE SCALAR VARY BY
L0012347	0	0.22727E-01	498559.0	3707288.4	383.3	8.36	9.20	7.78	YES	
L0012348	0	0.22727E-01	498539.4	3707285.9	383.1	8.36	9.20	7.78	YES	
L0012349	0	0.22727E-01	498519.8	3707283.4	383.0	8.36	9.20	7.78	YES	
L0012350	0	0.22727E-01	498500.1	3707280.9	382.9	8.36	9.20	7.78	YES	
L0012351	0	0.22727E-01	498480.5	3707278.3	382.8	8.36	9.20	7.78	YES	
L0012352	0	0.22727E-01	498461.0	3707278.5	382.7	8.36	9.20	7.78	YES	
L0012353	0	0.22727E-01	498441.6	3707282.4	382.8	8.36	9.20	7.78	YES	
L0012354	0	0.22727E-01	498422.2	3707286.3	382.6	8.36	9.20	7.78	YES	
L0012355	0	0.22727E-01	498402.8	3707290.3	382.5	8.36	9.20	7.78	YES	
L0012356	0	0.22727E-01	498383.5	3707294.3	382.3	8.36	9.20	7.78	YES	
L0012357	0	0.22727E-01	498368.8	3707307.6	382.4	8.36	9.20	7.78	YES	
L0012358	0	0.22727E-01	498354.2	3707320.9	382.4	8.36	9.20	7.78	YES	
L0012359	0	0.22727E-01	498340.6	3707335.1	382.4	8.36	9.20	7.78	YES	
L0012360	0	0.22727E-01	498329.0	3707351.2	382.5	8.36	9.20	7.78	YES	
L0012361	0	0.22727E-01	498317.4	3707367.2	382.6	8.36	9.20	7.78	YES	
L0012362	0	0.22727E-01	498305.8	3707383.2	382.6	8.36	9.20	7.78	YES	
L0012363	0	0.22727E-01	498294.3	3707399.3	382.6	8.36	9.20	7.78	YES	
L0012364	0	0.22727E-01	498282.7	3707415.3	382.7	8.36	9.20	7.78	YES	
L0012365	0	0.22727E-01	498271.1	3707431.4	382.7	8.36	9.20	7.78	YES	
L0012366	0	0.22727E-01	498259.5	3707447.4	382.7	8.36	9.20	7.78	YES	
L0012367	0	0.22727E-01	498247.9	3707463.4	382.8	8.36	9.20	7.78	YES	
L0012368	0	0.22727E-01	498236.4	3707479.5	382.8	8.36	9.20	7.78	YES	
VOL1	0	0.10000E+01	498217.8	3707473.7	382.7	3.00	1.19	0.43	YES	
VOL2	0	0.10000E+01	498229.4	3707450.6	382.5	3.00	1.19	0.71	YES	
VOL3	0	0.10000E+01	498245.0	3707432.7	382.7	3.00	1.19	0.71	YES	
VOL4	0	0.10000E+01	498246.7	3707486.4	382.9	3.00	1.19	0.71	YES	
VOL5	0	0.10000E+01	498261.1	3707467.4	382.9	3.00	1.19	0.71	YES	
VOL6	0	0.10000E+01	498276.2	3707447.8	382.8	3.00	1.19	0.71	YES	
VOL7	0	0.10000E+01	498237.7	3707394.7	382.4	22.86	9.47	8.14	YES	

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** AREA SOURCE DATA ***

SOURCE ID	NUMBER PART. CATS.	EMISSION RATE (GRAMS/SEC /METER**2)	COORD (SW CORNER) X (METERS)	COORD (SW CORNER) Y (METERS)	BASE ELEV. (METERS)	RELEASE HEIGHT (METERS)	X-DIM OF AREA (METERS)	Y-DIM OF AREA (METERS)	ORIENT. OF AREA (DEG.)	INIT. SZ (METERS)	URBAN SOURCE	EMISSION RATE SCALAR VARY BY
AREA1	0	0.31163E-04	498129.5	3707474.3	382.4	0.00	242.50	142.33	53.13	0.00	YES	

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** SOURCE IDs DEFINING SOURCE GROUPS ***

SRCGROUP ID	SOURCE IDs
AREA1	AREA1 ,
SLINE1	L0011630 , L0011631 , L0011632 , L0011633 , L0011634 , L0011635 , L0011636 , L0011637 ,
	L0011638 , L0011639 , L0011640 , L0011641 , L0011642 , L0011643 , L0011644 , L0011645 ,
	L0011646 , L0011647 , L0011648 , L0011649 , L0011650 , L0011651 , L0011652 , L0011653 ,
	L0011654 , L0011655 , L0011656 , L0011657 , L0011658 , L0011659 , L0011660 , L0011661 ,
	L0011662 , L0011663 , L0011664 , L0011665 , L0011666 , L0011667 , L0011668 , L0011669 ,
	L0011670 , L0011671 , L0011672 , L0011673 , L0011674 , L0011675 , L0011676 , L0011677 ,
	L0011678 , L0011679 , L0011680 , L0011681 , L0011682 , L0011683 , L0011684 , L0011685 ,
	L0011686 , L0011687 , L0011688 , L0011689 , L0011690 , L0011691 , L0011692 , L0011693 ,
	L0011694 , L0011695 , L0011696 , L0011697 , L0011698 , L0011699 , L0011700 , L0011701 ,
	L0011702 , L0011703 , L0011704 , L0011705 , L0011706 , L0011707 , L0011708 , L0011709 ,
	L0011710 , L0011711 , L0011712 , L0011713 , L0011714 , L0011715 , L0011716 , L0011717 ,
	L0011718 , L0011719 , L0011720 , L0011721 , L0011722 , L0011723 , L0011724 , L0011725 ,
	L0011726 , L0011727 , L0011728 , L0011729 , L0011730 , L0011731 , L0011732 , L0011733 ,
	L0011734 , L0011735 , L0011736 , L0011737 , L0011738 , L0011739 , L0011740 , L0011741 ,
	L0011742 , L0011743 , L0011744 , L0011745 , L0011746 , L0011747 , L0011748 , L0011749 ,
	L0011750 , L0011751 , L0011752 , L0011753 , L0011754 , L0011755 , L0011756 , L0011757 ,
	L0011758 , L0011759 , L0011760 , L0011761 , L0011762 , L0011763 , L0011764 , L0011765 ,
	L0011766 , L0011767 , L0011768 , L0011769 , L0011770 , L0011771 , L0011772 , L0011773 ,
	L0011774 , L0011775 , L0011776 , L0011777 , L0011778 , L0011779 , L0011780 , L0011781 ,

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** SOURCE IDs DEFINING SOURCE GROUPS ***

SRCGROUP ID	SOURCE IDs
	L0011782 , L0011783 ,
SLINE2	L0012259 , L0012260 , L0012261 , L0012262 , L0012263 , L0012264 , L0012265 , L0012266 ,
	L0012267 , L0012268 , L0012269 , L0012270 , L0012271 , L0012272 , L0012273 , L0012274 ,
	L0012275 , L0012276 , L0012277 , L0012278 , L0012279 , L0012280 , L0012281 , L0012282 ,
	L0012283 , L0012284 , L0012285 , L0012286 , L0012287 , L0012288 , L0012289 , L0012290 ,
	L0012291 , L0012292 , L0012293 , L0012294 , L0012295 , L0012296 , L0012297 , L0012298 ,
	L0012299 , L0012300 , L0012301 , L0012302 , L0012303 , L0012304 , L0012305 , L0012306 ,
	L0012307 , L0012308 , L0012309 , L0012310 , L0012311 , L0012312 , L0012313 , L0012314 ,
	L0012315 , L0012316 , L0012317 , L0012318 , L0012319 , L0012320 , L0012321 , L0012322 ,
	L0012323 , L0012324 ,
SLINE3	L0011850 , L0011851 , L0011852 , L0011853 , L0011854 , L0011855 , L0011856 , L0011857 ,
	L0011858 , L0011859 , L0011860 , L0011861 , L0011862 , L0011863 , L0011864 , L0011865 ,
	L0011866 , L0011867 , L0011868 , L0011869 , L0011870 , L0011871 , L0011872 , L0011873 ,
	L0011874 , L0011875 , L0011876 , L0011877 , L0011878 , L0011879 , L0011880 , L0011881 ,
	L0011882 , L0011883 , L0011884 , L0011885 , L0011886 , L0011887 , L0011888 , L0011889 ,
	L0011890 , L0011891 , L0011892 , L0011893 , L0011894 , L0011895 , L0011896 , L0011897 ,
	L0011898 , L0011899 , L0011900 , L0011901 , L0011902 , L0011903 , L0011904 , L0011905 ,
	L0011906 , L0011907 , L0011908 , L0011909 , L0011910 , L0011911 , L0011912 , L0011913 ,
	L0011914 , L0011915 , L0011916 , L0011917 , L0011918 , L0011919 , L0011920 , L0011921 ,
	L0011922 , L0011923 , L0011924 , L0011925 , L0011926 , L0011927 , L0011928 , L0011929 ,

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** SOURCE IDs DEFINING SOURCE GROUPS ***

SRCGROUP ID	SOURCE IDs
	L0011930 , L0011931 , L0011932 , L0011933 , L0011934 , L0011935 , L0011936 , L0011937 ,
	L0011938 , L0011939 , L0011940 , L0011941 , L0011942 , L0011943 , L0011944 , L0011945 ,
	L0011946 , L0011947 , L0011948 , L0011949 , L0011950 , L0011951 , L0011952 , L0011953 ,
	L0011954 , L0011955 , L0011956 , L0011957 , L0011958 , L0011959 , L0011960 , L0011961 ,
	L0011962 , L0011963 , L0011964 , L0011965 , L0011966 , L0011967 , L0011968 , L0011969 ,
	L0011970 , L0011971 , L0011972 , L0011973 , L0011974 , L0011975 , L0011976 , L0011977 ,
	L0011978 , L0011979 , L0011980 , L0011981 , L0011982 , L0011983 , L0011984 , L0011985 ,
	L0011986 , L0011987 , L0011988 , L0011989 , L0011990 , L0011991 , L0011992 , L0011993 ,
	L0011994 , L0011995 , L0011996 , L0011997 , L0011998 , L0011999 , L0012000 , L0012001 ,
	L0012002 , L0012003 , L0012004 , L0012005 , L0012006 ,
SLINE4	L0012007 , L0012008 , L0012009 , L0012010 , L0012011 , L0012012 , L0012013 , L0012014 ,
	L0012015 , L0012016 , L0012017 , L0012018 , L0012019 , L0012020 , L0012021 , L0012022 ,
	L0012023 , L0012024 , L0012025 , L0012026 , L0012027 , L0012028 , L0012029 , L0012030 ,
	L0012031 , L0012032 , L0012033 , L0012034 , L0012035 , L0012036 , L0012037 , L0012038 ,
	L0012039 , L0012040 , L0012041 , L0012042 , L0012043 , L0012044 , L0012045 , L0012046 ,
	L0012047 , L0012048 , L0012049 , L0012050 , L0012051 , L0012052 , L0012053 , L0012054 ,
	L0012055 , L0012056 , L0012057 , L0012058 , L0012059 , L0012060 , L0012061 , L0012062 ,
	L0012063 , L0012064 , L0012065 , L0012066 , L0012067 , L0012068 , L0012069 , L0012070 ,
	L0012071 , L0012072 , L0012073 , L0012074 , L0012075 , L0012076 , L0012077 , L0012078 ,
	L0012079 , L0012080 , L0012081 , L0012082 ,

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** SOURCE IDs DEFINING SOURCE GROUPS ***

SRCGROUP ID	SOURCE IDs
SLINE5	L0012214 , L0012215 , L0012216 , L0012217 , L0012218 , L0012219 , L0012220 , L0012221 ,
	L0012222 , L0012223 , L0012224 , L0012225 , L0012226 , L0012227 , L0012228 , L0012229 ,
	L0012230 , L0012231 , L0012232 , L0012233 , L0012234 , L0012235 , L0012236 , L0012237 ,
	L0012238 , L0012239 , L0012240 , L0012241 , L0012242 , L0012243 , L0012244 , L0012245 ,
	L0012246 , L0012247 , L0012248 , L0012249 , L0012250 , L0012251 , L0012252 , L0012253 ,
	L0012254 , L0012255 , L0012256 , L0012257 , L0012258 ,
SLINE6	L0012325 , L0012326 , L0012327 , L0012328 , L0012329 , L0012330 , L0012331 , L0012332 ,
	L0012333 , L0012334 , L0012335 , L0012336 , L0012337 , L0012338 , L0012339 , L0012340 ,
	L0012341 , L0012342 , L0012343 , L0012344 , L0012345 , L0012346 , L0012347 , L0012348 ,
	L0012349 , L0012350 , L0012351 , L0012352 , L0012353 , L0012354 , L0012355 , L0012356 ,
	L0012357 , L0012358 , L0012359 , L0012360 , L0012361 , L0012362 , L0012363 , L0012364 ,
	L0012365 , L0012366 , L0012367 , L0012368 ,
VOL1	VOL1 ,
VOL2	VOL2 ,
VOL3	VOL3 ,
VOL4	VOL4 ,
VOL5	VOL5 ,
VOL6	VOL6 ,
VOL7	VOL7 ,
ALL	AREA1 , L0011630 , L0011631 , L0011632 , L0011633 , L0011634 , L0011635 , L0011636 ,

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** SOURCE IDs DEFINING SOURCE GROUPS ***

SRCGROUP ID	SOURCE IDs
	L0011637 , L0011638 , L0011639 , L0011640 , L0011641 , L0011642 , L0011643 , L0011644 ,
	L0011645 , L0011646 , L0011647 , L0011648 , L0011649 , L0011650 , L0011651 , L0011652 ,
	L0011653 , L0011654 , L0011655 , L0011656 , L0011657 , L0011658 , L0011659 , L0011660 ,
	L0011661 , L0011662 , L0011663 , L0011664 , L0011665 , L0011666 , L0011667 , L0011668 ,
	L0011669 , L0011670 , L0011671 , L0011672 , L0011673 , L0011674 , L0011675 , L0011676 ,
	L0011677 , L0011678 , L0011679 , L0011680 , L0011681 , L0011682 , L0011683 , L0011684 ,
	L0011685 , L0011686 , L0011687 , L0011688 , L0011689 , L0011690 , L0011691 , L0011692 ,
	L0011693 , L0011694 , L0011695 , L0011696 , L0011697 , L0011698 , L0011699 , L0011700 ,
	L0011701 , L0011702 , L0011703 , L0011704 , L0011705 , L0011706 , L0011707 , L0011708 ,
	L0011709 , L0011710 , L0011711 , L0011712 , L0011713 , L0011714 , L0011715 , L0011716 ,
	L0011717 , L0011718 , L0011719 , L0011720 , L0011721 , L0011722 , L0011723 , L0011724 ,
	L0011725 , L0011726 , L0011727 , L0011728 , L0011729 , L0011730 , L0011731 , L0011732 ,
	L0011733 , L0011734 , L0011735 , L0011736 , L0011737 , L0011738 , L0011739 , L0011740 ,
	L0011741 , L0011742 , L0011743 , L0011744 , L0011745 , L0011746 , L0011747 , L0011748 ,
	L0011749 , L0011750 , L0011751 , L0011752 , L0011753 , L0011754 , L0011755 , L0011756 ,
	L0011757 , L0011758 , L0011759 , L0011760 , L0011761 , L0011762 , L0011763 , L0011764 ,
	L0011765 , L0011766 , L0011767 , L0011768 , L0011769 , L0011770 , L0011771 , L0011772 ,
	L0011773 , L0011774 , L0011775 , L0011776 , L0011777 , L0011778 , L0011779 , L0011780 ,
	L0011781 , L0011782 , L0011783 , L0012259 , L0012260 , L0012261 , L0012262 , L0012263 ,
	L0012264 , L0012265 , L0012266 , L0012267 , L0012268 , L0012269 , L0012270 , L0012271 ,

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** SOURCE IDs DEFINING SOURCE GROUPS ***

SRCGROUP ID	SOURCE IDs
	L0012272 , L0012273 , L0012274 , L0012275 , L0012276 , L0012277 , L0012278 , L0012279 ,
	L0012280 , L0012281 , L0012282 , L0012283 , L0012284 , L0012285 , L0012286 , L0012287 ,
	L0012288 , L0012289 , L0012290 , L0012291 , L0012292 , L0012293 , L0012294 , L0012295 ,
	L0012296 , L0012297 , L0012298 , L0012299 , L0012300 , L0012301 , L0012302 , L0012303 ,
	L0012304 , L0012305 , L0012306 , L0012307 , L0012308 , L0012309 , L0012310 , L0012311 ,
	L0012312 , L0012313 , L0012314 , L0012315 , L0012316 , L0012317 , L0012318 , L0012319 ,
	L0012320 , L0012321 , L0012322 , L0012323 , L0012324 , L0011850 , L0011851 , L0011852 ,
	L0011853 , L0011854 , L0011855 , L0011856 , L0011857 , L0011858 , L0011859 , L0011860 ,
	L0011861 , L0011862 , L0011863 , L0011864 , L0011865 , L0011866 , L0011867 , L0011868 ,
	L0011869 , L0011870 , L0011871 , L0011872 , L0011873 , L0011874 , L0011875 , L0011876 ,
	L0011877 , L0011878 , L0011879 , L0011880 , L0011881 , L0011882 , L0011883 , L0011884 ,
	L0011885 , L0011886 , L0011887 , L0011888 , L0011889 , L0011890 , L0011891 , L0011892 ,
	L0011893 , L0011894 , L0011895 , L0011896 , L0011897 , L0011898 , L0011899 , L0011900 ,
	L0011901 , L0011902 , L0011903 , L0011904 , L0011905 , L0011906 , L0011907 , L0011908 ,
	L0011909 , L0011910 , L0011911 , L0011912 , L0011913 , L0011914 , L0011915 , L0011916 ,
	L0011917 , L0011918 , L0011919 , L0011920 , L0011921 , L0011922 , L0011923 , L0011924 ,
	L0011925 , L0011926 , L0011927 , L0011928 , L0011929 , L0011930 , L0011931 , L0011932 ,
	L0011933 , L0011934 , L0011935 , L0011936 , L0011937 , L0011938 , L0011939 , L0011940 ,
	L0011941 , L0011942 , L0011943 , L0011944 , L0011945 , L0011946 , L0011947 , L0011948 ,
	L0011949 , L0011950 , L0011951 , L0011952 , L0011953 , L0011954 , L0011955 , L0011956 ,

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** SOURCE IDs DEFINING SOURCE GROUPS ***

SRCGROUP ID	SOURCE IDs
	L0011957 , L0011958 , L0011959 , L0011960 , L0011961 , L0011962 , L0011963 , L0011964 ,
	L0011965 , L0011966 , L0011967 , L0011968 , L0011969 , L0011970 , L0011971 , L0011972 ,
	L0011973 , L0011974 , L0011975 , L0011976 , L0011977 , L0011978 , L0011979 , L0011980 ,
	L0011981 , L0011982 , L0011983 , L0011984 , L0011985 , L0011986 , L0011987 , L0011988 ,
	L0011989 , L0011990 , L0011991 , L0011992 , L0011993 , L0011994 , L0011995 , L0011996 ,
	L0011997 , L0011998 , L0011999 , L0012000 , L0012001 , L0012002 , L0012003 , L0012004 ,
	L0012005 , L0012006 , L0012007 , L0012008 , L0012009 , L0012010 , L0012011 , L0012012 ,
	L0012013 , L0012014 , L0012015 , L0012016 , L0012017 , L0012018 , L0012019 , L0012020 ,
	L0012021 , L0012022 , L0012023 , L0012024 , L0012025 , L0012026 , L0012027 , L0012028 ,
	L0012029 , L0012030 , L0012031 , L0012032 , L0012033 , L0012034 , L0012035 , L0012036 ,
	L0012037 , L0012038 , L0012039 , L0012040 , L0012041 , L0012042 , L0012043 , L0012044 ,
	L0012045 , L0012046 , L0012047 , L0012048 , L0012049 , L0012050 , L0012051 , L0012052 ,
	L0012053 , L0012054 , L0012055 , L0012056 , L0012057 , L0012058 , L0012059 , L0012060 ,
	L0012061 , L0012062 , L0012063 , L0012064 , L0012065 , L0012066 , L0012067 , L0012068 ,
	L0012069 , L0012070 , L0012071 , L0012072 , L0012073 , L0012074 , L0012075 , L0012076 ,
	L0012077 , L0012078 , L0012079 , L0012080 , L0012081 , L0012082 , L0012214 , L0012215 ,
	L0012216 , L0012217 , L0012218 , L0012219 , L0012220 , L0012221 , L0012222 , L0012223 ,
	L0012224 , L0012225 , L0012226 , L0012227 , L0012228 , L0012229 , L0012230 , L0012231 ,
	L0012232 , L0012233 , L0012234 , L0012235 , L0012236 , L0012237 , L0012238 , L0012239 ,
	L0012240 , L0012241 , L0012242 , L0012243 , L0012244 , L0012245 , L0012246 , L0012247 ,

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** SOURCE IDs DEFINING SOURCE GROUPS ***

SRCGROUP ID	SOURCE IDs
	L0012248 , L0012249 , L0012250 , L0012251 , L0012252 , L0012253 , L0012254 , L0012255 ,
	L0012256 , L0012257 , L0012258 , L0012325 , L0012326 , L0012327 , L0012328 , L0012329 ,
	L0012330 , L0012331 , L0012332 , L0012333 , L0012334 , L0012335 , L0012336 , L0012337 ,
	L0012338 , L0012339 , L0012340 , L0012341 , L0012342 , L0012343 , L0012344 , L0012345 ,
	L0012346 , L0012347 , L0012348 , L0012349 , L0012350 , L0012351 , L0012352 , L0012353 ,
	L0012354 , L0012355 , L0012356 , L0012357 , L0012358 , L0012359 , L0012360 , L0012361 ,
	L0012362 , L0012363 , L0012364 , L0012365 , L0012366 , L0012367 , L0012368 , VOL1 ,
	VOL2 , VOL3 , VOL4 , VOL5 , VOL6 , VOL7 ,

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** SOURCE IDs DEFINED AS URBAN SOURCES ***

URBAN ID	URBAN POP	SOURCE IDs
	2517830.	AREA1 , L0011630 , L0011631 , L0011632 , L0011633 , L0011634 , L0011635 , L0011636 ,
		L0011637 , L0011638 , L0011639 , L0011640 , L0011641 , L0011642 , L0011643 , L0011644 ,
		L0011645 , L0011646 , L0011647 , L0011648 , L0011649 , L0011650 , L0011651 , L0011652 ,
		L0011653 , L0011654 , L0011655 , L0011656 , L0011657 , L0011658 , L0011659 , L0011660 ,
		L0011661 , L0011662 , L0011663 , L0011664 , L0011665 , L0011666 , L0011667 , L0011668 ,
		L0011669 , L0011670 , L0011671 , L0011672 , L0011673 , L0011674 , L0011675 , L0011676 ,
		L0011677 , L0011678 , L0011679 , L0011680 , L0011681 , L0011682 , L0011683 , L0011684 ,
		L0011685 , L0011686 , L0011687 , L0011688 , L0011689 , L0011690 , L0011691 , L0011692 ,
		L0011693 , L0011694 , L0011695 , L0011696 , L0011697 , L0011698 , L0011699 , L0011700 ,
		L0011701 , L0011702 , L0011703 , L0011704 , L0011705 , L0011706 , L0011707 , L0011708 ,
		L0011709 , L0011710 , L0011711 , L0011712 , L0011713 , L0011714 , L0011715 , L0011716 ,
		L0011717 , L0011718 , L0011719 , L0011720 , L0011721 , L0011722 , L0011723 , L0011724 ,
		L0011725 , L0011726 , L0011727 , L0011728 , L0011729 , L0011730 , L0011731 , L0011732 ,
		L0011733 , L0011734 , L0011735 , L0011736 , L0011737 , L0011738 , L0011739 , L0011740 ,
		L0011741 , L0011742 , L0011743 , L0011744 , L0011745 , L0011746 , L0011747 , L0011748 ,
		L0011749 , L0011750 , L0011751 , L0011752 , L0011753 , L0011754 , L0011755 , L0011756 ,
		L0011757 , L0011758 , L0011759 , L0011760 , L0011761 , L0011762 , L0011763 , L0011764 ,
		L0011765 , L0011766 , L0011767 , L0011768 , L0011769 , L0011770 , L0011771 , L0011772 ,
		L0011773 , L0011774 , L0011775 , L0011776 , L0011777 , L0011778 , L0011779 , L0011780 ,
		L0011781 , L0011782 , L0011783 , L0012259 , L0012260 , L0012261 , L0012262 , L0012263 ,

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** SOURCE IDs DEFINED AS URBAN SOURCES ***

URBAN ID	URBAN POP	SOURCE IDs
		L0012264 , L0012265 , L0012266 , L0012267 , L0012268 , L0012269 , L0012270 , L0012271 ,
		L0012272 , L0012273 , L0012274 , L0012275 , L0012276 , L0012277 , L0012278 , L0012279 ,
		L0012280 , L0012281 , L0012282 , L0012283 , L0012284 , L0012285 , L0012286 , L0012287 ,
		L0012288 , L0012289 , L0012290 , L0012291 , L0012292 , L0012293 , L0012294 , L0012295 ,
		L0012296 , L0012297 , L0012298 , L0012299 , L0012300 , L0012301 , L0012302 , L0012303 ,
		L0012304 , L0012305 , L0012306 , L0012307 , L0012308 , L0012309 , L0012310 , L0012311 ,
		L0012312 , L0012313 , L0012314 , L0012315 , L0012316 , L0012317 , L0012318 , L0012319 ,
		L0012320 , L0012321 , L0012322 , L0012323 , L0012324 , L0011850 , L0011851 , L0011852 ,
		L0011853 , L0011854 , L0011855 , L0011856 , L0011857 , L0011858 , L0011859 , L0011860 ,
		L0011861 , L0011862 , L0011863 , L0011864 , L0011865 , L0011866 , L0011867 , L0011868 ,
		L0011869 , L0011870 , L0011871 , L0011872 , L0011873 , L0011874 , L0011875 , L0011876 ,
		L0011877 , L0011878 , L0011879 , L0011880 , L0011881 , L0011882 , L0011883 , L0011884 ,
		L0011885 , L0011886 , L0011887 , L0011888 , L0011889 , L0011890 , L0011891 , L0011892 ,
		L0011893 , L0011894 , L0011895 , L0011896 , L0011897 , L0011898 , L0011899 , L0011900 ,
		L0011901 , L0011902 , L0011903 , L0011904 , L0011905 , L0011906 , L0011907 , L0011908 ,
		L0011909 , L0011910 , L0011911 , L0011912 , L0011913 , L0011914 , L0011915 , L0011916 ,
		L0011917 , L0011918 , L0011919 , L0011920 , L0011921 , L0011922 , L0011923 , L0011924 ,
		L0011925 , L0011926 , L0011927 , L0011928 , L0011929 , L0011930 , L0011931 , L0011932 ,
		L0011933 , L0011934 , L0011935 , L0011936 , L0011937 , L0011938 , L0011939 , L0011940 ,
		L0011941 , L0011942 , L0011943 , L0011944 , L0011945 , L0011946 , L0011947 , L0011948 ,

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** SOURCE IDs DEFINED AS URBAN SOURCES ***

URBAN ID	URBAN POP	SOURCE IDs
		L0011949 , L0011950 , L0011951 , L0011952 , L0011953 , L0011954 , L0011955 , L0011956 ,
		L0011957 , L0011958 , L0011959 , L0011960 , L0011961 , L0011962 , L0011963 , L0011964 ,
		L0011965 , L0011966 , L0011967 , L0011968 , L0011969 , L0011970 , L0011971 , L0011972 ,
		L0011973 , L0011974 , L0011975 , L0011976 , L0011977 , L0011978 , L0011979 , L0011980 ,
		L0011981 , L0011982 , L0011983 , L0011984 , L0011985 , L0011986 , L0011987 , L0011988 ,
		L0011989 , L0011990 , L0011991 , L0011992 , L0011993 , L0011994 , L0011995 , L0011996 ,
		L0011997 , L0011998 , L0011999 , L0012000 , L0012001 , L0012002 , L0012003 , L0012004 ,
		L0012005 , L0012006 , L0012007 , L0012008 , L0012009 , L0012010 , L0012011 , L0012012 ,
		L0012013 , L0012014 , L0012015 , L0012016 , L0012017 , L0012018 , L0012019 , L0012020 ,
		L0012021 , L0012022 , L0012023 , L0012024 , L0012025 , L0012026 , L0012027 , L0012028 ,
		L0012029 , L0012030 , L0012031 , L0012032 , L0012033 , L0012034 , L0012035 , L0012036 ,
		L0012037 , L0012038 , L0012039 , L0012040 , L0012041 , L0012042 , L0012043 , L0012044 ,
		L0012045 , L0012046 , L0012047 , L0012048 , L0012049 , L0012050 , L0012051 , L0012052 ,
		L0012053 , L0012054 , L0012055 , L0012056 , L0012057 , L0012058 , L0012059 , L0012060 ,
		L0012061 , L0012062 , L0012063 , L0012064 , L0012065 , L0012066 , L0012067 , L0012068 ,
		L0012069 , L0012070 , L0012071 , L0012072 , L0012073 , L0012074 , L0012075 , L0012076 ,
		L0012077 , L0012078 , L0012079 , L0012080 , L0012081 , L0012082 , L0012214 , L0012215 ,
		L0012216 , L0012217 , L0012218 , L0012219 , L0012220 , L0012221 , L0012222 , L0012223 ,
		L0012224 , L0012225 , L0012226 , L0012227 , L0012228 , L0012229 , L0012230 , L0012231 ,
		L0012232 , L0012233 , L0012234 , L0012235 , L0012236 , L0012237 , L0012238 , L0012239 ,

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** SOURCE IDs DEFINED AS URBAN SOURCES ***

URBAN ID	URBAN POP	SOURCE IDs
		L0012240 , L0012241 , L0012242 , L0012243 , L0012244 , L0012245 , L0012246 , L0012247 ,
		L0012248 , L0012249 , L0012250 , L0012251 , L0012252 , L0012253 , L0012254 , L0012255 ,
		L0012256 , L0012257 , L0012258 , L0012325 , L0012326 , L0012327 , L0012328 , L0012329 ,
		L0012330 , L0012331 , L0012332 , L0012333 , L0012334 , L0012335 , L0012336 , L0012337 ,
		L0012338 , L0012339 , L0012340 , L0012341 , L0012342 , L0012343 , L0012344 , L0012345 ,
		L0012346 , L0012347 , L0012348 , L0012349 , L0012350 , L0012351 , L0012352 , L0012353 ,
		L0012354 , L0012355 , L0012356 , L0012357 , L0012358 , L0012359 , L0012360 , L0012361 ,
		L0012362 , L0012363 , L0012364 , L0012365 , L0012366 , L0012367 , L0012368 , VOL1 ,
		VOL2 , VOL3 , VOL4 , VOL5 , VOL6 , VOL7 ,

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** DISCRETE CARTESIAN RECEPTORS ***
(X-COORD, Y-COORD, ZELEV, ZHILL, ZFLAG)
(METERS)

(	498457.5,	3707738.7,	384.5,	545.6,	1.8);	(	498540.6,	3707527.4,	383.9,	545.6,	1.8);
(	498070.6,	3707175.2,	380.3,	545.6,	1.8);	(	498116.8,	3707452.4,	382.2,	545.6,	1.8);
(	498240.4,	3707276.8,	381.6,	545.6,	1.8);	(	498092.5,	3707092.1,	379.7,	545.6,	1.8);
(	498032.5,	3707054.0,	379.3,	545.6,	1.8);	(	497939.0,	3707130.2,	379.4,	545.6,	1.8);
(	497817.7,	3707524.0,	390.4,	482.7,	1.8);	(	497937.8,	3707642.9,	389.1,	482.7,	1.8);
(	498024.4,	3707797.6,	392.0,	482.7,	1.8);	(	498194.2,	3707735.3,	384.3,	482.7,	1.8);

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** METEOROLOGICAL DAYS SELECTED FOR PROCESSING ***
(1=YES; 0=NO)

```
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1
```

NOTE: METEOROLOGICAL DATA ACTUALLY PROCESSED WILL ALSO DEPEND ON WHAT IS INCLUDED IN THE DATA FILE.

*** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
(METERS/SEC)

1.54,   3.09,   5.14,   8.23, 10.80,

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** UP TO THE FIRST 24 HOURS OF METEOROLOGICAL DATA ***

  Surface file: ELSI_v9.SFC   Met Version: 16216
  Profile file: ELSI_v9.PFL
  Surface format: FREE
  Profile format: FREE
  Surface station no.:   3171   Upper air station no.:   3190
                Name: LAKE_ELSINORE   Name: UNKNOWN
                Year: 2012   Year: 2012

First 24 hours of scalar data

YR	MO	DY	JDY	HR	H0	U*	W*	DT/DZ	ZICNV	ZIMCH	M-O LEN	Z0	BOWEN	ALBEDO	REF WS	WD	HT	REF TA	HT
12	01	01	1	01	-1.3	0.065	-9.000	-9.000	-999.	40.	18.2	0.23	2.69	1.00	0.40	78.	9.1	284.2	5.5
12	01	01	1	02	-4.2	0.092	-9.000	-9.000	-999.	67.	16.0	0.23	2.69	1.00	0.90	69.	9.1	283.8	5.5
12	01	01	1	03	-4.2	0.092	-9.000	-9.000	-999.	67.	16.0	0.23	2.69	1.00	0.90	286.	9.1	282.5	5.5
12	01	01	1	04	-4.2	0.092	-9.000	-9.000	-999.	67.	16.0	0.23	2.69	1.00	0.90	348.	9.1	282.5	5.5
12	01	01	1	05	-1.3	0.066	-9.000	-9.000	-999.	40.	18.2	0.23	2.69	1.00	0.40	17.	9.1	282.0	5.5
12	01	01	1	06	-4.2	0.092	-9.000	-9.000	-999.	67.	16.0	0.23	2.69	1.00	0.90	161.	9.1	282.0	5.5
12	01	01	1	07	-1.3	0.066	-9.000	-9.000	-999.	40.	18.2	0.23	2.69	1.00	0.40	273.	9.1	282.0	5.5
12	01	01	1	08	-3.6	0.091	-9.000	-9.000	-999.	66.	18.3	0.23	2.69	0.54	0.90	113.	9.1	283.8	5.5
12	01	01	1	09	39.6	0.087	0.358	0.016	40.	61.	-1.4	0.23	2.69	0.33	0.40	336.	9.1	285.9	5.5
12	01	01	1	10	110.7	0.206	0.740	0.007	127.	225.	-6.9	0.23	2.69	0.25	1.30	158.	9.1	291.4	5.5
12	01	01	1	11	161.7	0.105	1.203	0.005	374.	87.	-1.0	0.23	2.69	0.23	0.40	33.	9.1	297.0	5.5
12	01	01	1	12	185.5	0.271	1.535	0.005	676.	339.	-9.3	0.23	2.69	0.22	1.80	313.	9.1	298.8	5.5
12	01	01	1	13	183.9	0.219	1.828	0.005	1154.	247.	-4.9	0.23	2.69	0.22	1.30	250.	9.1	300.4	5.5
12	01	01	1	14	156.6	0.266	1.869	0.005	1446.	330.	-10.4	0.23	2.69	0.23	1.80	217.	9.1	301.4	5.5
12	01	01	1	15	104.7	0.256	1.677	0.005	1562.	311.	-13.8	0.23	2.69	0.27	1.80	248.	9.1	302.0	5.5
12	01	01	1	16	32.7	0.319	1.147	0.005	1596.	433.	-85.9	0.23	2.69	0.36	2.70	235.	9.1	302.0	5.5
12	01	01	1	17	-15.5	0.190	-9.000	-9.000	-999.	208.	39.6	0.23	2.69	0.63	1.80	46.	9.1	299.2	5.5
12	01	01	1	18	-4.1	0.092	-9.000	-9.000	-999.	73.	16.2	0.23	2.69	1.00	0.90	107.	9.1	294.9	5.5
12	01	01	1	19	-999.0	-9.000	-9.000	-9.000	-999.	-999.	-99999.0	0.23	2.69	1.00	999.00	999.	-9.0	292.5	5.5
12	01	01	1	20	-4.2	0.092	-9.000	-9.000	-999.	67.	16.1	0.23	2.69	1.00	0.90	323.	9.1	290.4	5.5
12	01	01	1	21	-8.8	0.133	-9.000	-9.000	-999.	116.	23.2	0.23	2.69	1.00	1.30	34.	9.1	287.5	5.5
12	01	01	1	22	-1.3	0.065	-9.000	-9.000	-999.	41.	18.1	0.23	2.69	1.00	0.40	359.	9.1	286.4	5.5
12	01	01	1	23	-1.3	0.065	-9.000	-9.000	-999.	40.	18.1	0.23	2.69	1.00	0.40	351.	9.1	285.4	5.5
12	01	01	1	24	-4.2	0.092	-9.000	-9.000	-999.	67.	16.0	0.23	2.69	1.00	0.90	11.	9.1	284.9	5.5

First hour of profile data

YR	MO	DY	HR	HEIGHT	F	WDIR	WSPD	AMB_TMP	sigmaA	sigmaW	sigmaV
12	01	01	01	5.5	0	-999.	-99.00	284.3	99.0	-99.00	-99.00
12	01	01	01	9.1	1	78.	0.40	-999.0	99.0	-99.00	-99.00

F indicates top of profile (=1) or below (=0)

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** THE PERIOD (43848 HRS) AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: AREA1   ***
INCLUDING SOURCE(S):   AREA1   ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF TOXICS   IN MICROGRAMS/M**3   **

X-COORD (M)	Y-COORD (M)	CONC	X-COORD (M)	Y-COORD (M)	CONC
498457.45	3707738.74	6.74032	498540.59	3707527.43	10.76802
498070.61	3707175.23	7.74970	498116.80	3707452.37	36.37740
498240.36	3707276.85	68.35136	498092.55	3707092.09	7.40834
498032.51	3707053.98	4.94826	497938.97	3707130.20	3.32868
497817.73	3707523.96	2.44211	497937.82	3707642.90	7.62684
498024.43	3707797.64	15.94368	498194.17	3707735.28	20.25319

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** THE PERIOD (43848 HRS) AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: SLINE1 ***
INCLUDING SOURCE(S): L0011630 , L0011631 , L0011632 , L0011633 , L0011634 ,
L0011635 , L0011636 , L0011637 , L0011638 , L0011639 , L0011640 , L0011641 , L0011642 ,
L0011643 , L0011644 , L0011645 , L0011646 , L0011647 , L0011648 , L0011649 , L0011650 ,
L0011651 , L0011652 , L0011653 , L0011654 , L0011655 , L0011656 , L0011657 , . . . ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF TOXICS IN MICROGRAMS/M**3 **

X-COORD (M)	Y-COORD (M)	CONC	X-COORD (M)	Y-COORD (M)	CONC
498457.45	3707738.74	5.90896	498540.59	3707527.43	5.47622
498070.61	3707175.23	15.30826	498116.80	3707452.37	127.08866
498240.36	3707276.85	13.93381	498092.55	3707092.09	9.99156
498032.51	3707053.98	9.49164	497938.97	3707130.20	16.90603
497817.73	3707523.96	15.09213	497937.82	3707642.90	13.48106
498024.43	3707797.64	7.70527	498194.17	3707735.28	11.15509

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** THE PERIOD (43848 HRS) AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: SLINE2 ***
INCLUDING SOURCE(S): L0012259 , L0012260 , L0012261 , L0012262 , L0012263 ,
L0012264 , L0012265 , L0012266 , L0012267 , L0012268 , L0012269 , L0012270 , L0012271 ,
L0012272 , L0012273 , L0012274 , L0012275 , L0012276 , L0012277 , L0012278 , L0012279 ,
L0012280 , L0012281 , L0012282 , L0012283 , L0012284 , L0012285 , L0012286 , . . . ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF TOXICS IN MICROGRAMS/M**3 **

X-COORD (M)	Y-COORD (M)	CONC	X-COORD (M)	Y-COORD (M)	CONC
498457.45	3707738.74	4.67072	498540.59	3707527.43	4.47085
498070.61	3707175.23	15.73043	498116.80	3707452.37	74.19792
498240.36	3707276.85	12.75436	498092.55	3707092.09	10.54997
498032.51	3707053.98	10.15379	497938.97	3707130.20	17.55428
497817.73	3707523.96	14.16271	497937.82	3707642.90	12.69046
498024.43	3707797.64	6.95504	498194.17	3707735.28	8.55882

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** THE PERIOD (43848 HRS) AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: SLINE3 ***
INCLUDING SOURCE(S): L0011850 , L0011851 , L0011852 , L0011853 , L0011854 ,
L0011855 , L0011856 , L0011857 , L0011858 , L0011859 , L0011860 , L0011861 , L0011862 ,
L0011863 , L0011864 , L0011865 , L0011866 , L0011867 , L0011868 , L0011869 , L0011870 ,
L0011871 , L0011872 , L0011873 , L0011874 , L0011875 , L0011876 , L0011877 , . . . ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF TOXICS IN MICROGRAMS/M**3 **

X-COORD (M)	Y-COORD (M)	CONC	X-COORD (M)	Y-COORD (M)	CONC
498457.45	3707738.74	6.12299	498540.59	3707527.43	5.54884
498070.61	3707175.23	14.47392	498116.80	3707452.37	100.94281
498240.36	3707276.85	13.39864	498092.55	3707092.09	9.54938
498032.51	3707053.98	9.05363	497938.97	3707130.20	15.76859
497817.73	3707523.96	15.60227	497937.82	3707642.90	14.07076
498024.43	3707797.64	8.07330	498194.17	3707735.28	11.99021

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** THE PERIOD (43848 HRS) AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: SLINE4 ***
INCLUDING SOURCE(S): L0012007 , L0012008 , L0012009 , L0012010 , L0012011 ,
L0012012 , L0012013 , L0012014 , L0012015 , L0012016 , L0012017 , L0012018 , L0012019 ,
L0012020 , L0012021 , L0012022 , L0012023 , L0012024 , L0012025 , L0012026 , L0012027 ,
L0012028 , L0012029 , L0012030 , L0012031 , L0012032 , L0012033 , L0012034 , . . . ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF TOXICS IN MICROGRAMS/M**3 **

X-COORD (M)	Y-COORD (M)	CONC	X-COORD (M)	Y-COORD (M)	CONC
498457.45	3707738.74	5.52695	498540.59	3707527.43	5.21364
498070.61	3707175.23	14.19774	498116.80	3707452.37	64.73409
498240.36	3707276.85	13.11472	498092.55	3707092.09	9.67457
498032.51	3707053.98	9.17253	497938.97	3707130.20	15.20693
497817.73	3707523.96	13.41861	497937.82	3707642.90	12.76856
498024.43	3707797.64	7.88234	498194.17	3707735.28	10.50274

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** THE PERIOD (43848 HRS) AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: SLINE5 ***
INCLUDING SOURCE(S): L0012214 , L0012215 , L0012216 , L0012217 , L0012218 ,
L0012219 , L0012220 , L0012221 , L0012222 , L0012223 , L0012224 , L0012225 , L0012226 ,
L0012227 , L0012228 , L0012229 , L0012230 , L0012231 , L0012232 , L0012233 , L0012234 ,
L0012235 , L0012236 , L0012237 , L0012238 , L0012239 , L0012240 , L0012241 , . . . ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF TOXICS IN MICROGRAMS/M**3 **

X-COORD (M)	Y-COORD (M)	CONC	X-COORD (M)	Y-COORD (M)	CONC
498457.45	3707738.74	8.30738	498540.59	3707527.43	37.19550
498070.61	3707175.23	6.19847	498116.80	3707452.37	11.35756
498240.36	3707276.85	19.90580	498092.55	3707092.09	5.49886
498032.51	3707053.98	4.29634	497938.97	3707130.20	3.81121
497817.73	3707523.96	2.44776	497937.82	3707642.90	3.52410
498024.43	3707797.64	4.03837	498194.17	3707735.28	6.09253

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** THE PERIOD (43848 HRS) AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: SLINE6 ***
INCLUDING SOURCE(S): L0012325 , L0012326 , L0012327 , L0012328 , L0012329 ,
L0012330 , L0012331 , L0012332 , L0012333 , L0012334 , L0012335 , L0012336 , L0012337 ,
L0012338 , L0012339 , L0012340 , L0012341 , L0012342 , L0012343 , L0012344 , L0012345 ,
L0012346 , L0012347 , L0012348 , L0012349 , L0012350 , L0012351 , L0012352 , . . . ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF TOXICS IN MICROGRAMS/M**3 **

X-COORD (M)	Y-COORD (M)	CONC	X-COORD (M)	Y-COORD (M)	CONC
498457.45	3707738.74	8.56178	498540.59	3707527.43	40.13947
498070.61	3707175.23	6.11451	498116.80	3707452.37	11.23271
498240.36	3707276.85	19.23486	498092.55	3707092.09	5.41918
498032.51	3707053.98	4.24474	497938.97	3707130.20	3.77861
497817.73	3707523.96	2.45078	497937.82	3707642.90	3.52508
498024.43	3707797.64	4.07380	498194.17	3707735.28	6.23754

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** THE PERIOD (43848 HRS) AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: VOL1   ***
INCLUDING SOURCE(S):   VOL1   ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF TOXICS   IN MICROGRAMS/M**3   **

X-COORD (M)	Y-COORD (M)	CONC	X-COORD (M)	Y-COORD (M)	CONC
498457.45	3707738.74	10.00857	498540.59	3707527.43	11.29544
498070.61	3707175.23	10.46079	498116.80	3707452.37	79.42300
498240.36	3707276.85	26.29213	498092.55	3707092.09	7.60166
498032.51	3707053.98	6.03988	497938.97	3707130.20	6.38919
497817.73	3707523.96	6.32755	497937.82	3707642.90	10.09634
498024.43	3707797.64	10.14908	498194.17	3707735.28	15.83415

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** THE PERIOD (43848 HRS) AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: VOL2   ***
INCLUDING SOURCE(S):   VOL2   ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF TOXICS   IN MICROGRAMS/M**3   **

X-COORD (M)	Y-COORD (M)	CONC	X-COORD (M)	Y-COORD (M)	CONC
498457.45	3707738.74	9.43901	498540.59	3707527.43	11.83912
498070.61	3707175.23	11.30349	498116.80	3707452.37	68.05931
498240.36	3707276.85	32.86168	498092.55	3707092.09	8.20825
498032.51	3707053.98	6.41013	497938.97	3707130.20	6.63698
497817.73	3707523.96	5.94256	497937.82	3707642.90	9.16817
498024.43	3707797.64	9.15500	498194.17	3707735.28	13.59952

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** THE PERIOD (43848 HRS) AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: VOL3   ***
INCLUDING SOURCE(S):   VOL3   ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF TOXICS   IN MICROGRAMS/M**3   **

X-COORD (M)	Y-COORD (M)	CONC	X-COORD (M)	Y-COORD (M)	CONC
498457.45	3707738.74	9.12617	498540.59	3707527.43	12.65256
498070.61	3707175.23	11.71908	498116.80	3707452.37	53.16821
498240.36	3707276.85	39.70366	498092.55	3707092.09	8.59709
498032.51	3707053.98	6.61831	497938.97	3707130.20	6.68636
497817.73	3707523.96	5.55623	497937.82	3707642.90	8.30168
498024.43	3707797.64	8.32976	498194.17	3707735.28	12.12381

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** THE PERIOD (43848 HRS) AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: VOL4   ***
INCLUDING SOURCE(S):   VOL4   ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF TOXICS   IN MICROGRAMS/M**3   **

X-COORD (M)	Y-COORD (M)	CONC	X-COORD (M)	Y-COORD (M)	CONC
498457.45	3707738.74	11.49174	498540.59	3707527.43	13.34089
498070.61	3707175.23	9.23383	498116.80	3707452.37	49.95818
498240.36	3707276.85	23.65072	498092.55	3707092.09	6.93510
498032.51	3707053.98	5.53575	497938.97	3707130.20	5.74515
497817.73	3707523.96	5.70664	497937.82	3707642.90	8.95303
498024.43	3707797.64	9.71782	498194.17	3707735.28	16.78408

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** THE PERIOD (43848 HRS) AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: VOL5 ***
INCLUDING SOURCE(S): VOL5 ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF TOXICS IN MICROGRAMS/M**3 **

X-COORD (M)	Y-COORD (M)	CONC	X-COORD (M)	Y-COORD (M)	CONC
498457.45	3707738.74	11.00718	498540.59	3707527.43	14.38838
498070.61	3707175.23	9.62295	498116.80	3707452.37	43.53759
498240.36	3707276.85	27.56977	498092.55	3707092.09	7.27455
498032.51	3707053.98	5.73436	497938.97	3707130.20	5.83251
497817.73	3707523.96	5.36031	497937.82	3707642.90	8.14489
498024.43	3707797.64	8.81227	498194.17	3707735.28	14.57286

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** THE PERIOD (43848 HRS) AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: VOL6   ***
INCLUDING SOURCE(S):   VOL6   ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF TOXICS   IN MICROGRAMS/M**3   **

X-COORD (M)	Y-COORD (M)	CONC	X-COORD (M)	Y-COORD (M)	CONC
498457.45	3707738.74	10.45388	498540.59	3707527.43	15.46008
498070.61	3707175.23	9.97238	498116.80	3707452.37	36.91831
498240.36	3707276.85	32.32446	498092.55	3707092.09	7.61520
498032.51	3707053.98	5.92698	497938.97	3707130.20	5.89592
497817.73	3707523.96	5.02090	497937.82	3707642.90	7.41835
498024.43	3707797.64	8.01473	498194.17	3707735.28	12.71748

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** THE PERIOD (43848 HRS) AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: VOL7   ***
INCLUDING SOURCE(S):   VOL7   ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF TOXICS   IN MICROGRAMS/M**3   **

X-COORD (M)	Y-COORD (M)	CONC	X-COORD (M)	Y-COORD (M)	CONC
498457.45	3707738.74	4.40368	498540.59	3707527.43	6.40904
498070.61	3707175.23	7.39895	498116.80	3707452.37	17.36654
498240.36	3707276.85	22.95102	498092.55	3707092.09	6.09971
498032.51	3707053.98	4.65912	497938.97	3707130.20	4.23238
497817.73	3707523.96	3.05130	497937.82	3707642.90	5.12800
498024.43	3707797.64	5.42681	498194.17	3707735.28	6.67208

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** THE PERIOD (43848 HRS) AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S): AREA1 , L0011630 , L0011631 , L0011632 , L0011633 ,
L0011634 , L0011635 , L0011636 , L0011637 , L0011638 , L0011639 , L0011640 , L0011641 ,
L0011642 , L0011643 , L0011644 , L0011645 , L0011646 , L0011647 , L0011648 , L0011649 ,
L0011650 , L0011651 , L0011652 , L0011653 , L0011654 , L0011655 , L0011656 , . . . ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF TOXICS IN MICROGRAMS/M**3 **

X-COORD (M)	Y-COORD (M)	CONC	X-COORD (M)	Y-COORD (M)	CONC
498457.45	3707738.74	111.76933	498540.59	3707527.43	194.19806
498070.61	3707175.23	149.48449	498116.80	3707452.37	774.36231
498240.36	3707276.85	366.04700	498092.55	3707092.09	110.42342
498032.51	3707053.98	92.28546	497938.97	3707130.20	117.77282
497817.73	3707523.96	102.58186	497937.82	3707642.90	124.89733
498024.43	3707797.64	114.27726	498194.17	3707735.28	167.09411

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** THE   1ST HIGHEST 1-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: AREA1   ***
INCLUDING SOURCE(S):   AREA1   ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF TOXICS   IN MICROGRAMS/M**3   **

X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)	X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)
498457.45	3707738.74	197.78433	(14040407)	498540.59	3707527.43	234.49228	(15120808)
498070.61	3707175.23	232.13999	(14093007)	498116.80	3707452.37	682.33464	(12100807)
498240.36	3707276.85	620.14604	(15061806)	498092.55	3707092.09	216.91641	(15092907)
498032.51	3707053.98	183.25937	(15033007)	497938.97	3707130.20	176.38702	(12092507)
497817.73	3707523.96	198.36994	(12100807)	497937.82	3707642.90	246.74876	(15101907)
498024.43	3707797.64	230.67150	(16051606)	498194.17	3707735.28	321.97283	(16091207)

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** THE   1ST HIGHEST 1-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: SLINE1   ***
INCLUDING SOURCE(S): L0011630 , L0011631 , L0011632 , L0011633 , L0011634 ,
L0011635 , L0011636 , L0011637 , L0011638 , L0011639 , L0011640 , L0011641 , L0011642 ,
L0011643 , L0011644 , L0011645 , L0011646 , L0011647 , L0011648 , L0011649 , L0011650 ,
L0011651 , L0011652 , L0011653 , L0011654 , L0011655 , L0011656 , L0011657 , . . . ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF TOXICS   IN MICROGRAMS/M**3 **

X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)	X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)
498457.45	3707738.74	49.53863	(15020517)	498540.59	3707527.43	30.64870	(12121717)
498070.61	3707175.23	45.94633	(14041207)	498116.80	3707452.37	318.58336	(14041207)
498240.36	3707276.85	41.25333	(14041207)	498092.55	3707092.09	33.02670	(14041207)
498032.51	3707053.98	33.49161	(14041207)	497938.97	3707130.20	56.59700	(14041207)
497817.73	3707523.96	45.53786	(12061301)	497937.82	3707642.90	41.83237	(12071422)
498024.43	3707797.64	35.17573	(12062802)	498194.17	3707735.28	63.56616	(16012917)

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** THE   1ST HIGHEST 1-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: SLINE2   ***
INCLUDING SOURCE(S): L0012259 , L0012260 , L0012261 , L0012262 , L0012263 ,
L0012264 , L0012265 , L0012266 , L0012267 , L0012268 , L0012269 , L0012270 , L0012271 ,
L0012272 , L0012273 , L0012274 , L0012275 , L0012276 , L0012277 , L0012278 , L0012279 ,
L0012280 , L0012281 , L0012282 , L0012283 , L0012284 , L0012285 , L0012286 , . . . ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF TOXICS   IN MICROGRAMS/M**3 **

X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)	X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)
498457.45	3707738.74	36.18064	(15101018)	498540.59	3707527.43	32.85028	(13090619)
498070.61	3707175.23	49.42228	(14041207)	498116.80	3707452.37	199.43306	(13062706)
498240.36	3707276.85	44.27570	(12122516)	498092.55	3707092.09	35.88471	(14041207)
498032.51	3707053.98	35.51465	(14041207)	497938.97	3707130.20	59.51584	(14041207)
497817.73	3707523.96	49.48040	(16072819)	497937.82	3707642.90	47.56079	(15060820)
498024.43	3707797.64	40.70028	(12081221)	498194.17	3707735.28	52.05002	(16012917)

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** THE   1ST HIGHEST 1-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: SLINE3   ***
INCLUDING SOURCE(S): L0011850 , L0011851 , L0011852 , L0011853 , L0011854 ,
L0011855 , L0011856 , L0011857 , L0011858 , L0011859 , L0011860 , L0011861 , L0011862 ,
L0011863 , L0011864 , L0011865 , L0011866 , L0011867 , L0011868 , L0011869 , L0011870 ,
L0011871 , L0011872 , L0011873 , L0011874 , L0011875 , L0011876 , L0011877 , . . . ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF TOXICS   IN MICROGRAMS/M**3 **

X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)	X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)
498457.45	3707738.74	45.86387	(15020517)	498540.59	3707527.43	30.52482	(16033018)
498070.61	3707175.23	43.46598	(14041207)	498116.80	3707452.37	247.88313	(14041207)
498240.36	3707276.85	39.11117	(14041207)	498092.55	3707092.09	31.52019	(14041207)
498032.51	3707053.98	31.96654	(14041207)	497938.97	3707130.20	53.14694	(14041207)
497817.73	3707523.96	47.75112	(13083019)	497937.82	3707642.90	42.66306	(12071422)
498024.43	3707797.64	36.04538	(16081819)	498194.17	3707735.28	66.64158	(16012917)

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** THE   1ST HIGHEST 1-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: SLINE4   ***
INCLUDING SOURCE(S): L0012007 , L0012008 , L0012009 , L0012010 , L0012011 ,
L0012012 , L0012013 , L0012014 , L0012015 , L0012016 , L0012017 , L0012018 , L0012019 ,
L0012020 , L0012021 , L0012022 , L0012023 , L0012024 , L0012025 , L0012026 , L0012027 ,
L0012028 , L0012029 , L0012030 , L0012031 , L0012032 , L0012033 , L0012034 , . . . ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF TOXICS   IN MICROGRAMS/M**3 **

X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)	X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)
498457.45	3707738.74	39.66920	(15101018)	498540.59	3707527.43	35.64314	(13090219)
498070.61	3707175.23	41.70551	(14041207)	498116.80	3707452.37	168.33960	(16061906)
498240.36	3707276.85	38.62422	(14041207)	498092.55	3707092.09	30.49264	(14041207)
498032.51	3707053.98	29.99219	(14041207)	497938.97	3707130.20	49.76975	(14041207)
497817.73	3707523.96	46.61569	(15100821)	497937.82	3707642.90	44.04283	(12081420)
498024.43	3707797.64	37.32882	(12081221)	498194.17	3707735.28	61.99263	(16012917)

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** THE   1ST HIGHEST 1-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: SLINE5   ***
INCLUDING SOURCE(S): L0012214 , L0012215 , L0012216 , L0012217 , L0012218 ,
L0012219 , L0012220 , L0012221 , L0012222 , L0012223 , L0012224 , L0012225 , L0012226 ,
L0012227 , L0012228 , L0012229 , L0012230 , L0012231 , L0012232 , L0012233 , L0012234 ,
L0012235 , L0012236 , L0012237 , L0012238 , L0012239 , L0012240 , L0012241 , . . . ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF TOXICS   IN MICROGRAMS/M**3 **

X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)	X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)
498457.45	3707738.74	29.33974	(12081020)	498540.59	3707527.43	112.13776	(16090507)
498070.61	3707175.23	31.38882	(15051418)	498116.80	3707452.37	45.83590	(16090507)
498240.36	3707276.85	75.84211	(15051418)	498092.55	3707092.09	25.06902	(15051418)
498032.51	3707053.98	20.59105	(13083021)	497938.97	3707130.20	20.18600	(15051418)
497817.73	3707523.96	28.33259	(12072004)	497937.82	3707642.90	29.68248	(12091418)
498024.43	3707797.64	27.11411	(15081720)	498194.17	3707735.28	25.53834	(16072519)

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** THE   1ST HIGHEST 1-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: SLINE6   ***
INCLUDING SOURCE(S): L0012325 , L0012326 , L0012327 , L0012328 , L0012329 ,
L0012330 , L0012331 , L0012332 , L0012333 , L0012334 , L0012335 , L0012336 , L0012337 ,
L0012338 , L0012339 , L0012340 , L0012341 , L0012342 , L0012343 , L0012344 , L0012345 ,
L0012346 , L0012347 , L0012348 , L0012349 , L0012350 , L0012351 , L0012352 , . . . ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF TOXICS   IN MICROGRAMS/M**3 **

X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)	X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)
498457.45	3707738.74	29.95416	(12081020)	498540.59	3707527.43	120.34947	(16090507)
498070.61	3707175.23	31.37838	(15051418)	498116.80	3707452.37	43.87910	(16090507)
498240.36	3707276.85	76.28612	(15051418)	498092.55	3707092.09	24.46607	(15051418)
498032.51	3707053.98	20.51844	(13083021)	497938.97	3707130.20	20.23271	(15051418)
497817.73	3707523.96	28.49288	(12072004)	497937.82	3707642.90	29.89724	(12091418)
498024.43	3707797.64	27.65468	(15081720)	498194.17	3707735.28	26.29423	(16072519)

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** THE   1ST HIGHEST 1-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: VOL1   ***
INCLUDING SOURCE(S):   VOL1   ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF TOXICS   IN MICROGRAMS/M**3   **

X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)	X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)
498457.45	3707738.74	71.62665	(15020517)	498540.59	3707527.43	63.45061	(16123016)
498070.61	3707175.23	56.06685	(14090307)	498116.80	3707452.37	493.30422	(16082707)
498240.36	3707276.85	145.26703	(12110208)	498092.55	3707092.09	32.29052	(14042905)
498032.51	3707053.98	28.62309	(14090307)	497938.97	3707130.20	28.44752	(12102617)
497817.73	3707523.96	68.44009	(15100918)	497937.82	3707642.90	89.65034	(12091418)
498024.43	3707797.64	81.10462	(16110817)	498194.17	3707735.28	95.76848	(15083118)

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** THE   1ST HIGHEST 1-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: VOL2   ***
INCLUDING SOURCE(S):   VOL2   ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF TOXICS   IN MICROGRAMS/M**3   **

X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)	X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)
498457.45	3707738.74	51.98741	(15020517)	498540.59	3707527.43	73.39296	(16123016)
498070.61	3707175.23	62.37928	(14090307)	498116.80	3707452.37	332.94386	(16082707)
498240.36	3707276.85	180.43745	(12110208)	498092.55	3707092.09	34.21054	(15112117)
498032.51	3707053.98	34.13356	(14090307)	497938.97	3707130.20	29.26023	(12102617)
497817.73	3707523.96	65.92764	(15100918)	497937.82	3707642.90	81.38609	(12091418)
498024.43	3707797.64	74.77189	(16110817)	498194.17	3707735.28	81.96580	(15083118)

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** THE   1ST HIGHEST 1-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: VOL3   ***
INCLUDING SOURCE(S):   VOL3   ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF TOXICS   IN MICROGRAMS/M**3   **

X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)	X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)
498457.45	3707738.74	51.14780	(16010616)	498540.59	3707527.43	74.54359	(15091218)
498070.61	3707175.23	58.39601	(14090307)	498116.80	3707452.37	241.91649	(16090507)
498240.36	3707276.85	196.13831	(12110208)	498092.55	3707092.09	42.50548	(14090307)
498032.51	3707053.98	36.63145	(14090307)	497938.97	3707130.20	29.08142	(12021517)
497817.73	3707523.96	60.37455	(15100918)	497937.82	3707642.90	73.19139	(12081324)
498024.43	3707797.64	69.23603	(16062021)	498194.17	3707735.28	70.65761	(15083118)

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** THE   1ST HIGHEST 1-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: VOL4   ***
INCLUDING SOURCE(S):   VOL4   ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF TOXICS   IN MICROGRAMS/M**3   **

X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)	X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)
498457.45	3707738.74	72.49851	(15020517)	498540.59	3707527.43	69.75213	(16123016)
498070.61	3707175.23	51.20371	(14090307)	498116.80	3707452.37	308.01731	(16082707)
498240.36	3707276.85	114.01713	(12110208)	498092.55	3707092.09	29.57891	(15112117)
498032.51	3707053.98	29.22930	(14090307)	497938.97	3707130.20	25.98800	(12102617)
497817.73	3707523.96	63.17161	(13083019)	497937.82	3707642.90	79.18354	(12051020)
498024.43	3707797.64	78.89824	(16073120)	498194.17	3707735.28	93.86732	(15083118)

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** THE   1ST HIGHEST 1-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: VOL5   ***
INCLUDING SOURCE(S):   VOL5   ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF TOXICS   IN MICROGRAMS/M**3   **

X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)	X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)
498457.45	3707738.74	58.92090	(16010616)	498540.59	3707527.43	87.37962	(16123016)
498070.61	3707175.23	49.55924	(14090307)	498116.80	3707452.37	250.88937	(16082707)
498240.36	3707276.85	111.05083	(12110208)	498092.55	3707092.09	35.74007	(14090307)
498032.51	3707053.98	31.62153	(14090307)	497938.97	3707130.20	25.87288	(12102617)
497817.73	3707523.96	59.00702	(15100918)	497937.82	3707642.90	74.40185	(12091418)
498024.43	3707797.64	72.93998	(16073120)	498194.17	3707735.28	82.29895	(14021817)

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** THE   1ST HIGHEST 1-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: VOL6   ***
INCLUDING SOURCE(S):   VOL6   ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF TOXICS   IN MICROGRAMS/M**3   **

X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)	X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)
498457.45	3707738.74	66.50917	(16010616)	498540.59	3707527.43	91.06776	(16123016)
498070.61	3707175.23	41.67755	(14090307)	498116.80	3707452.37	161.48377	(16082707)
498240.36	3707276.85	110.45064	(12110517)	498092.55	3707092.09	41.62259	(14090307)
498032.51	3707053.98	31.38356	(14090307)	497938.97	3707130.20	26.31950	(12021517)
497817.73	3707523.96	56.58511	(15100918)	497937.82	3707642.90	69.70017	(12091418)
498024.43	3707797.64	67.63072	(13082320)	498194.17	3707735.28	71.30681	(14021817)

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** THE   1ST HIGHEST 1-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: VOL7   ***
INCLUDING SOURCE(S):   VOL7   ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF TOXICS   IN MICROGRAMS/M**3   **

X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)	X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)
498457.45	3707738.74	43.20095	(13063024)	498540.59	3707527.43	57.75105	(15091218)
498070.61	3707175.23	52.53379	(14091404)	498116.80	3707452.37	214.25640	(16090507)
498240.36	3707276.85	164.94195	(12110208)	498092.55	3707092.09	44.87029	(15091022)
498032.51	3707053.98	38.40310	(12082006)	497938.97	3707130.20	38.32089	(12081906)
497817.73	3707523.96	44.61364	(12090502)	497937.82	3707642.90	48.52015	(12082002)
498024.43	3707797.64	44.35195	(15091020)	498194.17	3707735.28	51.17050	(15083118)

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** THE   1ST HIGHEST 1-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: ALL   ***
INCLUDING SOURCE(S):   AREA1   , L0011630   , L0011631   , L0011632   , L0011633   ,
L0011634   , L0011635   , L0011636   , L0011637   , L0011638   , L0011639   , L0011640   , L0011641   ,
L0011642   , L0011643   , L0011644   , L0011645   , L0011646   , L0011647   , L0011648   , L0011649   ,
L0011650   , L0011651   , L0011652   , L0011653   , L0011654   , L0011655   , L0011656   , . . .   ,

*** DISCRETE CARTESIAN RECEPTOR POINTS ***

** CONC OF TOXICS   IN MICROGRAMS/M**3   **

X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)	X-COORD (M)	Y-COORD (M)	CONC	(YYMMDDHH)
498457.45	3707738.74	543.87115	(15020517)	498540.59	3707527.43	653.18497	(15120808)
498070.61	3707175.23	559.42381	(14093007)	498116.80	3707452.37	2391.56825	(16082707)
498240.36	3707276.85	1331.73532	(12110208)	498092.55	3707092.09	456.48073	(15092907)
498032.51	3707053.98	386.02159	(15092907)	497938.97	3707130.20	439.22795	(12092507)
497817.73	3707523.96	731.23950	(15100918)	497937.82	3707642.90	848.27639	(12091418)
498024.43	3707797.64	758.36876	(16062021)	498194.17	3707735.28	757.23244	(15083118)

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** THE SUMMARY OF MAXIMUM PERIOD (43848 HRS) RESULTS ***

** CONC OF TOXICS IN MICROGRAMS/M**3 **

GROUP ID		AVERAGE CONC		RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)					OF TYPE	NETWORK GRID-ID
AREA1	1ST HIGHEST VALUE IS	68.35136	AT (	498240.36,	3707276.85,	381.61,	545.56,	1.80)	DC	
	2ND HIGHEST VALUE IS	36.37740	AT (	498116.80,	3707452.37,	382.20,	545.56,	1.80)	DC	
	3RD HIGHEST VALUE IS	20.25319	AT (	498194.17,	3707735.28,	384.31,	482.73,	1.80)	DC	
	4TH HIGHEST VALUE IS	15.94368	AT (	498024.43,	3707797.64,	392.04,	482.73,	1.80)	DC	
	5TH HIGHEST VALUE IS	10.76802	AT (	498540.59,	3707527.43,	383.95,	545.56,	1.80)	DC	
	6TH HIGHEST VALUE IS	7.74970	AT (	498070.61,	3707175.23,	380.30,	545.56,	1.80)	DC	
	7TH HIGHEST VALUE IS	7.62684	AT (	497937.82,	3707642.90,	389.12,	482.73,	1.80)	DC	
	8TH HIGHEST VALUE IS	7.40834	AT (	498092.55,	3707092.09,	379.73,	545.56,	1.80)	DC	
	9TH HIGHEST VALUE IS	6.74032	AT (	498457.45,	3707738.74,	384.46,	545.56,	1.80)	DC	
	10TH HIGHEST VALUE IS	4.94826	AT (	498032.51,	3707053.98,	379.34,	545.56,	1.80)	DC	
SLINE1	1ST HIGHEST VALUE IS	127.08866	AT (	498116.80,	3707452.37,	382.20,	545.56,	1.80)	DC	
	2ND HIGHEST VALUE IS	16.90603	AT (	497938.97,	3707130.20,	379.35,	545.56,	1.80)	DC	
	3RD HIGHEST VALUE IS	15.30826	AT (	498070.61,	3707175.23,	380.30,	545.56,	1.80)	DC	
	4TH HIGHEST VALUE IS	15.09213	AT (	497817.73,	3707523.96,	390.39,	482.73,	1.80)	DC	
	5TH HIGHEST VALUE IS	13.93381	AT (	498240.36,	3707276.85,	381.61,	545.56,	1.80)	DC	
	6TH HIGHEST VALUE IS	13.48106	AT (	497937.82,	3707642.90,	389.12,	482.73,	1.80)	DC	
	7TH HIGHEST VALUE IS	11.15509	AT (	498194.17,	3707735.28,	384.31,	482.73,	1.80)	DC	
	8TH HIGHEST VALUE IS	9.99156	AT (	498092.55,	3707092.09,	379.73,	545.56,	1.80)	DC	
	9TH HIGHEST VALUE IS	9.49164	AT (	498032.51,	3707053.98,	379.34,	545.56,	1.80)	DC	
	10TH HIGHEST VALUE IS	7.70527	AT (	498024.43,	3707797.64,	392.04,	482.73,	1.80)	DC	
SLINE2	1ST HIGHEST VALUE IS	74.19792	AT (	498116.80,	3707452.37,	382.20,	545.56,	1.80)	DC	
	2ND HIGHEST VALUE IS	17.55428	AT (	497938.97,	3707130.20,	379.35,	545.56,	1.80)	DC	
	3RD HIGHEST VALUE IS	15.73043	AT (	498070.61,	3707175.23,	380.30,	545.56,	1.80)	DC	
	4TH HIGHEST VALUE IS	14.16271	AT (	497817.73,	3707523.96,	390.39,	482.73,	1.80)	DC	
	5TH HIGHEST VALUE IS	12.75436	AT (	498240.36,	3707276.85,	381.61,	545.56,	1.80)	DC	
	6TH HIGHEST VALUE IS	12.69046	AT (	497937.82,	3707642.90,	389.12,	482.73,	1.80)	DC	
	7TH HIGHEST VALUE IS	10.54997	AT (	498092.55,	3707092.09,	379.73,	545.56,	1.80)	DC	
	8TH HIGHEST VALUE IS	10.15379	AT (	498032.51,	3707053.98,	379.34,	545.56,	1.80)	DC	
	9TH HIGHEST VALUE IS	8.55882	AT (	498194.17,	3707735.28,	384.31,	482.73,	1.80)	DC	
	10TH HIGHEST VALUE IS	6.95504	AT (	498024.43,	3707797.64,	392.04,	482.73,	1.80)	DC	
SLINE3	1ST HIGHEST VALUE IS	100.94281	AT (	498116.80,	3707452.37,	382.20,	545.56,	1.80)	DC	
	2ND HIGHEST VALUE IS	15.76859	AT (	497938.97,	3707130.20,	379.35,	545.56,	1.80)	DC	
	3RD HIGHEST VALUE IS	15.60227	AT (	497817.73,	3707523.96,	390.39,	482.73,	1.80)	DC	
	4TH HIGHEST VALUE IS	14.47392	AT (	498070.61,	3707175.23,	380.30,	545.56,	1.80)	DC	
	5TH HIGHEST VALUE IS	14.07076	AT (	497937.82,	3707642.90,	389.12,	482.73,	1.80)	DC	
	6TH HIGHEST VALUE IS	13.39864	AT (	498240.36,	3707276.85,	381.61,	545.56,	1.80)	DC	
	7TH HIGHEST VALUE IS	11.99021	AT (	498194.17,	3707735.28,	384.31,	482.73,	1.80)	DC	
	8TH HIGHEST VALUE IS	9.54938	AT (	498092.55,	3707092.09,	379.73,	545.56,	1.80)	DC	
	9TH HIGHEST VALUE IS	9.05363	AT (	498032.51,	3707053.98,	379.34,	545.56,	1.80)	DC	
	10TH HIGHEST VALUE IS	8.07330	AT (	498024.43,	3707797.64,	392.04,	482.73,	1.80)	DC	

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** THE SUMMARY OF MAXIMUM PERIOD (43848 HRS) RESULTS ***

** CONC OF TOXICS IN MICROGRAMS/M**3 **

GROUP ID		AVERAGE CONC	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)					OF TYPE	NETWORK GRID-ID
SLINE4	1ST HIGHEST VALUE IS	64.73409 AT	(498116.80,	3707452.37,	382.20,	545.56,	1.80)	DC	
	2ND HIGHEST VALUE IS	15.20693 AT	(497938.97,	3707130.20,	379.35,	545.56,	1.80)	DC	
	3RD HIGHEST VALUE IS	14.19774 AT	(498070.61,	3707175.23,	380.30,	545.56,	1.80)	DC	
	4TH HIGHEST VALUE IS	13.41861 AT	(497817.73,	3707523.96,	390.39,	482.73,	1.80)	DC	
	5TH HIGHEST VALUE IS	13.11472 AT	(498240.36,	3707276.85,	381.61,	545.56,	1.80)	DC	
	6TH HIGHEST VALUE IS	12.76856 AT	(497937.82,	3707642.90,	389.12,	482.73,	1.80)	DC	
	7TH HIGHEST VALUE IS	10.50274 AT	(498194.17,	3707735.28,	384.31,	482.73,	1.80)	DC	
	8TH HIGHEST VALUE IS	9.67457 AT	(498092.55,	3707092.09,	379.73,	545.56,	1.80)	DC	
	9TH HIGHEST VALUE IS	9.17253 AT	(498032.51,	3707053.98,	379.34,	545.56,	1.80)	DC	
	10TH HIGHEST VALUE IS	7.88234 AT	(498024.43,	3707797.64,	392.04,	482.73,	1.80)	DC	
SLINE5	1ST HIGHEST VALUE IS	37.19550 AT	(498540.59,	3707527.43,	383.95,	545.56,	1.80)	DC	
	2ND HIGHEST VALUE IS	19.90580 AT	(498240.36,	3707276.85,	381.61,	545.56,	1.80)	DC	
	3RD HIGHEST VALUE IS	11.35756 AT	(498116.80,	3707452.37,	382.20,	545.56,	1.80)	DC	
	4TH HIGHEST VALUE IS	8.30738 AT	(498457.45,	3707738.74,	384.46,	545.56,	1.80)	DC	
	5TH HIGHEST VALUE IS	6.19847 AT	(498070.61,	3707175.23,	380.30,	545.56,	1.80)	DC	
	6TH HIGHEST VALUE IS	6.09253 AT	(498194.17,	3707735.28,	384.31,	482.73,	1.80)	DC	
	7TH HIGHEST VALUE IS	5.49886 AT	(498092.55,	3707092.09,	379.73,	545.56,	1.80)	DC	
	8TH HIGHEST VALUE IS	4.29634 AT	(498032.51,	3707053.98,	379.34,	545.56,	1.80)	DC	
	9TH HIGHEST VALUE IS	4.03837 AT	(498024.43,	3707797.64,	392.04,	482.73,	1.80)	DC	
	10TH HIGHEST VALUE IS	3.81121 AT	(497938.97,	3707130.20,	379.35,	545.56,	1.80)	DC	
SLINE6	1ST HIGHEST VALUE IS	40.13947 AT	(498540.59,	3707527.43,	383.95,	545.56,	1.80)	DC	
	2ND HIGHEST VALUE IS	19.23486 AT	(498240.36,	3707276.85,	381.61,	545.56,	1.80)	DC	
	3RD HIGHEST VALUE IS	11.23271 AT	(498116.80,	3707452.37,	382.20,	545.56,	1.80)	DC	
	4TH HIGHEST VALUE IS	8.56178 AT	(498457.45,	3707738.74,	384.46,	545.56,	1.80)	DC	
	5TH HIGHEST VALUE IS	6.23754 AT	(498194.17,	3707735.28,	384.31,	482.73,	1.80)	DC	
	6TH HIGHEST VALUE IS	6.11451 AT	(498070.61,	3707175.23,	380.30,	545.56,	1.80)	DC	
	7TH HIGHEST VALUE IS	5.41918 AT	(498092.55,	3707092.09,	379.73,	545.56,	1.80)	DC	
	8TH HIGHEST VALUE IS	4.24474 AT	(498032.51,	3707053.98,	379.34,	545.56,	1.80)	DC	
	9TH HIGHEST VALUE IS	4.07380 AT	(498024.43,	3707797.64,	392.04,	482.73,	1.80)	DC	
	10TH HIGHEST VALUE IS	3.77861 AT	(497938.97,	3707130.20,	379.35,	545.56,	1.80)	DC	
VOL1	1ST HIGHEST VALUE IS	79.42300 AT	(498116.80,	3707452.37,	382.20,	545.56,	1.80)	DC	
	2ND HIGHEST VALUE IS	26.29213 AT	(498240.36,	3707276.85,	381.61,	545.56,	1.80)	DC	
	3RD HIGHEST VALUE IS	15.83415 AT	(498194.17,	3707735.28,	384.31,	482.73,	1.80)	DC	
	4TH HIGHEST VALUE IS	11.29544 AT	(498540.59,	3707527.43,	383.95,	545.56,	1.80)	DC	
	5TH HIGHEST VALUE IS	10.46079 AT	(498070.61,	3707175.23,	380.30,	545.56,	1.80)	DC	
	6TH HIGHEST VALUE IS	10.14908 AT	(498024.43,	3707797.64,	392.04,	482.73,	1.80)	DC	
	7TH HIGHEST VALUE IS	10.09634 AT	(497937.82,	3707642.90,	389.12,	482.73,	1.80)	DC	
	8TH HIGHEST VALUE IS	10.00857 AT	(498457.45,	3707738.74,	384.46,	545.56,	1.80)	DC	
	9TH HIGHEST VALUE IS	7.60166 AT	(498092.55,	3707092.09,	379.73,	545.56,	1.80)	DC	
	10TH HIGHEST VALUE IS	6.38919 AT	(497938.97,	3707130.20,	379.35,	545.56,	1.80)	DC	

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** THE SUMMARY OF MAXIMUM PERIOD (43848 HRS) RESULTS ***

** CONC OF TOXICS IN MICROGRAMS/M**3 **

GROUP ID		AVERAGE CONC		RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)					OF TYPE	NETWORK GRID-ID
VOL2	1ST HIGHEST VALUE IS	68.05931	AT (	498116.80,	3707452.37,	382.20,	545.56,	1.80)	DC	
	2ND HIGHEST VALUE IS	32.86168	AT (	498240.36,	3707276.85,	381.61,	545.56,	1.80)	DC	
	3RD HIGHEST VALUE IS	13.59952	AT (	498194.17,	3707735.28,	384.31,	482.73,	1.80)	DC	
	4TH HIGHEST VALUE IS	11.83912	AT (	498540.59,	3707527.43,	383.95,	545.56,	1.80)	DC	
	5TH HIGHEST VALUE IS	11.30349	AT (	498070.61,	3707175.23,	380.30,	545.56,	1.80)	DC	
	6TH HIGHEST VALUE IS	9.43901	AT (	498457.45,	3707738.74,	384.46,	545.56,	1.80)	DC	
	7TH HIGHEST VALUE IS	9.16817	AT (	497937.82,	3707642.90,	389.12,	482.73,	1.80)	DC	
	8TH HIGHEST VALUE IS	9.15500	AT (	498024.43,	3707797.64,	392.04,	482.73,	1.80)	DC	
	9TH HIGHEST VALUE IS	8.20825	AT (	498092.55,	3707092.09,	379.73,	545.56,	1.80)	DC	
	10TH HIGHEST VALUE IS	6.63698	AT (	497938.97,	3707130.20,	379.35,	545.56,	1.80)	DC	
VOL3	1ST HIGHEST VALUE IS	53.16821	AT (	498116.80,	3707452.37,	382.20,	545.56,	1.80)	DC	
	2ND HIGHEST VALUE IS	39.70366	AT (	498240.36,	3707276.85,	381.61,	545.56,	1.80)	DC	
	3RD HIGHEST VALUE IS	12.65256	AT (	498540.59,	3707527.43,	383.95,	545.56,	1.80)	DC	
	4TH HIGHEST VALUE IS	12.12381	AT (	498194.17,	3707735.28,	384.31,	482.73,	1.80)	DC	
	5TH HIGHEST VALUE IS	11.71908	AT (	498070.61,	3707175.23,	380.30,	545.56,	1.80)	DC	
	6TH HIGHEST VALUE IS	9.12617	AT (	498457.45,	3707738.74,	384.46,	545.56,	1.80)	DC	
	7TH HIGHEST VALUE IS	8.59709	AT (	498092.55,	3707092.09,	379.73,	545.56,	1.80)	DC	
	8TH HIGHEST VALUE IS	8.32976	AT (	498024.43,	3707797.64,	392.04,	482.73,	1.80)	DC	
	9TH HIGHEST VALUE IS	8.30168	AT (	497937.82,	3707642.90,	389.12,	482.73,	1.80)	DC	
	10TH HIGHEST VALUE IS	6.68636	AT (	497938.97,	3707130.20,	379.35,	545.56,	1.80)	DC	
VOL4	1ST HIGHEST VALUE IS	49.95818	AT (	498116.80,	3707452.37,	382.20,	545.56,	1.80)	DC	
	2ND HIGHEST VALUE IS	23.65072	AT (	498240.36,	3707276.85,	381.61,	545.56,	1.80)	DC	
	3RD HIGHEST VALUE IS	16.78408	AT (	498194.17,	3707735.28,	384.31,	482.73,	1.80)	DC	
	4TH HIGHEST VALUE IS	13.34089	AT (	498540.59,	3707527.43,	383.95,	545.56,	1.80)	DC	
	5TH HIGHEST VALUE IS	11.49174	AT (	498457.45,	3707738.74,	384.46,	545.56,	1.80)	DC	
	6TH HIGHEST VALUE IS	9.71782	AT (	498024.43,	3707797.64,	392.04,	482.73,	1.80)	DC	
	7TH HIGHEST VALUE IS	9.23383	AT (	498070.61,	3707175.23,	380.30,	545.56,	1.80)	DC	
	8TH HIGHEST VALUE IS	8.95303	AT (	497937.82,	3707642.90,	389.12,	482.73,	1.80)	DC	
	9TH HIGHEST VALUE IS	6.93510	AT (	498092.55,	3707092.09,	379.73,	545.56,	1.80)	DC	
	10TH HIGHEST VALUE IS	5.74515	AT (	497938.97,	3707130.20,	379.35,	545.56,	1.80)	DC	
VOL5	1ST HIGHEST VALUE IS	43.53759	AT (	498116.80,	3707452.37,	382.20,	545.56,	1.80)	DC	
	2ND HIGHEST VALUE IS	27.56977	AT (	498240.36,	3707276.85,	381.61,	545.56,	1.80)	DC	
	3RD HIGHEST VALUE IS	14.57286	AT (	498194.17,	3707735.28,	384.31,	482.73,	1.80)	DC	
	4TH HIGHEST VALUE IS	14.38838	AT (	498540.59,	3707527.43,	383.95,	545.56,	1.80)	DC	
	5TH HIGHEST VALUE IS	11.00718	AT (	498457.45,	3707738.74,	384.46,	545.56,	1.80)	DC	
	6TH HIGHEST VALUE IS	9.62295	AT (	498070.61,	3707175.23,	380.30,	545.56,	1.80)	DC	
	7TH HIGHEST VALUE IS	8.81227	AT (	498024.43,	3707797.64,	392.04,	482.73,	1.80)	DC	
	8TH HIGHEST VALUE IS	8.14489	AT (	497937.82,	3707642.90,	389.12,	482.73,	1.80)	DC	
	9TH HIGHEST VALUE IS	7.27455	AT (	498092.55,	3707092.09,	379.73,	545.56,	1.80)	DC	
	10TH HIGHEST VALUE IS	5.83251	AT (	497938.97,	3707130.20,	379.35,	545.56,	1.80)	DC	

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** THE SUMMARY OF MAXIMUM PERIOD (43848 HRS) RESULTS ***

** CONC OF TOXICS IN MICROGRAMS/M**3 **

GROUP ID		AVERAGE CONC	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)					OF TYPE	NETWORK GRID-ID
VOL6	1ST HIGHEST VALUE IS	36.91831 AT	(498116.80,	3707452.37,	382.20,	545.56,	1.80)	DC	
	2ND HIGHEST VALUE IS	32.32446 AT	(498240.36,	3707276.85,	381.61,	545.56,	1.80)	DC	
	3RD HIGHEST VALUE IS	15.46008 AT	(498540.59,	3707527.43,	383.95,	545.56,	1.80)	DC	
	4TH HIGHEST VALUE IS	12.71748 AT	(498194.17,	3707735.28,	384.31,	482.73,	1.80)	DC	
	5TH HIGHEST VALUE IS	10.45388 AT	(498457.45,	3707738.74,	384.46,	545.56,	1.80)	DC	
	6TH HIGHEST VALUE IS	9.97238 AT	(498070.61,	3707175.23,	380.30,	545.56,	1.80)	DC	
	7TH HIGHEST VALUE IS	8.01473 AT	(498024.43,	3707797.64,	392.04,	482.73,	1.80)	DC	
	8TH HIGHEST VALUE IS	7.61520 AT	(498092.55,	3707092.09,	379.73,	545.56,	1.80)	DC	
	9TH HIGHEST VALUE IS	7.41835 AT	(497937.82,	3707642.90,	389.12,	482.73,	1.80)	DC	
	10TH HIGHEST VALUE IS	5.92698 AT	(498032.51,	3707053.98,	379.34,	545.56,	1.80)	DC	
VOL7	1ST HIGHEST VALUE IS	22.95102 AT	(498240.36,	3707276.85,	381.61,	545.56,	1.80)	DC	
	2ND HIGHEST VALUE IS	17.36654 AT	(498116.80,	3707452.37,	382.20,	545.56,	1.80)	DC	
	3RD HIGHEST VALUE IS	7.39895 AT	(498070.61,	3707175.23,	380.30,	545.56,	1.80)	DC	
	4TH HIGHEST VALUE IS	6.67208 AT	(498194.17,	3707735.28,	384.31,	482.73,	1.80)	DC	
	5TH HIGHEST VALUE IS	6.40904 AT	(498540.59,	3707527.43,	383.95,	545.56,	1.80)	DC	
	6TH HIGHEST VALUE IS	6.09971 AT	(498092.55,	3707092.09,	379.73,	545.56,	1.80)	DC	
	7TH HIGHEST VALUE IS	5.42681 AT	(498024.43,	3707797.64,	392.04,	482.73,	1.80)	DC	
	8TH HIGHEST VALUE IS	5.12800 AT	(497937.82,	3707642.90,	389.12,	482.73,	1.80)	DC	
	9TH HIGHEST VALUE IS	4.65912 AT	(498032.51,	3707053.98,	379.34,	545.56,	1.80)	DC	
	10TH HIGHEST VALUE IS	4.40368 AT	(498457.45,	3707738.74,	384.46,	545.56,	1.80)	DC	
ALL	1ST HIGHEST VALUE IS	774.36231 AT	(498116.80,	3707452.37,	382.20,	545.56,	1.80)	DC	
	2ND HIGHEST VALUE IS	366.04700 AT	(498240.36,	3707276.85,	381.61,	545.56,	1.80)	DC	
	3RD HIGHEST VALUE IS	194.19806 AT	(498540.59,	3707527.43,	383.95,	545.56,	1.80)	DC	
	4TH HIGHEST VALUE IS	167.09411 AT	(498194.17,	3707735.28,	384.31,	482.73,	1.80)	DC	
	5TH HIGHEST VALUE IS	149.48449 AT	(498070.61,	3707175.23,	380.30,	545.56,	1.80)	DC	
	6TH HIGHEST VALUE IS	124.89733 AT	(497937.82,	3707642.90,	389.12,	482.73,	1.80)	DC	
	7TH HIGHEST VALUE IS	117.77282 AT	(497938.97,	3707130.20,	379.35,	545.56,	1.80)	DC	
	8TH HIGHEST VALUE IS	114.27726 AT	(498024.43,	3707797.64,	392.04,	482.73,	1.80)	DC	
	9TH HIGHEST VALUE IS	111.76933 AT	(498457.45,	3707738.74,	384.46,	545.56,	1.80)	DC	
	10TH HIGHEST VALUE IS	110.42342 AT	(498092.55,	3707092.09,	379.73,	545.56,	1.80)	DC	

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** THE SUMMARY OF HIGHEST 1-HR RESULTS ***

** CONC OF TOXICS IN MICROGRAMS/M**3 **

GROUP ID		AVERAGE CONC	DATE (YYMMDDHH)	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)	OF TYPE	NETWORK GRID-ID
AREA1	HIGH 1ST HIGH VALUE IS	682.33464	ON 12100807:	AT (498116.80, 3707452.37, 382.20, 545.56, 1.80)	DC	
SLINE1	HIGH 1ST HIGH VALUE IS	318.58336	ON 14041207:	AT (498116.80, 3707452.37, 382.20, 545.56, 1.80)	DC	
SLINE2	HIGH 1ST HIGH VALUE IS	199.43306	ON 13062706:	AT (498116.80, 3707452.37, 382.20, 545.56, 1.80)	DC	
SLINE3	HIGH 1ST HIGH VALUE IS	247.88313	ON 14041207:	AT (498116.80, 3707452.37, 382.20, 545.56, 1.80)	DC	
SLINE4	HIGH 1ST HIGH VALUE IS	168.33960	ON 16061906:	AT (498116.80, 3707452.37, 382.20, 545.56, 1.80)	DC	
SLINE5	HIGH 1ST HIGH VALUE IS	112.13776	ON 16090507:	AT (498540.59, 3707527.43, 383.95, 545.56, 1.80)	DC	
SLINE6	HIGH 1ST HIGH VALUE IS	120.34947	ON 16090507:	AT (498540.59, 3707527.43, 383.95, 545.56, 1.80)	DC	
VOL1	HIGH 1ST HIGH VALUE IS	493.30422	ON 16082707:	AT (498116.80, 3707452.37, 382.20, 545.56, 1.80)	DC	
VOL2	HIGH 1ST HIGH VALUE IS	332.94386	ON 16082707:	AT (498116.80, 3707452.37, 382.20, 545.56, 1.80)	DC	
VOL3	HIGH 1ST HIGH VALUE IS	241.91649	ON 16090507:	AT (498116.80, 3707452.37, 382.20, 545.56, 1.80)	DC	
VOL4	HIGH 1ST HIGH VALUE IS	308.01731	ON 16082707:	AT (498116.80, 3707452.37, 382.20, 545.56, 1.80)	DC	
VOL5	HIGH 1ST HIGH VALUE IS	250.88937	ON 16082707:	AT (498116.80, 3707452.37, 382.20, 545.56, 1.80)	DC	
VOL6	HIGH 1ST HIGH VALUE IS	161.48377	ON 16082707:	AT (498116.80, 3707452.37, 382.20, 545.56, 1.80)	DC	
VOL7	HIGH 1ST HIGH VALUE IS	214.25640	ON 16090507:	AT (498116.80, 3707452.37, 382.20, 545.56, 1.80)	DC	
ALL	HIGH 1ST HIGH VALUE IS	2391.56825	ON 16082707:	AT (498116.80, 3707452.37, 382.20, 545.56, 1.80)	DC	

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR

*** MODELOPTs: NonDFAULT CONC FLAT and ELEV FLGPOL FASTAREA URBAN ADJ_U*

*** Message Summary : AERMOD Model Execution ***

 --------- Summary of Total Messages --------

A Total of   0 Fatal Error Message(s)
A Total of   2 Warning Message(s)
A Total of   1763 Informational Message(s)

A Total of   43848 Hours Were Processed

A Total of   884 Calm Hours Identified

A Total of   879 Missing Hours Identified (2.00 Percent)

   ******** FATAL ERROR MESSAGES ********
              *** NONE ***

   ********   WARNING MESSAGES   ********
ME W186   1397   MEOPEN: THRESH_1MIN 1-min ASOS wind speed threshold used   0.50
ME W187   1397   MEOPEN: ADJ_U* Option for Stable Low Winds used in AERMET

   ****
   *** AERMOD Finishes Successfully ***
   ****

APPENDIX B

ESTIMATED EMFAC2017 EMISSION RATES

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Vail Dam Seismic and Hydrologic Remediation Project

On-site workers		AADT by Truck Category[1]			
Pond Access #2 from		LDT[2]	2-Axle[3]	3-Axle[4]	4+-Axle[5]
DePortola Road NB		34	0	0	0
		% of Vehicles That Are Diesel-Powered[5]			
Average		0.7%	0%	0%	99.97%
Speed		Diesel Exhaust PM10 & PM2.5 Emissions at 40 mph (g/mi)6			
40 mph	PM_{10}	0.0054	0.00E+00	0.00E+00	1.10E-02
	$PM_{2.5}$	0.0052	0.00E+00	0.00E+00	1.05E-02
		% of Vehicles That Are Gasoline-Powered[5]			
Total distance		99%	100%	100%	0.028%
covered by On-site workers		Gasoline Exhaust ROG Emissions at 40 mph (g/mi)6			
roadway	ROG	0.0116	0.00E+00	0.00E+00	3.88E-01
sources		PM_{10}, $PM_{2.5}$ & ROG Exhaust Emissions (g/s)			
617 meters	PM_{10}	5.88E-09	0.00E+00	0.00E+00	0.00E+00
	$PM_{2.5}$	5.62E-09	0.00E+00	0.00E+00	0.00E+00
	ROG	1.74E-06	0.00E+00	0.00E+00	0.00E+00

Percent of traffic on this road

100%

Number of Sources	Emission Rates per source		
	g/s	lb/hr	lb/yr
310	1.9E-11	1.5E-10	0.0000
310	1.8E-11	1.4E-10	0.0000
310	5.6E-09	4.4E-08	0.0004

Speciated Emissions Rates

		lb/yr	lb/hr
diesel part.	--	1.32E-06	1.50E-10
PM2.5	--	1.26E-06	1.44E-10
1,3-butadiene	0.0055	2.14E-06	2.44E-10
benzene	0.02636	1.03E-05	1.17E-09
ethylbenzene	0.01072	4.18E-06	4.76E-10
MEK	0.00019	7.40E-08	8.44E-12
naphthalene	0.00048	1.87E-07	2.13E-11
propylene	0.03127998	1.22E-05	1.39E-09
styrene	0.00126	4.91E-07	5.60E-11
toluene	0.05879998	2.29E-05	2.61E-09
m & p-xylene	0.03639998	1.42E-05	1.62E-09

[1] ADT from project traffic study

[2] LDT assumed to LDT2 (Large Pick-up Trucks)

[3] 2 axle trucks are assumed to be MDV (Medium-Duty Truck GVW=5,574-8,500 lbs.)

[4] 3 axle trucks are assumed to be MHDT (Medium-Heavy Duty Truck GVW=14,001-33,000 lbs.)

[5] 4+ axle trucks are assumed to be HHDT (Heavy-Heavy Duty Truck GVW=33,001-60,000 lbs.)

[6] Source: EMFAC2017 fleet percentages.

[7] Source: EMFAC2017 emission factors for 2023 (model year aggregate).

Vail Dam Seismic and Hydrologic Remediation Project

On-site trucks		AADT by Truck Category[1]			
Pond Access #2 from		LDV[2]	2-Axle[3]	3-Axle[4]	4+-Axle[5]
DePortola Road NB		0	0	0	91
		% of Vehicles That Are Diesel-Powered[5]			
Average		0.7%	0%	0%	99.97%
Speed		Diesel Exhaust PM10 & PM2.5 Emissions at 40 mph (g/mi)6			
40 mph	PM_{10}	0.0054	0.00E+00	0.00E+00	1.10E-02
	$PM_{2.5}$	0.0052	0.00E+00	0.00E+00	1.05E-02
		% of Vehicles That Are Gasoline-Powered[5]			
Total distance		99%	100%	100%	0.028%
covered by On-site trucks		Gasoline Exhaust ROG Emissions at 40 mph (g/mi)6			
roadway	ROG	0.0116	0.00E+00	0.00E+00	3.88E-01
sources		PM_{10}, $PM_{2.5}$ & ROG Exhaust Emissions (g/s)			
540 meters	PM_{10}	0.00E+00	0.00E+00	0.00E+00	3.89E-06
	$PM_{2.5}$	0.00E+00	0.00E+00	0.00E+00	3.72E-06
	ROG	0.00E+00	0.00E+00	0.00E+00	3.82E-08

Percent of traffic on this road

100%

Number of Sources	Emission Rates per source		
	g/s	lb/hr	lb/yr
271	1.4E-08	1.1E-07	0.0010
271	1.4E-08	1.1E-07	0.0010
271	1.4E-10	1.1E-09	0.0000

Speciated Emissions Rates

		lb/yr	lb/hr
diesel part.	--	9.99E-04	1.14E-07
PM2.5	--	9.56E-04	1.09E-07
1,3-butadiene	0.0055	5.39E-08	6.15E-12
benzene	0.02636	2.58E-07	2.95E-11
ethylbenzene	0.01072	1.05E-07	1.20E-11
MEK	0.00019	1.86E-09	2.13E-13
naphthalene	0.00048	4.71E-09	5.37E-13
propylene	0.03127998	3.07E-07	3.50E-11
styrene	0.00126	1.24E-08	1.41E-12
toluene	0.05879998	5.77E-07	6.58E-11
m & p-xylene	0.03639998	3.57E-07	4.07E-11

[1] ADT from project traffic study

[2] LDT assumed to LDT2 (Large Pick-up Trucks)

[3] 2 axle trucks are assumed to be MDV (Medium-Duty Truck GVW=5,574-8,500 lbs.)

[4] 3 axle trucks are assumed to be MHDT (Medium-Heavy Duty Truck GVW=14,001-33,000 lbs.)

[5] 4+ axle trucks are assumed to be HHDT (Heavy-Heavy Duty Truck GVW=33,001-60,000 lbs.)

[6] Source: EMFAC2017 fleet percentages.

[7] Source: EMFAC2017 emission factors for 2023 (model year aggregate).

Vail Dam Seismic and Hydrologic Remediation Project

On-site workers		AADT by Truck Category[1]			
Pond Access #2 to		LDV[2]	2-Axle[3]	3-Axle[4]	4+-Axle[5]
DePortola Road SB		34	0	0	0
		% of Vehicles That Are Diesel-Powered[5]			
Average		0.7%	0%	0%	99.97%
Speed		Diesel Exhaust PM10 & PM2.5 Emissions at 40 mph (g/mi)6			
40 mph	PM_{10}	0.0054	0.00E+00	0.00E+00	1.10E-02
	$PM_{2.5}$	0.0052	0.00E+00	0.00E+00	1.05E-02
		% of Vehicles That Are Gasoline-Powered[5]			
Total distance		99%	100%	100%	0.028%
covered by On-site workers		Gasoline Exhaust ROG Emissions at 40 mph (g/mi)6			
roadway	ROG	0.0116	0.00E+00	0.00E+00	3.88E-01
sources		PM_{10}, $PM_{2.5}$ & ROG Exhaust Emissions (g/s)			
629 meters	PM_{10}	5.99E-09	0.00E+00	0.00E+00	0.00E+00
	$PM_{2.5}$	5.73E-09	0.00E+00	0.00E+00	0.00E+00
	ROG	1.77E-06	0.00E+00	0.00E+00	0.00E+00

Percent of traffic on this road

100%

Number of Sources	Emission Rates per source		
	g/s	lb/hr	lb/yr
316	1.9E-11	1.5E-10	0.0000
316	1.8E-11	1.4E-10	0.0000
316	5.6E-09	4.4E-08	0.0004

Speciated Emissions Rates

		lb/yr	lb/hr
diesel part.	--	1.32E-06	1.50E-10
PM2.5	--	1.26E-06	1.44E-10
1,3-butadiene	0.0055	2.14E-06	2.44E-10
benzene	0.02636	1.03E-05	1.17E-09
ethylbenzene	0.01072	4.17E-06	4.76E-10
MEK	0.00019	7.40E-08	8.44E-12
naphthalene	0.00048	1.87E-07	2.13E-11
propylene	0.03127998	1.22E-05	1.39E-09
styrene	0.00126	4.91E-07	5.60E-11
toluene	0.05879998	2.29E-05	2.61E-09
m & p-xylene	0.03639998	1.42E-05	1.62E-09

[1] ADT from project traffic study

[2] LDT assumed to LDT2 (Large Pick-up Trucks)

[3] 2 axle trucks are assumed to be MDV (Medium-Duty Truck GVW=5,574-8,500 lbs.)

[4] 3 axle trucks are assumed to be MHDT (Medium-Heavy Duty Truck GVW=14,001-33,000 lbs.)

[5] 4+ axle trucks are assumed to be HHDT (Heavy-Heavy Duty Truck GVW=33,001-60,000 lbs.)

[6] Source: EMFAC2017 fleet percentages.

[7] Source: EMFAC2017 emission factors for 2023 (model year aggregate).

Vail Dam Seismic and Hydrologic Remediation Project

On-site trucks		AADT by Truck Category[1]			
Pond Access #2 to		LDV[2]	2-Axle[3]	3-Axle[4]	4+-Axle[5]
DePortola Road SB		0	0	0	91
		% of Vehicles That Are Diesel-Powered[5]			
Average		0.7%	0%	0%	99.97%
Speed		Diesel Exhaust PM10 & PM2.5 Emissions at 40 mph (g/mi)6			
40 mph	PM_{10}	0.0054	0.00E+00	0.00E+00	1.10E-02
	$PM_{2.5}$	0.0052	0.00E+00	0.00E+00	1.05E-02
		% of Vehicles That Are Gasoline-Powered[5]			
Total distance		99%	100%	100%	0.028%
covered by On-site trucks		Gasoline Exhaust ROG Emissions at 40 mph (g/mi)6			
roadway	ROG	0.0116	0.00E+00	0.00E+00	3.88E-01
sources		PM_{10}, $PM_{2.5}$ & ROG Exhaust Emissions (g/s)			
628 meters	PM_{10}	0.00E+00	0.00E+00	0.00E+00	4.53E-06
	$PM_{2.5}$	0.00E+00	0.00E+00	0.00E+00	4.33E-06
	ROG	0.00E+00	0.00E+00	0.00E+00	4.44E-08

Percent of traffic on this road: 100%

Number of Sources	Emission Rates per source		
	g/s	lb/hr	lb/yr
315	1.4E-08	1.1E-07	0.0010
315	1.4E-08	1.1E-07	0.0010
315	1.4E-10	1.1E-09	0.0000

Speciated Emissions Rates

		lb/yr	lb/hr
diesel part.	--	1.00E-03	1.14E-07
PM2.5	--	9.57E-04	1.09E-07
1,3-butadiene	0.0055	5.40E-08	6.16E-12
benzene	0.02636	2.59E-07	2.95E-11
ethylbenzene	0.01072	1.05E-07	1.20E-11
MEK	0.00019	1.87E-09	2.13E-13
naphthalene	0.00048	4.71E-09	5.38E-13
propylene	0.03127998	3.07E-07	3.50E-11
styrene	0.00126	1.24E-08	1.41E-12
toluene	0.05879998	5.77E-07	6.59E-11
m & p-xylene	0.03639998	3.57E-07	4.08E-11

[1] ADT from project traffic study

[2] LDT assumed to LDT2 (Large Pick-up Trucks)

[3] 2 axle trucks are assumed to be MDV (Medium-Duty Truck GVW=5,574-8,500 lbs.)

[4] 3 axle trucks are assumed to be MHDT (Medium-Heavy Duty Truck GVW=14,001-33,000 lbs.)

[5] 4+ axle trucks are assumed to be HHDT (Heavy-Heavy Duty Truck GVW=33,001-60,000 lbs.)

[6] Source: EMFAC2017 fleet percentages.

[7] Source: EMFAC2017 emission factors for 2023 (model year aggregate).

Vail Dam Seismic and Hydrologic Remediation Project

On-site travel		AADT by Truck Category[1]				Percent of traffic on this road			
Trucks Outbound to Dam Site		LDV[2]	2-Axle[3]	3-Axle[4]	4+-Axle[5]	100%			
		0	0	0	91				
		% of Vehicles That Are Diesel-Powered[5]							
Average Speed		0.7%	0%	0%	99.97%				
		Diesel Exhaust PM10 & PM2.5 Emissions at 15 mph (g/mi)6							
15 mph	PM_{10}	0.0054	0.00E+00	0.00E+00	1.10E-02				
	$PM_{2.5}$	0.0052	0.00E+00	0.00E+00	1.05E-02				
		% of Vehicles That Are Gasoline-Powered[5]							
Total distance covered by On-site travel driveway sources		99%	100%	100%	0.028%				
		Gasoline Exhaust ROG Emissions at 15 mph (g/mi)6				Number of Sources	Emission Rates per source		
	ROG	0.0116	0.00E+00	0.00E+00	3.88E-01		g/s	lb/hr	lb/yr
		PM_{10}, $PM_{2.5}$ & ROG Exhaust Emissions (g/s)							
873 meters	PM_{10}	0.00E+00	0.00E+00	0.00E+00	6.29E-06	437	1.4E-08	1.1E-07	0.0010
	$PM_{2.5}$	0.00E+00	0.00E+00	0.00E+00	6.02E-06	437	1.4E-08	1.1E-07	0.0010
	ROG	0.00E+00	0.00E+00	0.00E+00	6.18E-08	437	1.4E-10	1.1E-09	0.0000

[1] ADT from project traffic study

[2] LDT assumed to LDT2 (Large Pick-up Trucks)

[3] 2 axle trucks are assumed to be MDV (Medium-Duty Truck GVW=5,574-8,500 lbs.)

[4] 3 axle trucks are assumed to be MHDT (Medium-Heavy Duty Truck GVW=14,001-33,000 lbs.)

[5] 4+ axle trucks are assumed to be HHDT (Heavy-Heavy Duty Truck GVW=33,001-60,000 lbs.)

[6] Source: EMFAC2017 fleet percentages.

[7] Source: EMFAC2017 emission factors for 2023 (model year aggregate).

Speciated Emissions Rates

		lb/yr	lb/hr
diesel part.	--	1.00E-03	1.14E-07
PM2.5	--	9.58E-04	1.09E-07
1,3-butadiene	0.0055	5.41E-08	6.17E-12
benzene	0.02636	2.59E-07	2.96E-11
ethylbenzene	0.01072	1.05E-07	1.20E-11
MEK	0.00019	1.87E-09	2.13E-13
naphthalene	0.00048	4.72E-09	5.38E-13
propylene	0.03127998	3.08E-07	3.51E-11
styrene	0.00126	1.24E-08	1.41E-12
toluene	0.05879998	5.78E-07	6.59E-11
m & p-xylene	0.03639998	3.58E-07	4.08E-11

Vail Dam Seismic and Hydrologic Remediation Project

On-site travel		AADT by Truck Category[1]							
Trucks Inbound		LDV[2]	2-Axle[3]	3-Axle[4]	4+-Axle[5]				
from I-10		16	0	0	5				
		% of Vehicles That Are Diesel-Powered[5]							
Average		0.7%	0%	0%	99.97%				
Speed		Diesel Exhaust PM10 & PM2.5 Emissions at 15 mph (g/mi)6							
15 mph	PM_{10}	0.0054	0.00E+00	0.00E+00	1.10E-02				
	$PM_{2.5}$	0.0052	0.00E+00	0.00E+00	1.05E-02				
		% of Vehicles That Are Gasoline-Powered[5]							
Total distance		99%	100%	100%	0.028%				
covered by On-site travel		Gasoline Exhaust ROG Emissions at 15 mph (g/mi)6				Number			
driveway	ROG	0.0116	0.00E+00	0.00E+00	3.88E-01	of	Emission Rates per source		
sources		PM_{10}, $PM_{2.5}$ & ROG Exhaust Emissions (g/s)				Sources	g/s	lb/hr	lb/yr
861 meters	PM_{10}	3.86E-09	0.00E+00	0.00E+00	3.41E-07	413	8.3E-10	6.6E-09	0.0001
	$PM_{2.5}$	3.69E-09	0.00E+00	0.00E+00	3.26E-07	413	8.0E-10	6.3E-09	0.0001
	ROG	1.14E-06	0.00E+00	0.00E+00	3.35E-09	413	2.8E-09	2.2E-08	0.0002

Percent of traffic on this road

100%

Speciated Emissions Rates

		lb/yr	lb/hr
diesel part.	--	5.81E-05	6.63E-09
PM2.5	--	5.56E-05	6.34E-09
1,3-butadiene	0.0055	1.06E-06	1.21E-10
benzene	0.02636	5.07E-06	5.79E-10
ethylbenzene	0.01072	2.06E-06	2.35E-10
MEK	0.00019	3.66E-08	4.17E-12
naphthalene	0.00048	9.24E-08	1.05E-11
propylene	0.03127998	6.02E-06	6.87E-10
styrene	0.00126	2.42E-07	2.77E-11
toluene	0.05879998	1.13E-05	1.29E-09
m & p-xylene	0.03639998	7.00E-06	7.99E-10

[1] ADT from project traffic study

[2] LDT assumed to LDT2 (Large Pick-up Trucks)

[3] 2 axle trucks are assumed to be MDV (Medium-Duty Truck GVW=5,574-8,500 lbs.)

[4] 3 axle trucks are assumed to be MHDT (Medium-Heavy Duty Truck GVW=14,001-33,000 lbs.)

[5] 4+ axle trucks are assumed to be HHDT (Heavy-Heavy Duty Truck GVW=33,001-60,000 lbs.)

[6] Source: EMFAC2017 fleet percentages.

[7] Source: EMFAC2017 emission factors for 2023 (model year aggregate).

Source: EMFAC2017 (v1.0.3) Emission Rates
Region Type: Sub-Area
Region: Riverside (SC)
Calendar Year: 2023
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Units: miles/day for VMT, g/mile for RUNEX, PMBW and PMTW, mph for Speed

Region	Calendar Y	Vehicle Cat	Model Year	Speed	Fuel	VMT	ROG_RUNEX	PM10_RUNEX	PM2.5_RUNEX	Fuel %
Riverside (SC)	2023	LDT2	Aggregate	5	Gasoline	13168.22	0.090200634	0.009763582	0.008977329	
Riverside (SC)	2023	LDT2	Aggregate	5	Diesel	94.87527	0.261750127	0.017365895	0.016614654	
Riverside (SC)	2023	LDT2	Aggregate	15	Gasoline	20992.62	0.038488617	0.004105926	0.003775286	
Riverside (SC)	2023	LDT2	Aggregate	15	Diesel	151.2491	0.097486334	0.011295884	0.010807229	
Riverside (SC)	2023	LDT2	Aggregate	40	Gasoline	788016.3	0.011580673	0.001191789	0.001095822	99.28%
Riverside (SC)	2023	LDT2	Aggregate	40	Diesel	5677.552	0.0131426	0.005442886	0.005207429	0.72%
Riverside (SC)	2023	HHDT	Aggregate	5	Gasoline	1.162567	3.169795292	0.007052793	0.006484783	
Riverside (SC)	2023	HHDT	Aggregate	5	Diesel	3572.281	0.127609861	0.014111636	0.013501173	
Riverside (SC)	2023	HHDT	Aggregate	15	Gasoline	1.045434	1.326147017	0.002989557	0.002748787	
Riverside (SC)	2023	HHDT	Aggregate	15	Diesel	4121.602	0.04552112	0.009461159	0.009051873	
Riverside (SC)	2023	HHDT	Aggregate	40	Gasoline	29.7386	0.388464786	0.000888862	0.000817276	0.03%
Riverside (SC)	2023	HHDT	Aggregate	40	Diesel	106809.8	0.01387403	0.01101892	0.010542247	99.97%

Vail Dam Seismic and Hydrologic Remediation Project

Facility	Hours per day Trucks Operate	Total Truck Trips per Day	Truck Trips per Hour	Diesel Idle Exhaust PM_{10} (gm/vh-hr)[2]	Diesel Idle Exhaust $PM_{2.5}$ (gm/vh-hr)[2]	Operating Time (min/trip)[3]	Idle Exhaust Diesel PM_{10} (gm/hr)	Idle Exhaust Diesel $PM_{2.5}$ (gm/hr)
Truck Main Engine	16	91	6	0.0056	0.0053	15	0.0079	0.0076

Number of Sources	Diesel PM10 lb/hr	Diesel PM10 lb/yr	Diesel PM2.5 lb/hr	Diesel PM2.5 lb/yr
6	2.9E-06	0.0255	2.8E-06	0.0244

[1] ADT from Traffic Study

[2] Source: EMFAC2017 idling emission factors for 2023 HHDT.

[3] It is assumed that each truck idles for 15 minute per trip to account for multiple stops, i.e. at an entry check-in, loading/unloading and miscellaneous tasks.

EMFAC2017 (v1.0.3) Emission Rates
Region Type: County
Region: RIVERSIDE
Calendar Year: 2023
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Units: miles/day for VMT, trips/day for Trips, g/mile for RUNEX, PMBW and PMTW, g/trip for STREX, HTSK and RUNLS, g/vehicle/day for IDLEX, RESTL and DIURN

Region	Calend	Vehicle Ca	Model Year	Speed	Fuel	Population	VMT	Trips	ROG_IDLEX	PM10_IDLEX	PM2_5_IDLEX
RIVERSIDE	2023	HHDT	Aggregated	Aggregated	DSL	28527.49	4089325	334105.8	7.072732348	0.133581685	0.127803

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APPENDIX C

ESTIMATED CONSTRUCTION EQUIPMENT EMISSIONS

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Equipment Description	Estimated Hourly Fuel Consumption (gallons)	Estimated Operating Hours	Total Fuel Consumption (Gallon)	Total Estimated Legal Load Highway Trips	Number Units	Estimated Duration Weeks	Estimated Operating Hours	Total Fuel Consumption (Gallon)	Total Estimated Legal Load Highway Trips	Estimated One-way Distance Traveled
	Summary for Entire Project				Mobilization					
Excavator	14	3280	45920							
FE Loader	12	8320	99840							
Tractor w/ Dozer Motor Grader	14	3640	50960							
Moto Grader	10	2600	26000							
Compactor	9	2160	19440							
Truck Articulated Off Highway	14	10360	145040							
Truck Trailer for Equiptment/Materials	7	3680	25760	460	2	3	240	1680	30	28.4
Truck Trailer for Aggregates	7	17040	119280	7408						
Truck Trailer for Cement of Flyash	7	2160	15120	800						
Truck Water	7	6040	42280							
Truck Service	7	8080	56560							
Truck Ready Mix Concrete	7	1364	9548	341						
Rock Drills	7	5040	35280							
Generator Sets	9	4000	36000							
Crane	10	5800	58000							
Crane Crush and Screen Plant		720								
Concrete Batch Plant	9	1080	9720							
Grout Mix	4	2240	8960							
Grout Pump										
Chipper	4	560	2240							
Pickup	1	17440	17440		5	16	800	800		16.6
Excavator										
FE Loader					1	14	560	6720		
Tractor w/ Dozer Motor Grader					1	14	560	7840		
Moto Grader					1	14	560	5600		
Compactor										
Truck Articulated Off Highway					2	14	1120	15680		
Truck Trailer for Equiptment/Materials										
Truck Trailer for Aggregates				Access Roads & Staging Areas	12	7	840	5880	408	25.2
Truck Trailer for Cement of Flyash										
Truck Water										
Truck Service					1	14	560	3920		8.4
Truck Ready Mix Concrete					1	14	560	3920		100
Rock Drills										
Generator Sets										
Crane										
Crane Crush and Screen Plant										
Concrete Batch Plant										
Grout Mix										
Grout Pump										
Chipper					1	14	560	2240		
Pickup					8	14	1120	1120		16.6
Excavator					1	10	400	5600		
FE Loader					1	10	400	4800		
Tractor w/ Dozer Motor Grader										
Moto Grader										
Compactor										
Truck Articulated Off Highway					2	10	800	11200		
Truck Trailer for Equiptment/Materials					2	5	400	2800	50	28.4
Truck Trailer for Aggregates										
Truck Trailer for Cement of Flyash										
Truck Water					1	10	400	2800		18.6
Truck Service					1	10	400	2800		8.4
Truck Ready Mix Concrete										
Rock Drills										
Generator Sets										
Crane				Demolition of Facilities New Dam	1	10	400	4000		
Crane Crush and Screen Plant										
Concrete Batch Plant										
Grout Mix										
Grout Pump										
Chipper										
Pickup					9	10	900	900		16.6
Excavator					1	18	720	10080		
FE Loader					1	18	720	8640		
Tractor w/ Dozer Motor Grader					1	18	720	10080		
Moto Grader					1	18	720	7200		
Compactor										
Truck Articulated Off Highway					2	18	1440	20160		
Truck Trailer for Equiptment/Materials										
Truck Trailer for Aggregates										
Truck Trailer for Cement of Flyash										
Truck Water					1	18	720	5040		18.6
Truck Service					1	18	720	5040		8.4
Truck Ready Mix Concrete					1	1	40	280	10	100
Rock Drills					1	18	720	5040		
Generator Sets					1	18	720	6480		
Crane				Dam Foundation Excavation						

Crane Crush and Screen Plant		1	18	720			
Concrete Batch Plant							
Grout Mix							
Grout Pump							
Chipper							
Pickup		10	18	1800	1800		16.6
Excavator							
FE Loader		1	17	680	8160		
Tractor w/ Dozer Motor Grader							
Moto Grader							
Compactor							
Truck Articulated Off Highway							
Truck Trailer for Equiptment/Materials		1	4	160	1120	20	28.4
Truck Trailer for Aggregates							
Truck Trailer for Cement of Flyash							
Truck Water							
Truck Service		1	17	680	4760		8.4
Truck Ready Mix Concrete		1	2	60	420	15	100
Rock Drills							
Generator Sets							
Crane		1	8	320	3200		
Crane Crush and Screen Plant							
Concrete Batch Plant							
Grout Mix							
Grout Pump							
Chipper							
Pickup	Temporary EDV Vault	9	17	1530	1530		16.6
Excavator		1	6	240	3360		
FE Loader		1	6	240	2880		
Tractor w/ Dozer Motor Grader							
Moto Grader							
Compactor							
Truck Articulated Off Highway							
Truck Trailer for Equiptment/Materials		1	3	120	840	15	28.4
Truck Trailer for Aggregates							
Truck Trailer for Cement of Flyash							
Truck Water		1	6	240	1680		18.6
Truck Service		1	6	240	1680		8.4
Truck Ready Mix Concrete		1	1	52	364	13	100
Rock Drills							
Generator Sets							
Crane		1	3	120	1200		
Crane Crush and Screen Plant							
Concrete Batch Plant							
Grout Mix							
Grout Pump							
Chipper							
Pickup	Armor Spillway	9	6	540	540		16.6
Excavator		1	20	800	11200		
FE Loader		1	20	800	9600		
Tractor w/ Dozer Motor Grader							
Moto Grader							
Compactor							
Truck Articulated Off Highway							
Truck Trailer for Equiptment/Materials		1	10	400	2800	50	
Truck Trailer for Aggregates							
Truck Trailer for Cement of Flyash							
Truck Water		1	20	800	5600		18.6
Truck Service		1	20	800	5600		8.4
Truck Ready Mix Concrete							
Rock Drills		2	20	1600	11200		
Generator Sets		1	20	400	3600		
Crane		1	12	480	4800		
Crane Crush and Screen Plant							
Concrete Batch Plant							
Grout Mix		2	20	1600	6400		
Grout Pump							
Chipper							
Pickup	Dam Foundation Treatment & Grouting	8	20	1600	1600		16.6
Excavator							
FE Loader		1	12	1080	12960		
Tractor w/ Dozer Motor Grader		1	12	1080	15120		
Moto Grader		1	12	1080	10800		
Compactor		2	12	2160	19440		
Truck Articulated Off Highway		5	12	5400	75600		
Truck Trailer for Equiptment/Materials		1	12	1080	7560	135	28.4
Truck Trailer for Aggregates		43	12	16200	113400	7000	10.4
Truck Trailer for Cement of Flyash		2	12	2160	15120	800	70
Truck Water		1	12	1080	7560		18.6
Truck Service		1	12	1080	7560		8.4
Truck Ready Mix Concrete							
Rock Drills							
Generator Sets		2	12	2160	19440		
Crane		1	12	1080	10800		
Crane Crush and Screen Plant							
Concrete Batch Plant	RCC Placement (90 hr work Weeks)	1	12	1080	9720		

Grout Mix							
Grout Pump							
Chipper							
Pickup		18	12	2160	2160		16.6
Excavator							
FE Loader		1	28	1120	13440		
Tractor w/ Dozer Motor Grader							
Moto Grader							
Compactor							
Truck Articulated Off Highway							
Truck Trailer for Equiptment/Materials		1	8	320	2240	40	28.4
Truck Trailer for Aggregates							
Truck Trailer for Cement of Flyash							
Truck Water	Outlet Tower						
Truck Service		1	28	1120	7840		8.4
Truck Ready Mix Concrete		2	14	1152	8064	288	100
Rock Drills							
Generator Sets							
Crane		1	28	1120	11200		
Crane Crush and Screen Plant							
Concrete Batch Plant							
Grout Mix							
Grout Pump							
Chipper							
Pickup		9	28	2520	2520		16.6
Excavator							
FE Loader		1	19	760	9120		
Tractor w/ Dozer Motor Grader		1	19	760	10640		
Moto Grader							
Compactor							
Truck Articulated Off Highway							
Truck Trailer for Equiptment/Materials							
Truck Trailer for Aggregates							
Truck Trailer for Cement of Flyash							
Truck Water	Dam Drainage						
Truck Service		1	19	760	5320		8.4
Truck Ready Mix Concrete							
Rock Drills		2	19	1520	10640		
Generator Sets							
Crane		1	9	360	3600		
Crane Crush and Screen Plant							
Concrete Batch Plant							
Grout Mix							
Grout Pump							
Chipper							
Pickup		7	19	1330	1330		16.6
Excavator							
FE Loader		1	10	140	1680		
Tractor w/ Dozer Motor Grader		1	10	140	1960		
Moto Grader							
Compactor							
Truck Articulated Off Highway							
Truck Trailer for Equiptment/Materials							
Truck Trailer for Aggregates							
Truck Trailer for Cement of Flyash							
Truck Water	Dam Instrumentation						
Truck Service		1	10	400	2800		8.4
Truck Ready Mix Concrete							
Rock Drills		2	10	800	5600		
Generator Sets							
Crane		1	5	520	5200		
Crane Crush and Screen Plant							
Concrete Batch Plant							
Grout Mix							
Grout Pump							
Chipper							
Pickup		4	10	400	400		16.6
Excavator							
FE Loader		1	8	320	3840		
Tractor w/ Dozer Motor Grader							
Moto Grader							
Compactor							
Truck Articulated Off Highway							
Truck Trailer for Equiptment/Materials		1	4	160	1120	20	28.4
Truck Trailer for Aggregates							
Truck Trailer for Cement of Flyash							
Truck Water	Permannent EDV Vault						
Truck Service		1	8	320	2240		8.4
Truck Ready Mix Concrete		2	1	60	420	15	100
Rock Drills							
Generator Sets							
Crane		1	8	320	3200		
Crane Crush and Screen Plant							
Concrete Batch Plant							
Grout Mix							
Grout Pump							

Chipper							
Pickup		9	8	720	720		16.6
Excavator		1	10	400	5600		
FE Loader		1	10	400	4800		
Tractor w/ Dozer Motor Grader							
Moto Grader							
Compactor							
Truck Articulated Off Highway		2	10	400	5600		
Truck Trailer for Equiptment/Materials		2	5	400	2800	50	28.4
Truck Trailer for Aggregates							
Truck Trailer for Cement of Flyash							
Truck Water		1	10	400	2800		18.6
Truck Service		1	10	400	2800		8.4
Truck Ready Mix Concrete							
Rock Drills							
Generator Sets							
Crane		1	10	400	4000		
Crane Crush and Screen Plant							
Concrete Batch Plant							
Grout Mix							
Grout Pump							
Chipper							
Pickup		16	10	1600	1600		16.6
Excavator							
FE Loader		1	6	240	2880		
Tractor w/ Dozer Motor Grader		1	6	240	3360		
Moto Grader		1	6	240	2400		
Compactor							
Truck Articulated Off Highway							
Truck Trailer for Equiptment/Materials		2	3	240	1680	30	28.4
Truck Trailer for Aggregates							
Truck Trailer for Cement of Flyash							
Truck Water							
Truck Service							
Truck Ready Mix Concrete							
Rock Drills							
Generator Sets							
Crane							
Crane Crush and Screen Plant							
Concrete Batch Plant							
Grout Mix							
Grout Pump							
Chipper							
Pickup		7	6	420	420		16.6

Demolition of Existing Facilities

Site Reclamation & Demobilization

Emission Factors set up

1

Equiptment Description		CalEEMod Defaults				OffRoad (g/hp/hr)	OffRoad (g/hp/hr)	OffRoad (g/hp/hr)	OffRoad (g/hp/hr)	OffRoad (g/hp/hr)	OffRoad (g/hp/hr)	OffRoad (g/hp/hr)	OffRoad (g/hp/hr)	OffRoad (g/hp/hr)
		OFFROAD Equipment & OnRoad Vehicles	Horsepowe	Load Factor	MaxHP	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O
Excavator	Excavator	Excavators	158	0.38	175	0.191	3.074	1.678	0.005	0.081	0.075	472.192	0.153	0.004
FE Loader	FE Loader	Rubber Tired Loaders	203	0.36	250	0.226	1.188	2.347	0.005	0.079	0.072	469.904	0.152	0.004
Tractor w/ Dozer Motor Grader	Tractor w/ Dozer Motor Grader	Tractors/Loaders/Backhoes	97	0.37	120	0.260	3.536	2.647	0.005	0.142	0.131	475.898	0.154	0.004
Moto Grader	Moto Grader	Graders	187	0.41	250	0.307	1.273	3.888	0.005	0.124	0.114	474.239	0.153	0.004
Compactor	Compactor	Plate Compactors	8	0.43	15	0.661	3.469	4.142	0.008	0.161	0.161	568.299	0.059	0.005
Truck Articulated Off Highway	Truck Articulated Off Highway	Off-Highway Trucks	402	0.38	500	0.196	1.247	1.490	0.005	0.054	0.050	474.714	0.154	0.004
Rock Drills	Rock Drills	Bore/Drill Rigs	221	0.5	250	0.115	1.047	1.163	0.005	0.037	0.034	468.760	0.152	0.004
Generator Sets	Generator Sets	Generator Sets	84	0.74	120	0.301	3.353	2.671	0.006	0.134	0.134	568.299	0.027	0.004
Crane	Crane	Cranes	231	0.29	250	0.316	1.602	3.541	0.005	0.147	0.135	472.983	0.153	0.004
Concrete Batch Plant	Concrete Batch Plant	Other Material Handling Equipment	168	0.4	175	0.226	3.176	1.894	0.005	0.103	0.095	472.219	0.153	0.004
Grout Mix ~~and Pump~~	Grout Mix	Cement and Mortar Mixers	9	0.56	15	0.661	3.470	4.142	0.008	0.161	0.161	568.299	0.059	0.005
Grout Pump	Grout Pump	Pumps	84	0.74	120	0.321	3.404	2.708	0.006	0.142	0.142	568.299	0.029	0.004
Chipper	Chipper	Concrete/Industrial Saws	81	0.73	120	0.343	3.514	2.686	0.006	0.144	0.144	568.299	0.031	0.004
Totals														

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Annual Emissions (Tons / Year)		
Excavator	Excavator	Excavators
FE Loader	FE Loader	Rubber Tired Loaders
Tractor w/ Dozer Motor Grader	Tractor w/ Dozer Motor Grader	Tractors/Loaders/Backhoes
Moto Grader	Moto Grader	Graders
Compactor	Compactor	Plate Compactors
Truck Articulated Off Highway	Truck Articulated Off Highway	Off-Highway Trucks
Rock Drills	Rock Drills	Bore/Drill Rigs
Generator Sets	Generator Sets	Generator Sets
Crane	Crane	Cranes
Concrete Batch Plant	Concrete Batch Plant	Other Material Handling Equipment
Grout Mix ~~and Pump~~	Grout Mix and Pump	Cement and Mortar Mixers
Grout Pump	Chipper	Pumps
Chipper	Pickup	Concrete/Industrial Saws

3

Heavy Duty Truck Daily Emissions		
Truck Trailer for Equiptment/Materials	Truck Trailer for Equiptment/Materials	Heavy Heavy Duty Trucks
Truck Trailer for Aggregates	Truck Trailer for Aggregates	Heavy Heavy Duty Trucks
Truck Trailer for Cement of Flyash	Truck Trailer for Cement of Flyash	Heavy Heavy Duty Trucks
Truck Water	Truck Water	Heavy Heavy Duty Trucks
Truck Service	Truck Service	Heavy Heavy Duty Trucks
Truck Ready Mix Concrete	Truck Ready Mix Concrete	Heavy Heavy Duty Trucks
Pickup	Pickup	Light Duty Trucks

OnRoad (g/mile)	OnRoad (g/mile)	OnRoad (g/mile)	OnRoad (g/mile)	OnRoad (g/mile)	OnRoad (g/mile)	OnRoad (g/mile)	OnRoad (g/mile)	OnRoad (g/mile)
ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O
0.178470739	0.664434564	4.710246852	0.01694658	0.044225082	0.042311924	1793.762646	0.008289458	0.281954508
0.178470739	0.664434564	4.710246852	0.01694658	0.044225082	0.042311924	1793.762646	0.008289458	0.281954508
0.178470739	0.664434564	4.710246852	0.01694658	0.044225082	0.042311924	1793.762646	0.008289458	0.281954508
0.178470739	0.664434564	4.710246852	0.01694658	0.044225082	0.042311924	1793.762646	0.008289458	0.281954508
0.178470739	0.664434564	4.710246852	0.01694658	0.044225082	0.042311924	1793.762646	0.008289458	0.281954508
0.178470739	0.664434564	4.710246852	0.01694658	0.044225082	0.042311924	1793.762646	0.008289458	0.281954508
0.017762254	1.00012491	0.08376783	0.003252297	0.001621866	0.001493297	328.7208996	0.004248862	0.007150363

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Heavy Duty Truck Annual Emissions		
Truck Trailer for Equiptment/Materials	Truck Trailer for Equiptment/Materials	Heavy Heavy Duty Trucks
Truck Trailer for Aggregates	Truck Trailer for Aggregates	Heavy Heavy Duty Trucks
Truck Trailer for Cement of Flyash	Truck Trailer for Cement of Flyash	Heavy Heavy Duty Trucks
Truck Water	Truck Water	Heavy Heavy Duty Trucks
Truck Service	Truck Service	Heavy Heavy Duty Trucks
Truck Ready Mix Concrete	Truck Ready Mix Concrete	Heavy Heavy Duty Trucks
Pickup	Pickup	Light Duty Trucks

Daily Emissions (lbs/day)

	Mobilization									Access Roads & Staging Areas									Demolition of Facilities New Dam						
	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day
	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2
																			0.1981	3.18487	1.73862	0.00508	0.08402	0.07729	489.222
										0.28513	1.49817	2.95968	0.00618	0.09925	0.0913	592.59	0.19169	0.00539	0.28513	1.49817	2.95968	0.00618	0.09925	0.0913	592.59
										0.16115	2.18964	1.63947	0.00303	0.08819	0.08113	294.736	0.09531	0.00265							
										0.40604	1.68458	5.1441	0.00648	0.16366	0.15056	627.436	0.20295	0.00565							
										1.03386	6.57245	7.85416	0.02583	0.28575	0.26255	2502.75	0.80927	0.02253	1.03386	6.57245	7.85416	0.02583	0.28575	0.26255	2502.75
																			0.36495	1.85149	4.09395	0.00566	0.16993	0.15641	546.767
										0.34998	3.58555	2.74069	0.00612	0.14693	0.14693	579.871	0.03163	0.00436							

Daily Emissions (lbs/day)

Annual Emissions (tons/year)

	Mobilization									Access Roads & Staging Areas									Demolition of Facilities New Dam						
	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year
	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2
																			0.00506	0.08138	0.04442	0.00013	0.00215	0.00197	12.5004
										0.0102	0.05359	0.10587	0.00022	0.00355	0.00327	21.1983	0.00686	0.00019	0.00729	0.03828	0.07562	0.00016	0.00254	0.00233	15.1416
										0.00576	0.07833	0.05865	0.00011	0.00315	0.0029	10.5434	0.00341	9.5E-05							
										0.01452	0.06026	0.18402	0.00023	0.00585	0.00539	22.4448	0.00726	0.0002							
										0.03698	0.23511	0.28096	0.00092	0.01022	0.00939	89.529	0.02895	0.00081	0.02642	0.16794	0.20069	0.00066	0.0073	0.00671	63.9493
																			0.00932	0.04731	0.10461	0.00014	0.00434	0.004	13.9708
										0.01252	0.12826	0.09804	0.00022	0.00526	0.00526	20.7433	0.00113	0.00016							

Annual Emissions (tons/year)

Heavy Duty Trucks Daily Emissions (lbs/day)

	Mobilization									Access Roads & Staging Areas									Demolition of Facilities New Dam						
	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day
	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2
	0.0447	0.1664	1.17964	0.00424	0.01108	0.0106	449.232	0.00208	0.07061										0.0447	0.1664	1.17964	0.00424	0.01108	0.0106	449.232
										0.23796	0.88591	6.28033	0.0226	0.05897	0.05642	2391.68	0.01105	0.37594							
																			0.01464	0.05449	0.38629	0.00139	0.00363	0.00347	147.108
										0.00661	0.02461	0.17445	0.00063	0.00164	0.00157	66.4357	0.00031	0.01044	0.00661	0.02461	0.17445	0.00063	0.00164	0.00157	66.4357
										0.07869	0.29296	2.07683	0.00747	0.0195	0.01866	790.901	0.00365	0.12432							
	0.0065	0.36601	0.03066	0.00119	0.00059	0.00055	120.299	0.00155	0.00262	0.0104	0.58561	0.04905	0.0019	0.00095	0.00087	192.479	0.00249	0.00419	0.0117	0.65881	0.05518	0.00214	0.00107	0.00098	216.538

Heavy Duty Trucks Daily Emissions (lbs/day)

Heavy Duty Trucks Annual Emissions (tons/yr)

	Mobilization									Access Roads & Staging Areas									Demolition of Facilities New Dam						
	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year
	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2
	0.00034	0.00125	0.00885	3.2E-05	8.3E-05	7.9E-05	3.36929	1.6E-05	0.00053										0.00056	0.00208	0.01475	5.3E-05	0.00014	0.00013	5.61549
										0.00416	0.0155	0.10991	0.0004	0.00103	0.00099	41.8552	0.00019	0.00658							
																			0.00037	0.00136	0.00966	3.5E-05	9.1E-05	8.7E-05	3.67775
										0.00023	0.00086	0.00611	2.2E-05	5.7E-05	5.5E-05	2.32529	1.1E-05	0.00037	0.00017	0.00062	0.00436	1.6E-05	4.1E-05	3.9E-05	1.66092
										0.00275	0.01025	0.07269	0.00026	0.00068	0.00065	27.682	0.00013	0.00435							
	0.00026	0.01464	0.00123	4.8E-05	2.4E-05	2.2E-05	4.81204	6.2E-05	0.0001	0.00036	0.0205	0.00172	6.7E-05	3.3E-05	3.1E-05	6.73686	8.7E-05	0.00015	0.00029	0.01647	0.00138	5.4E-05	2.7E-05	2.5E-05	5.41355

Heavy Duty Trucks Annual Emissions (tons/yr)

		Dam Foundation Excavation									Temporary EDV Vault									Armor Spillway					
lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day
CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5
0.15821	0.00443	0.1981	3.18487	1.73862	0.00508	0.08402	0.07729	489.222	0.15821	0.00443										0.1981	3.18487	1.73862	0.00508	0.08402	0.07729
0.19169	0.00539	0.28513	1.49817	2.95968	0.00618	0.09925	0.0913	592.59	0.19169	0.00539	0.28513	1.49817	2.95968	0.00618	0.09925	0.0913	592.59	0.19169	0.00539	0.28513	1.49817	2.95968	0.00618	0.09925	0.0913
		0.16115	2.18964	1.63947	0.00303	0.08819	0.08113	294.736	0.09531	0.00265															
		0.40604	1.68458	5.1441	0.00648	0.16366	0.15056	627.436	0.20295	0.00565															
0.80927	0.02253	1.03386	6.57245	7.85416	0.02583	0.28575	0.26255	2502.75	0.80927	0.02253															
		0.21928	1.99708	2.21749	0.00915	0.07112	0.0654	893.84	0.28907	0.00815															
		0.32287	3.59659	2.86505	0.00644	0.14373	0.14373	609.585	0.02896	0.00458															
0.17687	0.00494										0.36495	1.85149	4.09395	0.00566	0.16993	0.15641	546.767	0.17687	0.00494	0.36495	1.85149	4.09395	0.00566	0.16993	0.15641

		Dam Foundation Excavation									Temporary EDV Vault									Armor Spillway					
tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year
CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5
0.00404	0.00011	0.00911	0.14648	0.07996	0.00023	0.00386	0.00355	22.5007	0.00728	0.0002										0.00304	0.04883	0.02665	7.8E-05	0.00129	0.00118
0.0049	0.00014	0.01311	0.06891	0.13612	0.00028	0.00456	0.0042	27.2549	0.00882	0.00025	0.01239	0.06508	0.12856	0.00027	0.00431	0.00397	25.7407	0.00833	0.00023	0.00437	0.02297	0.04537	9.5E-05	0.00152	0.0014
		0.00741	0.10071	0.0754	0.00014	0.00406	0.00373	13.5558	0.00438	0.00012															
		0.01867	0.07748	0.23659	0.0003	0.00753	0.00692	28.8576	0.00933	0.00026															
0.02068	0.00058	0.04755	0.30229	0.36123	0.00119	0.01314	0.01208	115.109	0.03722	0.00104															
		0.01009	0.09185	0.10199	0.00042	0.00327	0.00301	41.1102	0.0133	0.00037															
		0.01485	0.16542	0.13177	0.0003	0.00661	0.00661	28.0366	0.00133	0.00021															
0.00452	0.00013										0.00746	0.03785	0.08369	0.00012	0.00347	0.0032	11.1766	0.00362	0.0001	0.0028	0.01419	0.03138	4.3E-05	0.0013	0.0012

		Dam Foundation Excavation									Temporary EDV Vault									Armor Spillway					
lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day
CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5
0.00208	0.07061										0.02235	0.0832	0.58982	0.00212	0.00554	0.0053	224.616	0.00104	0.03531	0.02235	0.0832	0.58982	0.00212	0.00554	0.0053
0.00068	0.02312	0.01464	0.05449	0.38629	0.00139	0.00363	0.00347	147.108	0.00068	0.02312										0.01464	0.05449	0.38629	0.00139	0.00363	0.00347
0.00031	0.01044	0.00661	0.02461	0.17445	0.00063	0.00164	0.00157	66.4357	0.00031	0.01044	0.00661	0.02461	0.17445	0.00063	0.00164	0.00157	66.4357	0.00031	0.01044	0.00661	0.02461	0.17445	0.00063	0.00164	0.00157
		0.07869	0.29296	2.07683	0.00747	0.0195	0.01866	790.901	0.00365	0.12432	0.07869	0.29296	2.07683	0.00747	0.0195	0.01866	790.901	0.00365	0.12432	0.07869	0.29296	2.07683	0.00747	0.0195	0.01866
0.0028	0.00471	0.013	0.73201	0.06131	0.00238	0.00119	0.00109	240.598	0.00311	0.00523	0.0117	0.65881	0.05518	0.00214	0.00107	0.00098	216.538	0.0028	0.00471	0.0117	0.65881	0.05518	0.00214	0.00107	0.00098

		Dam Foundation Excavation									Temporary EDV Vault									Armor Spillway					
tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year
CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5
2.6E-05	0.00088										0.00022	0.00083	0.0059	2.1E-05	5.5E-05	5.3E-05	2.2462	1E-05	0.00035	0.00017	0.00062	0.00442	1.6E-05	4.2E-05	4E-05
1.7E-05	0.00058	0.00066	0.00245	0.01738	6.3E-05	0.00016	0.00016	6.61995	3.1E-05	0.00104										0.00022	0.00082	0.00579	2.1E-05	5.4E-05	5.2E-05
7.7E-06	0.00026	0.0003	0.00111	0.00785	2.8E-05	7.4E-05	7.1E-05	2.98965	1.4E-05	0.00047	0.00028	0.00105	0.00741	2.7E-05	7E-05	6.7E-05	2.82356	1.3E-05	0.00044	9.9E-05	0.00037	0.00262	9.4E-06	2.5E-05	2.4E-05
		0.0002	0.00073	0.00519	1.9E-05	4.9E-05	4.7E-05	1.97728	9.1E-06	0.00031	0.00039	0.00146	0.01038	3.7E-05	9.7E-05	9.3E-05	3.95457	1.8E-05	0.00062	0.0002	0.00073	0.00519	1.9E-05	4.9E-05	4.7E-05
7E-05	0.00012	0.00059	0.03294	0.00276	0.00011	5.3E-05	4.9E-05	10.8271	0.00014	0.00024	0.0005	0.028	0.00235	9.1E-05	4.5E-05	4.2E-05	9.20304	0.00012	0.0002	0.00018	0.00988	0.00083	3.2E-05	1.6E-05	1.5E-05

			Dam Foundation Treatment & Grouting										RCC Placement										Outlet Towe				
lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day
CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10
489.222	0.15821	0.00443	0.1981	3.18487	1.73862	0.00508	0.08402	0.07729	489.222	0.15821	0.00443														
592.59	0.19169	0.00539	0.28513	1.49817	2.95968	0.00618	0.09925	0.0913	592.59	0.19169	0.00539	0.57026	2.99634	5.91937	0.01236	0.1985	0.18261	1185.18	0.38337	0.01078	0.28513	1.49817	2.95968	0.00618	0.09925
												0.3223	4.37927	3.27894	0.00607	0.17638	0.16226	589.472	0.19063	0.00529					
												0.81208	3.36917	10.2882	0.01297	0.32732	0.30112	1254.87	0.40591	0.01131					
												0.15695	0.8237	0.9835	0.0019	0.03823	0.03823	134.94	0.01401	0.00113					
												5.16932	32.8622	39.2708	0.12917	1.42875	1.31276	12513.8	4.04636	0.11266					
			0.43857	3.99417	4.43499	0.01831	0.14225	0.13081	1787.68	0.57815	0.0163														
			0.32287	3.59659	2.86505	0.00644	0.14373	0.14373	609.585	0.02896	0.00458	1.29147	14.3864	11.4602	0.02574	0.57494	0.57494	2438.34	0.11585	0.01834					
546.767	0.17687	0.00494	0.36495	1.85149	4.09395	0.00566	0.16993	0.15641	546.767	0.17687	0.00494	0.7299	3.70298	8.1879	0.01133	0.33986	0.31281	1093.53	0.35373	0.00988	0.36495	1.85149	4.09395	0.00566	0.16993
												0.52322	7.36607	4.39225	0.01136	0.23842	0.21917	1095.19	0.35415	0.00991					
			0.11498	0.60358	0.72047	0.00139	0.028	0.028	98.8517	0.01026	0.00083														

			Dam Foundation Treatment & Grouting										RCC Placement										Outlet Towe				
tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year
CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10
7.50023	0.00243	6.8E-05	0.01012	0.16276	0.08885	0.00026	0.00429	0.00395	25.0008	0.00808	0.00023														
9.08497	0.00294	8.3E-05	0.01457	0.07656	0.15125	0.00032	0.00507	0.00467	30.2832	0.0098	0.00028	0.01967	0.10336	0.20419	0.00043	0.00685	0.0063	40.8823	0.01322	0.00037	0.0204	0.10719	0.21175	0.00044	0.0071
												0.01112	0.15106	0.11311	0.00021	0.00608	0.0056	20.3336	0.00658	0.00018					
												0.02801	0.11622	0.35489	0.00045	0.01129	0.01039	43.2863	0.014	0.00039					
												0.00541	0.02841	0.03393	6.6E-05	0.00132	0.00132	4.65472	0.00048	3.9E-05					
												0.17831	1.13357	1.35463	0.00446	0.04928	0.04528	431.658	0.13958	0.00389					
			0.02241	0.20411	0.22664	0.00094	0.00727	0.00668	91.3561	0.02955	0.00083														
			0.0165	0.1838	0.14641	0.00033	0.00735	0.00735	31.1517	0.00148	0.00023	0.04455	0.49625	0.39531	0.00089	0.01983	0.01983	84.1097	0.004	0.00063					
4.19123	0.00136	3.8E-05	0.01119	0.05677	0.12553	0.00017	0.00521	0.0048	16.7649	0.00542	0.00015	0.02518	0.12773	0.28244	0.00039	0.01172	0.01079	37.721	0.0122	0.00034	0.02611	0.13246	0.2929	0.00041	0.01216
												0.01805	0.25409	0.15151	0.00039	0.00822	0.00756	37.7782	0.01222	0.00034					
			0.00588	0.03084	0.03682	7.1E-05	0.00143	0.00143	5.05163	0.00052	4.2E-05														

			Dam Foundation Treatment & Grouting										RCC Placement										Outlet Towe				
lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day
CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10
224.616	0.00104	0.03531										0.02235	0.0832	0.58982	0.00212	0.00554	0.0053	224.616	0.00104	0.03531	0.02235	0.0832	0.58982	0.00212	0.00554
												0.35191	1.31012	9.28758	0.03341	0.0872	0.08343	3536.91	0.01634	0.55595					
												0.11017	0.41014	2.90756	0.01046	0.0273	0.02612	1107.26	0.00512	0.17405					
147.108	0.00068	0.02312	0.01464	0.05449	0.38629	0.00139	0.00363	0.00347	147.108	0.00068	0.02312	0.01464	0.05449	0.38629	0.00139	0.00363	0.00347	147.108	0.00068	0.02312					
66.4357	0.00031	0.01044	0.00661	0.02461	0.17445	0.00063	0.00164	0.00157	66.4357	0.00031	0.01044	0.00661	0.02461	0.17445	0.00063	0.00164	0.00157	66.4357	0.00031	0.01044	0.00661	0.02461	0.17445	0.00063	0.00164
790.901	0.00365	0.12432																			0.15738	0.58592	4.15366	0.01494	0.039
216.538	0.0028	0.00471	0.0104	0.58561	0.04905	0.0019	0.00095	0.00087	192.479	0.00249	0.00419	0.0234	1.31762	0.11036	0.00428	0.00214	0.00197	433.077	0.0056	0.00942	0.0117	0.65881	0.05518	0.00214	0.00107

			Dam Foundation Treatment & Grouting										RCC Placement Factor										Outlet Towe				
tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year
CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10
1.68465	7.8E-06	0.00026										0.00094	0.00349	0.02477	8.9E-05	0.00023	0.00022	9.43402	4.4E-05	0.00148	0.00045	0.00166	0.0118	4.2E-05	0.00011
												0.01478	0.05503	0.39008	0.0014	0.00366	0.0035	148.553	0.00069	0.02335					
												0.00463	0.01723	0.12212	0.00044	0.00115	0.0011	46.5057	0.00021	0.00731					
2.20665	1E-05	0.00035	0.00073	0.00272	0.01931	6.9E-05	0.00018	0.00017	7.3555	3.4E-05	0.00116	0.00061	0.00229	0.01622	5.8E-05	0.00015	0.00015	6.17862	2.9E-05	0.00097					
0.99655	4.6E-06	0.00016	0.00033	0.00123	0.00872	3.1E-05	8.2E-05	7.8E-05	3.32184	1.5E-05	0.00052	0.00028	0.00103	0.00733	2.6E-05	6.9E-05	6.6E-05	2.79034	1.3E-05	0.00044	0.00046	0.00172	0.01221	4.4E-05	0.00011
1.97728	9.1E-06	0.00031																			0.00551	0.02051	0.14538	0.00052	0.00136
3.24813	4.2E-05	7.1E-05	0.00052	0.02928	0.00245	9.5E-05	4.7E-05	4.4E-05	9.62409	0.00012	0.00021	0.00098	0.05534	0.00464	0.00018	9E-05	8.3E-05	18.1895	0.00024	0.0004	0.00082	0.04612	0.00386	0.00015	7.5E-05

er				Dam Drainage									Dam Instrumentation									Perma			
lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day
PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX
0.0913	592.59	0.19169	0.00539	0.28513	1.49817	2.95968	0.00618	0.09925	0.0913	592.59	0.19169	0.00539	0.28513	1.49817	2.95968	0.00618	0.09925	0.0913	592.59	0.19169	0.00539	0.28513	1.49817	2.95968	0.00618
				0.16115	2.18964	1.63947	0.00303	0.08819	0.08113	294.736	0.09531	0.00265	0.16115	2.18964	1.63947	0.00303	0.08819	0.08113	294.736	0.09531	0.00265				
				0.43857	3.99417	4.43499	0.01831	0.14225	0.13081	1787.68	0.57815	0.0163	0.43857	3.99417	4.43499	0.01831	0.14225	0.13081	1787.68	0.57815	0.0163				
0.15641	546.767	0.17687	0.00494	0.36495	1.85149	4.09395	0.00566	0.16993	0.15641	546.767	0.17687	0.00494	0.36495	1.85149	4.09395	0.00566	0.16993	0.15641	546.767	0.17687	0.00494	0.36495	1.85149	4.09395	0.00566

er				Dam Drainage									Dam Instrumentation									Perma			
tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year
PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX
0.00653	42.3965	0.01371	0.00039	0.01384	0.07273	0.14369	0.0003	0.00482	0.00443	28.7691	0.00931	0.00026	0.00729	0.03828	0.07562	0.00016	0.00254	0.00233	15.1416	0.0049	0.00014	0.00583	0.03062	0.0605	0.00013
				0.00782	0.1063	0.07959	0.00015	0.00428	0.00394	14.3089	0.00463	0.00013	0.00412	0.05595	0.04189	7.8E-05	0.00225	0.00207	7.53097	0.00244	6.8E-05				
				0.02129	0.19391	0.21531	0.00089	0.00691	0.00635	86.7883	0.02807	0.00079	0.01121	0.10206	0.11332	0.00047	0.00363	0.00334	45.678	0.01477	0.00042				
0.01119	39.1181	0.01265	0.00035	0.00839	0.04258	0.09415	0.00013	0.00391	0.0036	12.5737	0.00407	0.00011	0.00466	0.02365	0.0523	7.2E-05	0.00217	0.002	6.98538	0.00226	6.3E-05	0.00746	0.03785	0.08369	0.00012

er				Dam Drainage									Dam Instrumentation									Perma			
lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day
PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX
0.0053	224.616	0.00104	0.03531																			0.02235	0.0832	0.58982	0.00212
0.00157	66.4357	0.00031	0.01044	0.00661	0.02461	0.17445	0.00063	0.00164	0.00157	66.4357	0.00031	0.01044	0.00661	0.02461	0.17445	0.00063	0.00164	0.00157	66.4357	0.00031	0.01044	0.00661	0.02461	0.17445	0.00063
0.03731	1581.8	0.00731	0.24864																			0.15738	0.58592	4.15366	0.01494
0.00098	216.538	0.0028	0.00471	0.0091	0.51241	0.04292	0.00167	0.00083	0.00077	168.419	0.00218	0.00366	0.0052	0.29281	0.02452	0.00095	0.00047	0.00044	96.2393	0.00124	0.00209	0.0117	0.65881	0.05518	0.00214

er				Dam Drainage									Dam Instrumentation									Perma			
tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year
PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX
0.00011	4.49239	2.1E-05	0.00071																			0.00022	0.00083	0.0059	2.1E-05
0.00011	4.65057	2.1E-05	0.00073	0.00031	0.00117	0.00829	3E-05	7.8E-05	7.4E-05	3.15575	1.5E-05	0.0005	0.00017	0.00062	0.00436	1.6E-05	4.1E-05	3.9E-05	1.66092	7.7E-06	0.00026	0.00013	0.00049	0.00349	1.3E-05
0.00131	55.364	0.00026	0.0087																			0.00039	0.00146	0.01038	3.7E-05
6.9E-05	15.1579	0.0002	0.00033	0.00043	0.02434	0.00204	7.9E-05	3.9E-05	3.6E-05	8.00002	0.0001	0.00017	0.00013	0.00732	0.00061	2.4E-05	1.2E-05	1.1E-05	2.40602	3.1E-05	5.2E-05	0.00023	0.01318	0.0011	4.3E-05

anent EDV Vault

lbs/day	lbs/day	lbs/day	lbs/day	lbs/day
PM10	PM2.5	CO2	CH4	N2O
0.09925	0.0913	592.59	0.19169	0.00539
0.16993	0.15641	546.767	0.17687	0.00494

Demolition of Existing Facilities

lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day
ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5
0.0068	0.35958	1.88932	3.73242	0.00779	0.12516	0.11514	747.308	0.24173	0.28513	1.49817	2.95968	0.00618	0.09925	0.0913
									0.16115	2.18964	1.63947	0.00303	0.08819	0.08113
									0.40604	1.68458	5.1441	0.00648	0.16366	0.15056
0.00571	0.42188	2.14032	4.73259	0.00655	0.19644	0.18081	632.061	0.20446						

Site Reclamation & Demobilization

lbs/day	lbs/day	lbs/day	lbs/day	lbs/day
CO2	CH4	N2O		
592.59	0.19169	0.00539		
294.736	0.09531	0.00265		
627.436	0.20295	0.00565		

anent EDV Vault

tons/year	tons/year	tons/year	tons/year	tons/year
PM10	PM2.5	CO2	CH4	N2O
0.00203	0.00187	12.1133	0.00392	0.00011
0.00347	0.0032	11.1766	0.00362	0.0001

Demolition of Existing Facilities

tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year
ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5
0.00017	0.00919	0.04828	0.09537	0.0002	0.0032	0.00294	19.0949	0.00618	0.00437	0.02297	0.04537	9.5E-05	0.00152	0.0014
									0.00247	0.03357	0.02513	4.7E-05	0.00135	0.00124
									0.00622	0.02583	0.07886	9.9E-05	0.00251	0.00231
0.00015	0.01078	0.05469	0.12093	0.00017	0.00502	0.00462	16.1501	0.00522						

Site Reclamation & Demobilization

tons/year	tons/year	tons/year	tons/year	tons/year
CO2	CH4	N2O		
9.08497	0.00294	8.3E-05		
4.51858	0.00146	4.1E-05		
9.61918	0.00311	8.7E-05		

anent EDV Vault

lbs/day	lbs/day	lbs/day	lbs/day	lbs/day
PM10	PM2.5	CO2	CH4	N2O
0.00554	0.0053	224.616	0.00104	0.03531
0.00164	0.00157	66.4357	0.00031	0.01044
0.039	0.03731	1581.8	0.00731	0.24864
0.00107	0.00098	216.538	0.0028	0.00471

Demolition of Existing Facilities

lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day
ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5
0.0447	0.1664	1.17964	0.00424	0.01108	0.0106	449.232	0.00208	0.07061	0.0447	0.1664	1.17964	0.00424	0.01108	0.0106
0.01464	0.05449	0.38629	0.00139	0.00363	0.00347	147.108	0.00068	0.02312						
0.00661	0.02461	0.17445	0.00063	0.00164	0.00157	66.4357	0.00031	0.01044						
0.0208	1.17122	0.0981	0.00381	0.0019	0.00175	384.957	0.00498	0.00837	0.0091	0.51241	0.04292	0.00167	0.00083	0.00077

Site Reclamation & Demobilization

lbs/day	lbs/day	lbs/day	lbs/day	lbs/day
CO2	CH4	N2O		
449.232	0.00208	0.07061		
147.108	0.00068	0.02312		
66.4357	0.00031	0.01044		
168.419	0.00218	0.00366		

anent EDV Vault

tons/year	tons/year	tons/year	tons/year	tons/year
PM10	PM2.5	CO2	CH4	N2O
5.5E-05	5.3E-05	2.2462	1E-05	0.00035
3.3E-05	3.1E-05	1.32874	6.1E-06	0.00021
9.7E-05	9.3E-05	3.95457	1.8E-05	0.00062
2.1E-05	2E-05	4.33084	5.6E-05	9.4E-05

Demolition of Existing Facilities

tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year
ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5
0.00056	0.00208	0.01475	5.3E-05	0.00014	0.00013	5.61549	2.6E-05	0.00088	0.00034	0.00125	0.00885	3.2E-05	8.3E-05	7.9E-05
0.00037	0.00136	0.00966	3.5E-05	9.1E-05	8.7E-05	3.67775	1.7E-05	0.00058						
0.00017	0.00062	0.00436	1.6E-05	4.1E-05	3.9E-05	1.66092	7.7E-06	0.00026						
0.00052	0.02928	0.00245	9.5E-05	4.7E-05	4.4E-05	9.62409	0.00012	0.00021	0.00014	0.00769	0.00064	2.5E-05	1.2E-05	1.1E-05

Site Reclamation & Demobilization

tons/year	tons/year	tons/year	tons/year	tons/year
CO2	CH4	N2O		
3.36929	1.6E-05	0.00053		
2.52632	3.3E-05	5.5E-05		

			Horsepowe	Load Factor	MaxHP	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O
Excavator	Excavator	Excavators	158	0.38	175	0.191	3.074	1.678	0.005	0.081	0.075	472.192	0.153	0.004
FE Loader	FE Loader	Rubber Tired Loaders	203	0.36	250	0.226	1.188	2.347	0.005	0.079	0.072	469.904	0.152	0.004
Tractor w/ Dozer Motor Gra	Tractor w/ Dozer Motor Grader	Tractors/Loaders/Backhoes	97	0.37	120	0.260	3.536	2.647	0.005	0.142	0.131	475.898	0.154	0.004
Moto Grader	Moto Grader	Graders	187	0.41	250	0.307	1.273	3.888	0.005	0.124	0.114	474.239	0.153	0.004
Compactor	Compactor	Plate Compactors	8	0.43	15	0.661	3.469	4.142	0.008	0.161	0.161	568.299	0.059	0.005
Truck Articulated Off Highw	Truck Articulated Off Highway	Off-Highway Trucks	402	0.38	500	0.196	1.247	1.490	0.005	0.054	0.050	474.714	0.154	0.004
Truck Trailer for Equiptmen	Truck Trailer for Equiptment/Materials	Heavy Heavy Duty Trucks	N/A	N/A	N/A	0.178470739	0.664434564	4.710246852	0.01694658	0.044225082	0.042311924	1793.762646	0.008289458	0.281954508
Truck Trailer for Aggregates	Truck Trailer for Aggregates	Heavy Heavy Duty Trucks	N/A	N/A	N/A	0.178470739	0.664434564	4.710246852	0.01694658	0.044225082	0.042311924	1793.762646	0.008289458	0.281954508
Truck Trailer for Cement of	Truck Trailer for Cement of Flyash	Heavy Heavy Duty Trucks	N/A	N/A	N/A	0.178470739	0.664434564	4.710246852	0.01694658	0.044225082	0.042311924	1793.762646	0.008289458	0.281954508
Truck Water	Truck Water	Heavy Heavy Duty Trucks	N/A	N/A	N/A	0.178470739	0.664434564	4.710246852	0.01694658	0.044225082	0.042311924	1793.762646	0.008289458	0.281954508
Truck Service	Truck Service	Heavy Heavy Duty Trucks	N/A	N/A	N/A	0.178470739	0.664434564	4.710246852	0.01694658	0.044225082	0.042311924	1793.762646	0.008289458	0.281954508
Truck Ready Mix Concrete	Truck Ready Mix Concrete	Heavy Heavy Duty Trucks	N/A	N/A	N/A	0.178470739	0.664434564	4.710246852	0.01694658	0.044225082	0.042311924	1793.762646	0.008289458	0.281954508
Rock Drills	Rock Drills	Bore/Drill Rigs	221	0.5	250	0.115	1.047	1.163	0.005	0.037	0.034	468.760	0.152	0.004
Generator Sets	Generator Sets	Generator Sets	84	0.74	120	0.301	3.353	2.671	0.006	0.134	0.134	568.299	0.027	0.004
Crane	Crane	Cranes	231	0.29	250	0.316	1.602	3.541	0.005	0.147	0.135	472.983	0.153	0.004
Crane Crush and Screen Pla	Crane Crush and Screen Plant	Electricified Equipment	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Concrete Batch Plant	Concrete Batch Plant	Other Material Handling Equipment	168	0.4	175	0.226	3.176	1.894	0.005	0.103	0.095	472.219	0.153	0.004
Grout Mix ~~and Pump~~	Grout Mix and Pump	Cement and Mortar Mixers	9	0.56	15	0.661	3.470	4.142	0.008	0.161	0.161	568.299	0.059	0.005
Grout Pump		Pumps	84	0.74	120	0.321	3.404	2.708	0.006	0.142	0.142	568.299	0.029	0.004
Chipper	Chipper	Concrete/Industrial Saws	81	0.73	120	0.343	3.514	2.686	0.006	0.144	0.144	568.299	0.031	0.004
Pickup	Pickup	Light Duty Trucks	N/A	N/A	N/A	0.017762254	1.00012491	0.08376783	0.003252297	0.001621866	0.001493297	328.7208996	0.004248862	0.007150363

Emissions factors for off-road equipment and on-road trucks are conservatively assumed to be the 2022 scenario year presented in OFFROAD and EMFAC2017 spreadsheets.

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Equipment Description		Mobilization										Access Roads & Staging Areas										Demolition of Facilities New Dam									
		lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day
		ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO
Excavator	Daily Emiss	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.198096	3.184866	1.738622	0.005077	0.084025	0.07729	489.2216	0.158207	0.004428	0.198096	3.184866
FE Loader		0	0	0	0	0	0	0	0	0	0.285132	1.498172	2.959683	0.006179	0.099248	0.091303	592.59	0.191685	0.00539	0.285132	1.498172	2.959683	0.006179	0.099248	0.091303	592.59	0.191685	0.00539	0.285132	1.498172
Tractor w/ Dozer Motor Grader		0	0	0	0	0	0	0	0	0	0.161149	2.189637	1.63947	0.003035	0.088192	0.081132	294.7362	0.095314	0.002647	0	0	0	0	0	0	0	0	0	0.161149	2.189637
Moto Grader		0	0	0	0	0	0	0	0	0	0.40604	1.684583	5.144101	0.006483	0.16366	0.150562	627.4358	0.202954	0.005655	0	0	0	0	0	0	0	0	0	0.40604	1.684583
Compactor		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Articulated Off Highway		0	0	0	0	0	0	0	0	0	1.033865	6.57245	7.854157	0.025833	0.28575	0.262552	2502.752	0.809272	0.022533	1.033865	6.57245	7.854157	0.025833	0.28575	0.262552	2502.752	0.809272	0.022533	1.033865	6.57245
Rock Drills		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.219284	1.997085
Generator Sets		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.322867	3.596592
Crane		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.364948	1.85149	4.09395	0.005664	0.169931	0.156406	546.7669	0.176867	0.004941	0	0
Concrete Batch Plant		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grout Mix and Pump		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grout Pump		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chipper		0	0	0	0	0	0	0	0	0	0.349984	3.585553	2.740693	0.006122	0.146932	0.146932	579.8709	0.031631	0.004361	0	0	0	0	0	0	0	0	0	0	0
Totals		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.24	15.53	20.34	0.05	0.78	0.73	4,597.39	1.33	0.04	1.88	13.11	16.65	0.04	0.64	0.59	4,131.33	1.34	0.04	2.63	20.72

		Mobilization										Access Roads & Staging Areas										Demolition of Facilities New Dam									
		tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year
		ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO
Excavator	Annual Em	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.005062	0.081378	0.044425	0.00013	0.002147	0.001975	12.50038	0.004042	0.000113	0.009111	0.146481
FE Loader		0	0	0	0	0	0	0	0	0	0.0102	0.053593	0.105874	0.000221	0.00355	0.003266	21.19825	0.006857	0.000193	0.007286	0.038281	0.075625	0.000158	0.002536	0.002333	15.14161	0.004898	0.000138	0.013114	0.068905
Tractor w/ Dozer Motor Grader		0	0	0	0	0	0	0	0	0	0.005765	0.078328	0.058647	0.000109	0.003155	0.002902	10.54336	0.00341	9.47E-05	0	0	0	0	0	0	0	0	0	0.007412	0.100708
Moto Grader		0	0	0	0	0	0	0	0	0	0.014525	0.060261	0.184016	0.000232	0.005854	0.005386	22.44476	0.00726	0.000202	0	0	0	0	0	0	0	0	0	0.018675	0.077479
Compactor		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Articulated Off Highway		0	0	0	0	0	0	0	0	0	0.036984	0.235111	0.280961	0.000924	0.010222	0.009392	89.52898	0.028949	0.000806	0.026417	0.167936	0.200686	0.00066	0.007301	0.006709	63.94927	0.020678	0.000576	0.04755	0.302286
Rock Drills		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.010085	0.091852
Generator Sets		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01485	0.165417
Crane		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.009325	0.047308	0.104607	0.000145	0.004342	0.003996	13.97076	0.004519	0.000126	0	0
Concrete Batch Plant		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grout Mix and Pump		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grout Pump		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chipper		0	0	0	0	0	0	0	0	0	0.01252	0.128263	0.098041	0.000219	0.005256	0.005256	20.74326	0.001132	0.000156	0	0	0	0	0	0	0	0	0	0	0
Totals		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.56	0.73	0.00	0.03	0.03	164.46	0.05	0.00	0.05	0.33	0.43	0.00	0.02	0.02	105.56	0.03	0.00	0.12	0.95

	Mobilization										Access Roads & Staging Areas										Demolition of Facilities New Dam									
	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day
	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO
Truck Trailer for Equiptment/Materials	0.044696	0.166402	1.179639	0.004244	0.011076	0.010597	449.2316	0.002076	0.070613	0	0	0	0	0	0	0	0	0	0.044696	0.166402	1.179639	0.004244	0.011076	0.010597	449.2316	0.002076	0.070613	0	0
Truck Trailer for Aggregates	0	0	0	0	0	0	0	0	0	0.237961	0.885913	6.280329	0.022595	0.058967	0.056416	2391.684	0.011053	0.375939	0	0	0	0	0	0	0	0	0	0	0	0
Truck Trailer for Cement of Flyash	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Water	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.014636	0.054491	0.38629	0.00139	0.003627	0.00347	147.1075	0.00068	0.023123	0.014636	0.054491
Truck Service	0	0	0	0	0	0	0	0	0	0.00661	0.024609	0.174454	0.000628	0.001638	0.001567	66.43565	0.000307	0.010443	0.00661	0.024609	0.174454	0.000628	0.001638	0.001567	66.43565	0.000307	0.010443	0.00661	0.024609
Truck Ready Mix Concrete	0	0	0	0	0	0	0	0	0	0.078691	0.292961	2.076828	0.007472	0.0195	0.018656	790.9006	0.003655	0.124319	0	0	0	0	0	0	0	0	0	0	0.078691	0.292961
Pickup	0.0065	0.366007	0.030656	0.00119	0.000594	0.000546	120.2991	0.001555	0.002617	0.0104	0.585611	0.049049	0.001904	0.00095	0.000874	192.4786	0.002488	0.004187	0.011701	0.658812	0.05518	0.002142	0.001068	0.000984	216.5384	0.002799	0.00471	0.013001	0.732014
Total	0.05	0.53	1.21	0.01	0.01	0.01	569.53	0.00	0.07	0.33	1.79	8.58	0.03	0.08	0.08	3,441.50	0.02	0.51	0.08	0.90	1.80	0.01	0.02	0.02	879.31	0.01	0.11	0.11	1.10

	Mobilization										Access Roads & Staging Areas										Demolition of Facilities New Dam									
	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year
	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO
Truck Trailer for Equiptment/Materials	0.000335	0.001248	0.008847	3.18E-05	8.31E-05	7.95E-05	3.369294	1.56E-05	0.00053	0	0	0	0	0	0	0	0	0	0.000559	0.00208	0.014746	5.31E-05	0.000138	0.000132	5.615489	2.6E-05	0.000883	0	0
Truck Trailer for Aggregates	0	0	0	0	0	0	0	0	0	0.004164	0.015504	0.109908	0.000395	0.001032	0.000987	41.85517	0.000193	0.006579	0	0	0	0	0	0	0	0	0	0	0	0
Truck Trailer for Cement of Flyash	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Truck Water	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000366	0.001362	0.009657	3.47E-05	9.07E-05	8.68E-05	3.67775	1.7E-05	0.000578	0.000659	0.002452
Truck Service	0	0	0	0	0	0	0	0	0	0.000231	0.000861	0.006106	2.2E-05	5.73E-05	5.48E-05	2.325287	1.07E-05	0.000366	0.000165	0.000615	0.004361	1.57E-05	4.09E-05	3.92E-05	1.660919	7.68E-06	0.000261	0.000297	0.001107
Truck Ready Mix Concrete	0	0	0	0	0	0	0	0	0	0.002754	0.010254	0.07269	0.000262	0.000682	0.000653	27.68199	0.000128	0.004351	0	0	0	0	0	0	0	0	0	0	0.000197	0.000732
Pickup	0.00026	0.014641	0.001226	4.76E-05	2.37E-05	2.19E-05	4.812045	6.22E-05	0.000105	0.000364	0.020497	0.001717	6.67E-05	3.32E-05	3.06E-05	6.736863	8.71E-05	0.000147	0.000293	0.016471	0.00138	5.36E-05	2.67E-05	2.46E-05	5.413551	7E-05	0.000118	0.000585	0.032941
Total	0.00	0.02	0.01	0.00	0.00	0.00	8.18	0.00	0.00	0.01	0.05	0.19	0.00	0.00	0.00	78.60	0.00	0.01	0.00	0.02	0.03	0.00	0.00	0.00	16.37	0.00	0.00	0.00	0.04

	Mobilization										Access Roads & Staging Areas										Demolition of Facilities New Dam									
	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day
	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO
	0.05	0.53	1.21	0.01	0.01	0.01	569.53	0.00	0.07	2.57	17.32	28.92	0.08	0.86	0.81	8,038.88	1.35	0.56	1.96	14.01	18.44	0.05	0.66	0.60	5,010.64	1.34	0.15	2.74	21.83

	Mobilization										Access Roads & Staging Areas										Demolition of Facilities New Dam									
	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year
	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO
	0.00	0.02	0.01	0.00	0.00	0.00	8.18	0.00	0.00	0.09	0.60	0.92	0.00	0.03	0.03	243.06	0.05	0.01	0.05	0.36	0.46	0.00	0.02	0.02	121.93	0.03	0.00	0.12	0.99
							1	25	198							1	25	198							1	25	198		
							8.1813	0.0019	0.1256	8.3089						243.0579	1.2007	2.5530	246.8116						121.9297	0.8565	0.5529	123.3391	
																121.52896	0.6003358	1.2765188	123.40582										

Dam Foundation Excavation										Temporary EDV Vault										Armor Spillway										Dam Foundation Treatment & Grouting									
lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day
NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG						
1.738622	0.005077	0.084025	0.07729	489.2216	0.158207	0.004428	0	0	0	0	0	0	0	0	0	0	0.198096	3.184866	1.738622	0.005077	0.084025	0.07729	489.2216	0.158207	0.004428	0.198096	3.184866	1.738622	0.005077	0.084025	0.07729	489.2216	0.158207	0.004428	0					
2.959683	0.006179	0.099248	0.091303	592.59	0.191685	0.00539	0.285132	1.498172	2.959683	0.006179	0.099248	0.091303	592.59	0.191685	0.00539	0.285132	1.498172	2.959683	0.006179	0.099248	0.091303	592.59	0.191685	0.00539	0.285132	1.498172	2.959683	0.006179	0.099248	0.091303	592.59	0.191685	0.00539	0.570264					
1.63947	0.003035	0.088192	0.081132	294.7362	0.095314	0.002647	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.322298					
5.144101	0.006483	0.16366	0.150562	627.4358	0.202954	0.005655	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.81208					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.156952					
7.854157	0.025833	0.28575	0.262552	2502.752	0.809272	0.022533	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.169325					
2.217494	0.009153	0.071124	0.065404	893.8399	0.289073	0.00815	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.438568	3.99417	4.434988	0.018305	0.142248	0.130808	1787.68	0.578147	0.016299	0					
2.865045	0.006436	0.143735	0.143735	609.5853	0.028962	0.004584	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.322867	3.596592	2.865045	0.006436	0.143735	0.143735	609.5853	0.028962	0.004584	1.291469					
0	0	0	0	0	0	0	0.364948	1.85149	4.09395	0.005664	0.169931	0.156406	546.7669	0.176867	0.004941	0.364948	1.85149	4.09395	0.005664	0.169931	0.156406	546.7669	0.176867	0.004941	0.364948	1.85149	4.09395	0.005664	0.169931	0.156406	546.7669	0.176867	0.004941	0.729896					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.523221					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.114976	0.603582	0.720472	0.001392	0.028005	0.028005	98.85166	0.010263	0.000826	0					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
24.42	0.06	0.94	0.87	6,010.16	1.78	0.05	0.65	3.35	7.05	0.01	0.27	0.25	1,139.36	0.37	0.01	0.85	6.53	8.79	0.02	0.35	0.32	1,628.58	0.53	0.01	1.72	14.73	16.81	0.04	0.67	0.63	4,124.70	1.14	0.04	9.58					

Dam Foundation Excavation										Temporary EDV Vault										Armor Spillway										Dam Foundation Treatment & Grouting									
tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year
NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG						
0.079964	0.000233	0.003865	0.003555	22.50069	0.007276	0.000204	0	0	0	0	0	0	0	0	0	0	0.003037	0.048827	0.026655	7.78E-05	0.001288	0.001185	7.50023	0.002425	6.79E-05	0.010123	0.162757	0.088849	0.000259	0.004294	0.00395	25.00077	0.008085	0.000226	0					
0.136124	0.000284	0.004565	0.004199	27.2549	0.008816	0.000248	0.012385	0.065077	0.128562	0.000268	0.004311	0.003966	25.74074	0.008326	0.000234	0.004371	0.022968	0.045375	9.47E-05	0.001522	0.0014	9.084966	0.002939	8.26E-05	0.014571	0.076561	0.151249	0.000316	0.005072	0.004666	30.28322	0.009796	0.000275	0.019671					
0.075404	0.00014	0.004056	0.003731	13.55575	0.004384	0.000122	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.011118					
0.236592	0.000298	0.007527	0.006925	28.85755	0.009334	0.00026	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.028012					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.005414					
0.361235	0.001188	0.013142	0.012076	115.1087	0.037221	0.001036	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.178314					
0.101989	0.000421	0.003271	0.003008	41.11024	0.013295	0.000375	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.022412	0.204115	0.226642	0.000935	0.007269	0.006685	91.35608	0.029545	0.000833	0					
0.131772	0.000296	0.006611	0.006611	28.03656	0.001332	0.000211	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0165	0.183797	0.146413	0.000329	0.007345	0.007345	31.15173	0.00148	0.000234	0.044549					
0	0	0	0	0	0	0	0.00746	0.037847	0.083686	0.000116	0.003474	0.003197	11.17661	0.003615	0.000101	0.002797	0.014193	0.031382	4.34E-05	0.001303	0.001199	4.191227	0.001356	3.79E-05	0.01119	0.05677	0.125528	0.000174	0.00521	0.004796	16.76491	0.005423	0.000151	0.025177					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.018048					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.005876	0.030845	0.036818	7.11E-05	0.001431	0.001431	5.051632	0.000524	4.22E-05	0					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
1.12	0.00	0.04	0.04	276.42	0.08	0.00	0.02	0.10	0.21	0.00	0.01	0.01	36.92	0.01	0.00	0.01	0.09	0.10	0.00	0.00	0.00	20.78	0.01	0.00	0.08	0.71	0.78	0.00	0.03	0.03	199.61	0.05	0.00	0.33					

Dam Foundation Excavation										Temporary EDV Vault										Armor Spillway										Dam Foundation Treatment & Grouting									
lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day
NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG						
0	0	0	0	0	0	0	0.022348	0.083201	0.589819	0.002122	0.005538	0.005298	224.6158	0.001038	0.035306	0.022348	0.083201	0.589819	0.002122	0.005538	0.005298	224.6158	0.001038	0.035306	0	0	0	0	0	0	0	0	0	0	0.022348					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.351905					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.110167					
0.38629	0.00139	0.003627	0.00347	147.1075	0.00068	0.023123	0	0	0	0	0	0	0	0	0	0.014636	0.054491	0.38629	0.00139	0.003627	0.00347	147.1075	0.00068	0.023123	0.014636	0.054491	0.38629	0.00139	0.003627	0.00347	147.1075	0.00068	0.023123	0.014636					
0.174454	0.000628	0.001638	0.001567	66.43565	0.000307	0.010443	0.00661	0.024609	0.174454	0.000628	0.001638	0.001567	66.43565	0.000307	0.010443	0.00661	0.024609	0.174454	0.000628	0.001638	0.001567	66.43565	0.000307	0.010443	0.00661	0.024609	0.174454	0.000628	0.001638	0.001567	66.43565	0.000307	0.010443	0.00661					
2.076828	0.007472	0.0195	0.018656	790.9006	0.003655	0.124319	0.078691	0.292961	2.076828	0.007472	0.0195	0.018656	790.9006	0.003655	0.124319	0.078691	0.292961	2.076828	0.007472	0.0195	0.018656	790.9006	0.003655	0.124319	0	0	0	0	0	0	0	0	0	0	0					
0.061312	0.00238	0.001187	0.001093	240.5982	0.00311	0.005234	0.011701	0.658812	0.05518	0.002142	0.001068	0.000984	216.5384	0.002799	0.00471	0.011701	0.658812	0.05518	0.002142	0.001068	0.000984	216.5384	0.002799	0.00471	0.0104	0.585611	0.049049	0.001904	0.00095	0.000874	192.4786	0.002488	0.004187	0.023401					
2.70	0.01	0.03	0.02	1,245.04	0.01	0.16	0.12	1.06	2.90	0.01	0.03	0.03	1,298.49	0.01	0.17	0.13	1.11	3.28	0.01	0.03	0.03	1,445.60	0.01	0.20	0.03	0.66	0.61	0.00	0.01	0.01	406.02	0.00	0.04	0.53					

Dam Foundation Excavation										Temporary EDV Vault										Armor Spillway										Dam Foundation Treatment & Grouting									
tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year
NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG						
0	0	0	0	0	0	0	0.000223	0.000832	0.005898	2.12E-05	5.54E-05	5.3E-05	2.246196	1.04E-05	0.000353	0.000168	0.000624	0.004424	1.59E-05	4.15E-05	3.97E-05	1.684647	7.79E-06	0.000265	0	0	0	0	0	0	0	0	0	0	0.000939					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01478					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.004627					
0.017383	6.25E-05	0.000163	0.000156	6.61995	3.06E-05	0.001041	0	0	0	0	0	0	0	0	0	0.00022	0.000817	0.005794	2.08E-05	5.44E-05	5.21E-05	2.20665	1.02E-05	0.000347	0.000732	0.002725	0.019315	6.95E-05	0.000181	0.000174	7.3555	3.4E-05	0.001156	0.000615					
0.007851	2.82E-05	7.37E-05	7.05E-05	2.989655	1.38E-05	0.00047	0.000281	0.001046	0.007414	2.67E-05	6.96E-05	6.66E-05	2.823563	1.3E-05	0.000444	9.92E-05	0.000369	0.002617	9.41E-06	2.46E-05	2.35E-05	0.996552	4.61E-06	0.000157	0.000331	0.00123	0.008723	3.14E-05	8.19E-05	7.84E-05	3.321839	1.54E-05	0.000522	0.000278					
0.005192	1.87E-05	4.87E-05	4.66E-05	1.977285	9.14E-06	0.000311	0.000393	0.001465	0.010384	3.74E-05	9.75E-05	9.33E-05	3.95457	1.83E-05	0.000622	0.000197	0.000732	0.005192	1.87E-05	4.87E-05	4.66E-05	1.977285	9.14E-06	0.000311	0	0	0	0	0	0	0	0	0	0	0					
0.002759	0.000107	5.34E-05	4.92E-05	10.8271	0.00014	0.000236	0.000497	0.028	0.002345	9.11E-05	4.54E-05	4.18E-05	9.203036	0.000119	0.0002	0.000176	0.009882	0.000828	3.21E-05	1.6E-05	1.48E-05	3.24813	4.2E-05	7.07E-05	0.00052	0.029281	0.002453	9.52E-05	4.75E-05	4.37E-05	9.62409	0.000124	0.000209	0.000983					
0.03	0.00	0.00	0.00	22.41	0.00	0.00	0.00	0.03	0.03	0.00	0.00	0.00	18.23	0.00	0.00	0.00	0.01	0.02	0.00	0.00	0.00	10.11	0.00	0.00	0.00	0.03	0.03	0.00	0.00	0.00	20.30	0.00	0.00	0.02					

Dam Foundation Excavation										Temporary EDV Vault										Armor Spillway										Dam Foundation Treatment & Grouting									
lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day
NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG						
27.12	0.07	0.96	0.90	7,255.20	1.78	0.22	0.77	4.41	9.95	0.02	0.30	0.27	2,437.85	0.38	0.19	0.98	7.65	12.07	0.03	0.38	0.35	3,074.18	0.54	0.21	1.76	15.39	17.42	0.05	0.67	0.63	4,530.72	1.15	0.07	10.10					

Dam Foundation Excavation										Temporary EDV Vault										Armor Spillway										Dam Foundation Treatment & Grouting									
tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year
NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG						
1.16	0.00	0.04	0.04	298.84	0.08	0.00	0.02	0.13	0.24	0.00	0.01	0.01	55.14	0.01	0.00	0.01	0.10	0.12	0.00	0.00	0.00	30.89	0.01	0.00	0.08	0.75	0.81	0.00	0.03	0.03	219.91	0.06	0.00	0.35					
				1	25	198							1	25	198							1	25	198							1	25	198						
				298.8384	2.0463	0.8934	301.7781						55.1447	0.3026	0.3869	55.8341						30.8897	0.1698	0.2650	31.3245						219.9098	1.3757	0.7228	222.0082					

RCC Placement										Outlet Tower										Dam Drainage										Dam Instrumentation							
lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day
CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.996343	5.919367	0.012359	0.198495	0.182605	1185.18	0.38337	0.01078	0.285132	1.498172	2.959683	0.006179	0.099248	0.091303	592.59	0.191685	0.00539	0.285132	1.498172	2.959683	0.006179	0.099248	0.091303	592.59	0.191685	0.00539	0.285132	1.498172	2.959683	0.006179	0.099248	0.091303	592.59	0.191685	0.00539			
4.379274	3.27894	0.006069	0.176384	0.162264	589.4723	0.190629	0.005294	0	0	0	0	0	0	0	0	0	0.161149	2.189637	1.63947	0.003035	0.088192	0.081132	294.7362	0.095314	0.002647	0.161149	2.189637	1.63947	0.003035	0.088192	0.081132	294.7362	0.095314	0.002647			
3.369167	10.2882	0.012966	0.327319	0.301123	1254.872	0.405908	0.011309	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.8237	0.983502	0.0019	0.038229	0.038229	134.9404	0.014009	0.001128	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32.86225	39.27079	0.129167	1.428748	1.312761	12513.76	4.046361	0.112663	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.438568	3.99417	4.434988	0.018305	0.142248	0.130808	1787.68	0.578147	0.016299	0.438568	3.99417	4.434988	0.018305	0.142248	0.130808	1787.68	0.578147	0.016299			
14.38637	11.46018	0.025744	0.57494	0.57494	2438.341	0.115846	0.018338	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.702981	8.1879	0.011329	0.339863	0.312813	1093.534	0.353735	0.009881	0.364948	1.85149	4.09395	0.005664	0.169931	0.156406	546.7669	0.176867	0.004941	0.364948	1.85149	4.09395	0.005664	0.169931	0.156406	546.7669	0.176867	0.004941	0.364948	1.85149	4.09395	0.005664	0.169931	0.156406	546.7669	0.176867	0.004941			
7.366071	4.392248	0.011364	0.238418	0.219168	1095.19	0.354148	0.009912	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
69.89	83.78	0.21	3.32	3.10	20,305.29	5.86	0.18	0.65	3.35	7.05	0.01	0.27	0.25	1,139.36	0.37	0.01	1.25	9.53	13.13	0.03	0.50	0.46	3,221.77	1.04	0.03	1.25	9.53	13.13	0.03	0.50	0.46	3,221.77	1.04	0.03			

RCC Placement										Outlet Tower										Dam Drainage										Dam Instrumentation							
tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year
CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.103358	0.204186	0.000426	0.006847	0.006299	40.88235	0.013224	0.000372	0.0204	0.107186	0.211749	0.000442	0.007101	0.006532	42.39651	0.013714	0.000386	0.013843	0.072733	0.143687	0.0003	0.004818	0.004433	28.76906	0.009306	0.000262	0.007286	0.038281	0.075625	0.000158	0.002536	0.002333	15.14161	0.004898	0.000138			
0.151061	0.113106	0.000209	0.006084	0.005597	20.33363	0.006576	0.000183	0	0	0	0	0	0	0	0	0	0.007823	0.106302	0.079593	0.000147	0.004282	0.003939	14.30885	0.004627	0.000129	0.004118	0.055949	0.041891	7.75E-05	0.002253	0.002073	7.530974	0.002435	6.76E-05			
0.116218	0.354888	0.000447	0.011291	0.010387	43.28633	0.014002	0.00039	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.028413	0.033926	6.55E-05	0.001319	0.001319	4.654718	0.000483	3.89E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.133571	1.354631	0.004456	0.049284	0.045283	431.6576	0.139578	0.003886	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.021292	0.193909	0.21531	0.000889	0.006906	0.00635	86.78828	0.028068	0.000791	0.011206	0.102057	0.113321	0.000468	0.003635	0.003342	45.67804	0.014773	0.000416			
0.496252	0.395315	0.000888	0.019832	0.019832	84.10967	0.003996	0.000633	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.127733	0.282439	0.000391	0.011723	0.01079	37.72105	0.012202	0.000341	0.02611	0.132464	0.292899	0.000405	0.012158	0.01119	39.11812	0.012654	0.000353	0.008392	0.042578	0.094146	0.00013	0.003908	0.003597	12.57368	0.004067	0.000114	0.004662	0.023654	0.052303	7.24E-05	0.002171	0.001998	6.985379	0.00226	6.31E-05			
0.25409	0.151509	0.000392	0.008224	0.00756	37.77818	0.012216	0.000342	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.41	2.89	0.01	0.11	0.11	700.42	0.20	0.01	0.05	0.24	0.50	0.00	0.02	0.02	81.51	0.03	0.00	0.05	0.42	0.53	0.00	0.02	0.02	142.44	0.05	0.00	0.03	0.22	0.28	0.00	0.01	0.01	75.34	0.02	0.00			

RCC Placement										Outlet Tower										Dam Drainage										Dam Instrumentation							
lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day
CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O			
0.083201	0.589819	0.002122	0.005538	0.005298	224.6158	0.001038	0.035306	0.022348	0.083201	0.589819	0.002122	0.005538	0.005298	224.6158	0.001038	0.035306	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.31012	9.287577	0.033415	0.087202	0.08343	3536.908	0.016345	0.555953	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.410145	2.90756	0.010461	0.027299	0.026118	1107.261	0.005117	0.174046	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.054491	0.38629	0.00139	0.003627	0.00347	147.1075	0.00068	0.023123	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.024609	0.174454	0.000628	0.001638	0.001567	66.43565	0.000307	0.010443	0.00661	0.024609	0.174454	0.000628	0.001638	0.001567	66.43565	0.000307	0.010443	0.00661	0.024609	0.174454	0.000628	0.001638	0.001567	66.43565	0.000307	0.010443	0.00661	0.024609	0.174454	0.000628	0.001638	0.001567	66.43565	0.000307	0.010443			
0	0	0	0	0	0	0	0	0.157382	0.585921	4.153657	0.014944	0.038999	0.037312	1581.801	0.00731	0.248637	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.317625	0.110361	0.004285	0.002137	0.001967	433.0767	0.005598	0.00942	0.011701	0.658812	0.05518	0.002142	0.001068	0.000984	216.5384	0.002799	0.00471	0.0091	0.51241	0.042918	0.001666	0.000831	0.000765	168.4187	0.002177	0.003663	0.0052	0.292806	0.024525	0.000952	0.000475	0.000437	96.23928	0.001244	0.002093			
3.20	13.46	0.05	0.13	0.12	5,515.40	0.03	0.81	0.20	1.35	4.97	0.02	0.05	0.05	2,089.39	0.01	0.30	0.02	0.54	0.22	0.00	0.00	0.00	234.85	0.00	0.01	0.01	0.32	0.20	0.00	0.00	0.00	162.67	0.00	0.01			

RCC Placement										Outlet Tower										Dam Drainage										Dam Instrumentation							
tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year
CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O			
0.003494	0.024773	8.91E-05	0.000233	0.000223	9.434022	4.36E-05	0.001483	0.000447	0.001664	0.011797	4.24E-05	0.000111	0.000106	4.492391	2.08E-05	0.000706	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.055026	0.390085	0.001403	0.003663	0.003504	148.5526	0.000687	0.02335	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.017226	0.12212	0.000439	0.001147	0.001097	46.50574	0.000215	0.00731	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.002289	0.016224	5.84E-05	0.000152	0.000146	6.17862	2.86E-05	0.000971	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.001034	0.007327	2.64E-05	6.88E-05	6.58E-05	2.790345	1.29E-05	0.000439	0.000463	0.001723	0.012212	4.39E-05	0.000115	0.00011	4.650574	2.15E-05	0.000731	0.000314	0.001169	0.008287	2.98E-05	7.78E-05	7.44E-05	3.155747	1.46E-05	0.000496	0.000165	0.000615	0.004361	1.57E-05	4.09E-05	3.92E-05	1.660919	7.68E-06	0.000261			
0	0	0	0	0	0	0	0	0.005508	0.020508	0.14538	0.000523	0.001365	0.001306	55.36398	0.000256	0.008702	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.055341	0.004635	0.00018	8.97E-05	8.26E-05	18.18953	0.000235	0.000396	0.000819	0.046118	0.003863	0.00015	7.48E-05	6.89E-05	15.15794	0.000196	0.00033	0.000432	0.02434	0.002039	7.92E-05	3.95E-05	3.63E-05	8.000025	0.000103	0.000174	0.00013	0.00732	0.000613	2.38E-05	1.19E-05	1.09E-05	2.406022	3.11E-05	5.23E-05			
0.13	0.57	0.00	0.01	0.01	231.65	0.00	0.03	0.01	0.07	0.17	0.00	0.00	0.00	79.66	0.00	0.01	0.00	0.03	0.01	0.00	0.00	0.00	11.16	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	4.07	0.00	0.00			

RCC Placement										Outlet Tower										Dam Drainage										Dam Instrumentation							
lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day
CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O			
73.09	97.24	0.26	3.45	3.23	25,820.70	5.89	0.99	0.85	4.70	12.03	0.03	0.32	0.29	3,228.75	0.38	0.31	1.27	10.07	13.35	0.04	0.50	0.46	3,456.63	1.04	0.04	1.26	9.85	13.33	0.03	0.50	0.46	3,384.45	1.04	0.04			

RCC Placement										Outlet Tower										Dam Drainage										Dam Instrumentation							
tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year
CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O			
2.55	3.46	0.01	0.12	0.11	932.07	0.20	0.04	0.05	0.31	0.68	0.00	0.02	0.02	161.18	0.03	0.01	0.05	0.44	0.54	0.00	0.02	0.02	153.60	0.05	0.00	0.03	0.23	0.29	0.00	0.01	0.01	79.40	0.02	0.00			
					1	25	198							1	25	198							1	25	198							1	25	198			
					932.0744	5.0875	7.9465	945.1083						161.1795	0.6715	2.2193	164.0703						153.5956	1.1547	0.3891	155.1394						79.4029	0.6101	0.1977			
					466.03719	2.5437286	3.9732549	472.55417																														

Permanent EDV Vault										Demolition of Existing Facilities										Site Reclamation & Demobilization									
lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day
ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
0.285132	1.498172	2.959683	0.006179	0.099248	0.091303	592.59	0.191685	0.00539	0.006797	0.359576	1.889325	3.732418	0.007793	0.12516	0.115141	747.3077	0.241732	0.285132	1.498172	2.959683	0.006179	0.099248	0.091303	592.59	0.191685	0.00539			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.161149	2.189637	1.63947	0.003035	0.088192	0.081132	294.7362	0.095314	0.002647			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.40604	1.684583	5.144101	0.006483	0.16366	0.150562	627.4358	0.202954	0.005655			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
0.364948	1.85149	4.09395	0.005664	0.169931	0.156406	546.7669	0.176867	0.004941	0.005711	0.421879	2.140316	4.732592	0.006548	0.19644	0.180805	632.0607	0.204458	0	0	0	0	0	0	0	0	0			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
0.65	3.35	7.05	0.01	0.27	0.25	1,139.36	0.37	0.01	0.01	0.78	4.03	8.47	0.01	0.32	0.30	1,379.37	0.45	0.85	5.37	9.74	0.02	0.35	0.32	1,514.76	0.49	0.01			

Permanent EDV Vault										Demolition of Existing Facilities										Site Reclamation & Demobilization									
tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year
ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
0.005828	0.030625	0.0605	0.000126	0.002029	0.001866	12.11329	0.003918	0.00011	0.000174	0.009188	0.048275	0.095369	0.000199	0.003198	0.002942	19.09489	0.006177	0.004371	0.022968	0.045375	9.47E-05	0.001522	0.0014	9.084966	0.002939	8.26E-05			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.002471	0.033569	0.025135	4.65E-05	0.001352	0.001244	4.518584	0.001461	4.06E-05			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.006225	0.025826	0.078864	9.94E-05	0.002509	0.002308	9.619184	0.003111	8.67E-05			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
0.00746	0.037847	0.083686	0.000116	0.003474	0.003197	11.17661	0.003615	0.000101	0.000146	0.01078	0.054688	0.120925	0.000167	0.005019	0.00462	16.15015	0.005224	0	0	0	0	0	0	0	0	0			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
0.01	0.07	0.14	0.00	0.01	0.01	23.29	0.01	0.00	0.00	0.02	0.10	0.22	0.00	0.01	0.01	35.25	0.01	0.01	0.08	0.15	0.00	0.01	0.00	23.22	0.01	0.00			

Permanent EDV Vault										Demolition of Existing Facilities										Site Reclamation & Demobilization									
lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day
ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O			
0.022348	0.083201	0.589819	0.002122	0.005538	0.005298	224.6158	0.001038	0.035306	0.044696	0.166402	1.179639	0.004244	0.011076	0.010597	449.2316	0.002076	0.070613	0.044696	0.166402	1.179639	0.004244	0.011076	0.010597	449.2316	0.002076	0.070613			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
0	0	0	0	0	0	0	0	0	0.014636	0.054491	0.38629	0.00139	0.003627	0.00347	147.1075	0.00068	0.023123	0	0	0	0	0	0	0	0	0			
0.00661	0.024609	0.174454	0.000628	0.001638	0.001567	66.43565	0.000307	0.010443	0.00661	0.024609	0.174454	0.000628	0.001638	0.001567	66.43565	0.000307	0.010443	0	0	0	0	0	0	0	0	0			
0.157382	0.585921	4.153657	0.014944	0.038999	0.037312	1581.801	0.00731	0.248637	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
0.011701	0.658812	0.05518	0.002142	0.001068	0.000984	216.5384	0.002799	0.00471	0.020801	1.171222	0.098098	0.003809	0.001899	0.001749	384.9571	0.004976	0.008374	0.0091	0.51241	0.042918	0.001666	0.000831	0.000765	168.4187	0.002177	0.003663			
0.20	1.35	4.97	0.02	0.05	0.05	2,089.39	0.01	0.30	0.09	1.42	1.84	0.01	0.02	0.02	1,047.73	0.01	0.11	0.05	0.68	1.22	0.01	0.01	0.01	617.65	0.00	0.07			

Permanent EDV Vault										Demolition of Existing Facilities										Site Reclamation & Demobilization									
tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year
ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O			
0.000223	0.000832	0.005898	2.12E-05	5.54E-05	5.3E-05	2.246196	1.04E-05	0.000353	0.000559	0.00208	0.014746	5.31E-05	0.000138	0.000132	5.615489	2.6E-05	0.000883	0.000335	0.001248	0.008847	3.18E-05	8.31E-05	7.95E-05	3.369294	1.56E-05	0.00053			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
0	0	0	0	0	0	0	0	0	0.000366	0.001362	0.009657	3.47E-05	9.07E-05	8.68E-05	3.67775	1.7E-05	0.000578	0	0	0	0	0	0	0	0	0			
0.000132	0.000492	0.003489	1.26E-05	3.28E-05	3.13E-05	1.328735	6.14E-06	0.000209	0.000165	0.000615	0.004361	1.57E-05	4.09E-05	3.92E-05	1.660919	7.68E-06	0.000261	0	0	0	0	0	0	0	0	0			
0.000393	0.001465	0.010384	3.74E-05	9.75E-05	9.33E-05	3.95457	1.83E-05	0.000622	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
0.000234	0.013176	0.001104	4.28E-05	2.14E-05	1.97E-05	4.33084	5.6E-05	9.42E-05	0.00052	0.029281	0.002453	9.52E-05	4.75E-05	4.37E-05	9.62409	0.000124	0.000209	0.000137	0.007686	0.000644	2.5E-05	1.25E-05	1.15E-05	2.526324	3.27E-05	5.5E-05			
0.00	0.02	0.02	0.00	0.00	0.00	11.86	0.00	0.00	0.00	0.03	0.03	0.00	0.00	0.00	20.58	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	5.90	0.00	0.00			

Permanent EDV Vault										Demolition of Existing Facilities										Site Reclamation & Demobilization									
lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day	lbs/day
ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O			
0.85	4.70	12.03	0.03	0.32	0.29	3,228.75	0.38	0.31	0.10	2.20	5.87	8.48	0.03	0.34	1,048.03	1,379.38	0.56	0.91	6.05	10.97	0.02	0.36	0.33	2,132.41	0.49	0.09			

Permanent EDV Vault										Demolition of Existing Facilities										Site Reclamation & Demobilization									
tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year
ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4	N2O			
0.01	0.08	0.17	0.00	0.01	0.01	35.15	0.01	0.00	0.00	0.05	0.13	0.22	0.00	0.01	20.59	35.25	0.01	0.01	0.09	0.16	0.00	0.01	0.01	29.12	0.01	0.00			
						1	25	198							1	25	198							1	25	198			
80.2107						35.1502	0.1906	0.2948	35.6357						20.5858	881.1303	2.6397	904.3559						29.1184	0.1890	0.1573	29.4646		
															16.468648	704.90425	2.1117956	723.48469											
															4.1172	176.2261	0.5279	180.8712											

Equipment Description	Estimated Hourly Fuel Consumption (gallons)	Estimated Operating Hours	Total Fuel Consumption (Gallon)
Excavator	14	3,280	45,920
FE Loader	12	8,320	99,840
Tractor w/ Dozer Motor Grader	14	3,640	50,960
Moto Grader	10	2,600	26,000
Compactor	9	2,160	19,440
Truck Articulated Off Highway	14	10,360	145,040
Truck Trailer for Equiptment/Materials	7	3,680	25,760
Truck Trailer for Aggregates	7	17,040	119,280
Truck Trailer for Cement of Flyash	7	2,160	15,120
Truck Water	7	6,040	42,280
Truck Service	7	8,080	56,560
Truck Ready Mix Concrete	7	1,364	9,548
Rock Drills	7	5,040	35,280
Generator Sets	9	4,000	36,000
Crane	10	5,800	58,000
Cone Crush and Screen Plant (electric)	0	720	0
Concrete Batch Plant	9	1,080	9,720
Grout Mix and Pump	4	2,240	8,960
Chipper	4	560	2,240
Pickup	1	17,440	17,440
Total Diesel Fuel Consumption			**805,948**
Total Gasoline Fuel Consumption			**17,440**

APPENDIX D

ESTIMATED AGGREGATE PROCESSING EMISSIONS

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Vail Dam Aggregate Operations Data

Production Data

Activity	High Production			
	Annual (TPY)	Daily (TPD)	Hourly (TPH)	
Total Aggregate Throughput	-	-	-	* 1 cy = 2 tons
Primary Processing Production	147,000	8,000	800	
Secondary Processing Production	147,000	7,000	700	
Excess Excavation Material	116,800	3,000	300	*58,400cy
Sand Screen Plant	147,000	2,000	200	
Concrete Batch Plant	163,200	10,000	1,000	*81,600cy

Table Notes:

1. Total aggregate throughput will be 263,000 tons, and the volume may increase if additional material is required to enhance the seismic retrofit of the dam.

Production Schedule

Activity	Daily Schedule at Maximum Production Rate (hrs/day)	Annual Schedule at Maximum Production Rate (hrs/ year)
Aggregate Plant Schedule	-	-
Primary Processing Schedule	10	2,000
Secondary Processing Schedule	10	3,050
Recycled Material Schedule	10	3,050
Sand Screen Plant Schedule	10	3,050
Concrete Batch Plant Schedule	10	3,050

Table Notes: 6 am - 4 pm = typical hours of operatoin.
2,400 - 2,500 hours/year

Aggregate Material Transfer Rates

Activity	Percent of Products as Aggregate (%)	Aggregate Transferred		Transfer Method
		Annual Production (TPY)	Daily Max Production (TPD)	
Rock to Primary Storage Piles	100	147,000	8,000	Loader to on-site/off-road haul truck to plant
Rock to Screening Plant	100	147,000	7,000	Loader to on-site/off-road haul truck to plant
Aggregates to Haul Truck	100	263,800	3,000	Loading operation of off-site/on-road haul trucks
Aggregates to Concrete Batch Plant	80	305,000	1,500	Conveyor

Notes:

1. The estimated aggregate transfer data were obtained from the Project Description for the Vail Dam Project.
2. The Aggregate to On-Road Haul Truck represents the loading of product that will be transported off-site. The amount of aggregate product is based on the balance of total aggregate minus the aggregate sent to the concrete batch plant.
3. The concrete mix are fed by the aggregate screen plant and product stockpiles.

Haul Rates

Activity	Material Transferred			Method
	Annual (TPY)	Daily Max Production (TPD)	Truck Capacity (Tons)	
Aggregate Product	263,800	3,000	27	Truck
Concrete Product	163,200	10,000	20	Truck
Cement Delivery	2,665	270	27	Truck

Table Notes:

1. The cement and cement supplement delivery represents the amount of cement and supplements (fly-ash) brought on-site to be used for concrete production and is based on a mixing ration of approximately 14.0% cement, as shown in a average concrete composition, AP-42, Table 11.12-2.

Drilling and Blasting

			Blast Frequency			
ID	Source	holes/blast	blasts/day	blasts/month	blasts/ year	Tons Dynamite / Blast
B-1	Blasting Activity	10	1	5	10	5

Notes
10,000 sf area of drilling
68,000 pounds (or 34,000cy) rocks to be blasted

Blasting Emissions - Criteria Pollutants and GHG emissions

			CO EF	NOx EF	SO2 EF	CH4 EF	Amount of	CO Emissions			NOx Emissions			SO2 Emissions			CH4 Emissions		
ID	Source	Area (ft2)	blasting	blasting	blasting	blasting	rocks blasted	lb/hr	lb/day	TPY	lb/hr	lb/day	TPY	lb/hr	lb/day	TPY	lb/hr	lb/day	TPY
B-1	Blasting	10,000	104	53	1	0.7	34,000	1.9552	15.64576	0.884	0.9964	7.97332	0.4505	0.0188	0.15044	0.0085	0.01316	0.105308	0.00595

1. Emissions Factor Source: AP-42 5th Edition, Section 13.3, Table 13.3-1, January 1995.

Dust - PM10

			PM10 EF	PM2.5 EF	Drilling	PM10 EF	PM10 EF	PM10 Emissions			PM2.5 Emissions			Source Type
ID	Source	Area (ft2)	Drilling (lb/hole)	Drilling (lb/hole)	Control Efficiency	Blasting (lb/blast)	Blasting (lb/blast)	lb/hr	lb/day	TPY	lb/hr	lb/day	TPY	
B-1	Blasting	10,000	-	-	-	7.28	0.42	7.28	7.28	0.0364	0.42	0.42	0.0021	Area
D-1	Drilling	10,000	0.65	0.12	75%	-	-	0.1625	1.625	0.008125	0.03	0.3	0.0015	Area
							Total	7.44	8.91	0.04	0.45	0.72	0.00	

Notes:
1. Blasting Source: AECOM. Assumes 1.0 pounds of dynamite per cubic yard of rock blasted. Estimated 68,000 tons (or 34,000cy) rocks to be blasted.
2. Emissions Factor Source: AP-42 5th Edition, Section 11.9, Table 11.9-4, October 1998. Assumes PM10 = TSP/2 = 1.3 lbs/hole / 2 = 0.65 lb/hole.
3. Emissions factor for PM2.5 is calculated based on a similar mechanical process for aggreagte roock crushing. The emission factors for tertiary rock crushing will be used, based on AP-42 11.19.2, Table 11.19.2-2, Final Section, updated August 2004. The tertiary crushing emission factor for PM10 is 0.00054 lb/ton and the emissions factor for PM2.5 us 0.00010 lb/ton. The ratio of PM2.5 to PM10 is 0.00010/0.00054 = 0.185. Since the PM10 emission factor is estimated to be 0.65 lb/hole (see note 1), the emission factor for PM2.5 is estimated to be 0.65 lb/hole x 0.185 = 0.12 lb/hole.
4. Control Efficiency estimated to be between 63% and 88%, based on drill rotoclone or similar dust shroud device. Assumed midpoint of range reported.
5. AP-42 5th Edition, Section 11.9, Table 11.9-1. Also referenced Appendix E.2 of Background document to AP-42 5th Edition, Section 11.9.
PM10 EF = $0.000014(A)^{1.5}(0.52)$, where A = horizontal area in ft2 with a scaling factor for $\leq$10um of 0.52
PM2.5 EF = $0.000014(A)^{1.5}(0.03)$, where A = horizontal area in ft2 with a scaling factor for $\leq$2.5um of 0.03
Drill goes 40 feet deep. Total of 10 drilling holes. 1,000 ft/day drilling.

Example Calculation
Blasting PM10 = (7.28 lb/blast) x (1 blast/hr) = 7.28 lb/hr
Blasting PM10 = (1.57 lb/day) x (1 blast/day) = 1.57 lb/day
Blasting PM10 = (1.57 lb/day) x (250 blast/year) / (2,000 lb/ton) = 0.2 ton/year

5. Daily drilling emissions based on ability to drill one hole per hour per drill rig for 8 hours per day with one drill rig.
6. Based on 1 blast for the worst hourly potential to emit (PTE). However, modeled emission rate will be based on average of 1 blast in an 8-hour day.
7. Based on 1 blast per day, for the maximum daily PTE.

Blasting Gases - Dynamite Emission Factors

ID	Source	CO EF lb/ton	NOX EF lb/ton	SOx EF lb/ton	CO2 EF lb/ton	CH4 EF lb/ton	N2O EF lb/ton
B-1	Blasting Activity	104	53	1	0	0.7	0

Blasting Gases - Dynamite Emission Rates Criteria Pollutants

ID	Emissions	CO (lb/hr)	CO (lb/day)	CO (TPY)	NOx (lb/hr)	NOx (lb/day)	NOx (TPY)	SOx (lb/hr)	SOx (lb/day)	SOx (TPY)	Source Type
B-1	Blasting Activity	520.00	5,200.00	2.60	265.00	265.00	1.33	5.00	5.00	0.03	Area

Blasting Gases - Dynamite Emission Rates Greenhouse Gases

ID	Emissions	CO2 (lb/hr)	CO2 (lb/day)	CO2 (TPY)	CH4 (lb/hr)	CH4 (lb/day)	CH4 (TPY)	N2O (lb/hr)	N2O (lb/day)	N2O (TPY)	Source Type
B-1	Blasting Activity	0.00	0.00	0.00	3.50	3.50	0.0175	0.00	0.00	0.00	Area

Notes:
1. Emission Factor Source: AP-42 5th Edition, Section 13.3, Table 13.3-1, February 1980, ND = no data.
2. Based on 1 blast for the worst hourly potential to emit (PTE). However, modeled emission rate will be based on average of 10 blast in an 8-hour day.
3. Based on 10 blast per day, for the maximum daily PTE.

Drilling and Blasting Toxics Air Contaminants

Source ID		holes/blast	Blast Frequency			Tons ANFO/Blast
			blasts/day	blasts/month	blasts/year	
B1	Blasting Activity	10	1	4	10	5.0

Dust - PM10

Source ID		Area (ft^2)	PM10 EF Drilling[1] (lb/hole)	Drilling Control Efficiency[2] (%)	PM10 EF Blasting[3] (lb/blast)
B1	Blasting	10,000	-	-	7.28
Drill1	Drilling[4]	10,000	0.65	75%	-

1. Emission Factor Source: AP-42 5th Ed., Section 11.9.2, Table 11.9-4, October 1998. Assumes TSP/PM10 = 2.
2. Control efficiency estimated to be between 63% and 88%, based on drill rotoclone or similar dust shroud device. Assumed midpoint of range reported.
3. AP-42 5th Ed., Section 11.9.2, Table 11.9-1, Also Ref. Appendix E.2 of Background document to AP-42 5th Ed, Section 11.9.
PM10 EF = $0.000014(A)^{1.5}(0.52)$, where A = horizontal area in ft^2 with a scaling factor for $\leq$10um of 0.52

Example Calc:
Blasting PM10 = (7.28 lb/blast) x (1 blast/day) = 7.28 lb/day
Blasting PM10 = (7.28 lb/blast) x (50 blasts/yr) / (2000 lb/ton) = 0.182 TPY
4. Daily drilling emissions based on ability to drill one hole per hour per drill rig for 8 hours per day with two drill rigs.

Source ID	Source Description	Area (ft2)	AB2588 Toxic Air Contaminant	Ci (lbs/lb)	EF[1] (lbs/blast) or (lb/hole)	Emissions (lb/hr)	Emissions (lb/day)	Emissions (ton/yr)
B1	Blasting	10,000	Arsenic	1.50E-05	1.09E-04	1.09E-04	1.09E-04	5.46E-07
			Beryllium	1.00E-06	7.28E-06	7.28E-06	7.28E-06	3.64E-08
			Cadmium	1.00E-06	7.28E-06	7.28E-06	7.28E-06	3.64E-08
			Hex-Chromium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
			Chromium	4.60E-05	3.35E-04	3.35E-04	3.35E-04	1.67E-06
			Copper	9.40E-05	6.84E-04	6.84E-04	6.84E-04	3.42E-06
			Lead	3.00E-05	2.18E-04	2.18E-04	2.18E-04	1.09E-06
			Manganese	5.65E-04	4.11E-03	4.11E-03	4.11E-03	2.06E-05
			Mercury	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
			Nickel	3.00E-05	2.18E-04	2.18E-04	2.18E-04	1.09E-06
			Selenium	1.00E-06	7.28E-06	7.28E-06	7.28E-06	3.64E-08
Drill1	Drilling[2]	10,000	Arsenic	1.50E-05	9.75E-06	4.88E-06	3.20E-05	1.22E-07
			Beryllium	1.00E-06	6.50E-07	3.25E-07	2.13E-06	8.13E-09
			Cadmium	1.00E-06	6.50E-07	3.25E-07	2.13E-06	8.13E-09
			Hex-Chromium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
			Chromium	4.60E-05	2.99E-05	1.50E-05	9.81E-05	3.74E-07
			Copper	9.40E-05	6.11E-05	3.06E-05	2.00E-04	7.64E-07
			Lead	3.00E-05	1.95E-05	9.75E-06	6.40E-05	2.44E-07
			Manganese	5.65E-04	3.67E-04	1.84E-04	1.20E-03	4.59E-06
			Mercury	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
			Nickel	3.00E-05	1.95E-05	9.75E-06	6.40E-05	2.44E-07
			Selenium	1.00E-06	6.50E-07	3.25E-07	2.13E-06	8.13E-09

Notes:
1. Calculation procedures to estimate Drilling and Blasting toxic emissions is based on AP-42 5th Ed., Section 11.9.2 , Table 11.9-4 and Table 11.9-1, October 1998. Assumes TSP/PM10 = 2. Also Ref. Appendix E.2 of Background document to AP-42 5th Ed, Section 11.9.
This equation has been modified by the San Diego Air Pollution Control District to incorporate toxic emissions, based on trace metal concentrations in Drilling and Blasting operations at Mineral Industry sites, based upon test results from several San Diego County mineral product facilities provided to the District by AWR Consultants in July 1996.

Example Blasting Calculation:
Arsenic (lb/blast): EF = PM10 EF x Ci
Arsenic (lb/day): E_{As} = EF x (1 blast/day)
E_{As} = 3.86E-05 x 1 blast/day = 1.09E-04 lb/day

Example Drilling Calculation:
Arsenic (lb/hole): EF = PM10 EF x Ci x (1-e)
Arsenic (lb/day): E_{As} = EF x (1 hole/hour) x (6.56 hours/day) x (2 drill rigs) x (1-control eff)
E_{As} = 9.75E-06 x 1 x 6.56 x 2 x (1-80%) = 3.20E-05 lb/day

2. Daily drilling emissions based on ability to drill one hole per hour per drill rig for 6.56 hours per day with two drill rigs.

Drilling and Blasting Crystalline Silica

Source ID		Blast Frequency				
		holes/blast	blasts/day	blasts/month	blasts/year	Tons ANFO/Blast
B1	Blasting Activity	10	1	4	10	5.0

Dust - PM10

Source ID		Area (ft^2)	PM10 EF Drilling[1] (lb/hole)	PM2.5 EF Drilling[2] (lb/hole)	PM4 EF Drilling[6] (lb/hole)	Drilling Control Efficiency[3] (%)	PM10 EF Blasting[4] (lb/blast)	PM2.5 EF Blasting[4] (lb/blast)	PM4 EF Blasting[6] (lb/blast)	PM10 Emissions			PM2.5 Emissions			PM4 Emissions			Crystalline Silica Emissions[7]			Source Type
										(lb/hr)	(lb/day)	(TPY)	(lb/hr)	(lb/day)	(TPY)	(lb/hr)	(lb/day)	(TPY)	(lb/hr)	(lb/day)	(TPY)	
B1	Blasting	10,000					7.28	0.42	1.79	7.28	7.28	0.04	0.42	0.42	0.00	1.79	1.79	0.01	0.18	0.18	0.001	Volume
Drill1	Drilling[(5)]	10,000	0.65	0.12	0.260	75%				0.325	2.13	0.33	0.06	0.39	0.06	0.13	0.85	0.13	0.01	0.09	0.01	Area
									Total	**7.61**	**9.41**	**0.36**	**0.48**	**0.81**	**0.06**	**1.92**	**2.64**	**0.14**	**0.19**	**0.27**	**0.01**	

Notes:

1. Emission Factor Source: AP-42 5th Ed., Section 11.9.2, Table 11.9-4, October 1998. Assumes TSP/PM10 = 2.

11.19.2, Table 11.19.2-2, Final Section, updated August 2004. The tertiary crushing emission factor for PM10 is 0.00054 lb/ton and the emission factor for PM2.5 is 0.00010 lb/ton. The ratio

3. Control efficiency estimated to be between 63% and 88%, based on drill rotoclone or similar dust shroud device. Assumed midpoint of range reported.

4. AP-42 5th Ed., Section 11.9.2, Table 11.9-1, Also Ref. Appendix E.2 of Background document to AP-42 5th Ed, Section 11.9.

PM10 EF = $0.000014(A)^{1.5}(0.52)$, where A = horizontal area in ft^2 with a scaling factor for $\leq$10um of 0.52

PM2.5 EF = $0.000014(A)^{1.5}(0.03)$, where A = horizontal area in ft^2 with a scaling factor for $\leq$2.5um of 0.03

PM4 EF = $0.000014(A)^{1.5}(0.128)$, where A = horizontal area in ft^2 with a scaling factor for $\leq$4um of 0.128 (Based on linear interpolation of PM2.5 and PM10).

Example Calculation Blasting PM10 = (1.57 lb/blast) x (1 blast/hr) = 1.57 lb/hr

Blasting PM10 = (1.57 lb/day) x (1 blast/day) = 1.57 lb/day

Blasting PM10 = (1.57 lb/day) / (50 blasts/yr) / (2000 lb/ton) = 0.182 TPY

5. Daily drilling emissions based on ability to drill one hole per hour per drill rig for 8 hours per day with two drill rigs.

Based on 1 blast for the worst hourly potential to emit (PTE). However, modeled emission rate will be based on an average of 1 blast in an 8 hour day.

Based on 1 blast per day, for the maximum daily potential to emit (PTE).

6. Since there are no emission factors for PM4 provided in AP-42 5th Ed., Section 11.9, the PM10 scaling factor was used and scaled to PM4 using the ratio 0.14/0.35.

7. In a recent AWMA study, it was found that the crystalline silica percentage of PM4 particles is only 44% of the crystalline silica percentage in bulk samples of the same rock (Air Control

Storage Piles and Loading Operations

Storage Piles

ID	Source	PM10 EF lb/acre/day	PM2.5 EF lb/acre/day	Control Method	Control Efficiency	-	Pile Size (acres)	PM 10 Emissions lb/hr	PM 10 Emissions lb/day	PM 10 Emissions TPY	PM2.5 Emissions lb/hr	PM2.5 Emissions lb/day	PM2.5 Emissions TPY
SP1	Primary Storage Pile	4.161	2.2995	Wet Suppr	90%	-	0.406	0.016894	0.168937	0.030831	0.009336	0.09336	0.017038
SP2	Active Storage Pile	4.161	2.2995	Wet Suppr	90%	-	0.18	0.00749	0.074898	0.013669	0.004139	0.041391	0.007554
SP3	Concrete Sand Pile 1	4.161	2.2995	Wet Suppr	100%	75%	0.226	0	0	0	0	0	0
SP4	Concrete Recycle Pile 4	4.161	2.2995	Wet Suppr	90%	-	0.18	0.00749	0.074898	0.013669	0.004139	0.041391	0.007554
								0.058	0.576	0.082	0.032	0.318	0.045

Notes:

1. Storage piles are active 31 weeks.

2. Emissions Factor Source: AP-42 5th Edition, Section 11.9, Table 11.9-1 (Storage Piles), dated July 1998, as follows:

TSP (<=30 mm) = 0.72 x u lb TSP/acre-hr, where u (wind speed) = 3.04 mph

0.72 x 3.04 = 2.19 lb TSP/acre-hr

PM10 = TSP x SF, where SF (Scaling Factor) = 0.19

PM10 = 2.19 x 0.19 = 0.42 lb PM10/acre-hr x 10 operating hrs/day = 4.161 lb PM10/acre-day

PM2.5 = TSP x SF, where SF (Scaling Factor) = 0.105

PM2.5 = 2.19 x 0.105 = 0.23 lb PM10/acre-hr x 10 operating hrs/day = 2.2995 lb PM2.5/acre-day

a) Annual average wind speed of 3.04 mph obtained from Lake Elsinore Station #3171

3. AP-42 Section 13.2.4-4 states wet suppression results in 90% control.

Example Calculation: Storage Pile PM10 = 0.406 acres x 4.2 lb/acres/day x (1 - 0.9) = 0.1689 lb/day

Truck Loading Operation (Aggregate Loadout)

ID	Source	Material Loaded TPD	Material Loaded TPY	PM10 EF lb/ton	PM2.5 EF lb/ton	PM10 Emissions lb/hr	PM10 Emissions lb/day	PM10 Emissions TPY	PM2.5 Emissions lb/hr	PM2.5 Emissions lb/day	PM2.5 Emissions TPY
TL1	Loading to haul trucks	3,000	549,000	0.00009	0.000047	0.026	0.257	0.024	0.014	0.141	0.013

6. The following calculation procedures to estimate transfer point toxic emissions is based on AP-42 5th Ed. Section 13.2.4.3 Equation 1, January 1995, for the calculation of particulate matter. This equation has been modified by the San Diego Air Pollution Control District to incorporate toxic emissions, based on trace metal concentrations in aggregate dust, based upon test results from several San Diego County mineral product facilities provided to the District by AWR Consultants in July 1996.

Ea = Ua x [k x 0.0032 x (u/5)1.3 / (m/2)1.4] x Ci x (1 - e)
Eh = Uh x [k x 0.0032 x (u/5)1.3 / (m/2)1.4] x Ci x (1 - e)

Where:
Ea = Annual emissions of each listed substance, (lbs/year)
Eh = Maximum hourly emissions of each listed substance, (lbs/hour)
Ua = Annual material throughput for each transfer point, (tons/year)
Uh = Maximum hourly throughput for each transfer point, (tons/hour)
k = Particulate size multiplier, (dimensionless), k = 0.35 for PM10
u = Mean wind speed, (miles/hour) = 3.04 mph.
m = Material moisture content, (weight %) = 7.9%
Ci = Concentration of each listed substance in each material processed, (lbs/lb)
e = Control equipment efficiency, (%) (none)
a) Annual average wind speed of 3.04 mph obtained from Lake Elsinore Station #3171.

7. Includes overburden loadout.

8. Emissions factor for PM2.5 is calculated based on a ratio of controlled emission factors for a conveyor transfer point. The emissions factor for conveyor trasnfer point (controlled) will be used, based on AP-42 11.19.2, Table 11.19.2-2, Final Section, updated August 2004. The PM10 emission factor is 0.0000460 lb/ton and the emission factor for PM2.5 is 0.0000130 lb/ton. The ratio of PM2.5 to PM10 is 0.0000130/0.0000460 = 0.283. Since the PM10 emission factor is estimated to be 0.00009 lb/ton, the emission factor for PM2.5 is estimated to be 0.000047 lb/ton.

Storage Piles and Loading Operations Toxic Air Contaminants

Storage Piles

Group ID	Source	PM10 EF[2] lb/acre/day	Control Method	Control Efficiency[3]	Control Efficiency[4]	Pile Size[5] acres	PM10 Emissions lb/hr	lb/day	TPY
SP1	Primary Storage Pile	4.161	Wet Suppression	90%	-	0.406	0.01407805	0.1689366	0.03083093
SP2	Active Storage Pile	4.161	Wet Suppression	90%	-	0.18	0.0062415	0.074898	0.013668885
SP3	Concrete Sand Pile	4.161	Wet Suppression	100%	75%	0.226	0	0	0
SP4	Concrete Recycle Pile	4.161	Wet Suppression	90%	-	0.18	0.0062415	0.074898	0.013668885
TOTAL							**0.03**	**0.32**	**0.06**

1. Storage Piles are active 365 days per year.
2. Emission Factor Source: AP-42 5th Ed., Section 11.9, Table 11.9-1 (Storage Piles), dated July, 1998 as follows:
   TSP (<=30 mm) = 0.72 x u lb TSP/acre-hr: Where u (wind speed) = 3.04 mph
   0.72 x 3.04 = 2.19 lb TSP/acre-hr
   PM10 = TSP x SF: Where SF (Scaling Factor) = 0.19[b]
   PM10 = 2.19 x 0.19 = 0.4161 lb PM10/acre-hr x 10 operating hrs/day = 4.161 lb PM10/acre-day
   a) Annual average wind speed of 3.04 mph obtained from Lake Elsinore Station #3171.
   b) A scaling factor for active storage pile PM10 was not provided in AP-42 Table 11.9-1. Therefore, a scaling factor was derived as follows:
   The scaling factor for PM10 for bulldozing overburden (0.75 x PM15) was used as a basis. Since the scaling factor for bulldozing overburden is to be applied to the corresponding PM15 emission factor and since there is no data provided for PM15 for active storage pile emissions, a PM15 value was estimated for active storage piles using the ratio of PM15 to TSP provided for bulldozing overburden as follows:
   Bulldozing overburden TSP = 5.7 $(s)^{1.2}$ / $M^{1.3}$ lb/hr, where s (silt content) = 6.9%, and M (moisture content) = 7.9%.
   Bulldozing overburden TSP = 5.7 x $6.9^{1.2}$ / $7.9^{1.3}$ = 3.94 lb/hr
   Bulldozing overburden PM15 = 1.0 $(s)^{1.5}$ / $M^{1.4}$ lb/hr
   Bulldozing overburden PM15 = 1.0 x $6.9^{1.5}$ / $7.9^{1.4}$ = 1.00 lb/hr
   The ratio of PM15 to TSP = 1.00/3.94 = 0.25
   Applying the PM15 to TSP ratio and PM10 scaling factor based on bulldozing overburden, a scaling factor for the active storage pile PM10 is estimated as 0.25 x 0.75 = 0.19.
3. AP-42 Section 13.2.4-4 states wet suppression results in 90% control.

Example Calculation: Storage Pile PM10 = 0.406 acres x 4.161 lb/acres/day x (1 - 0.9) = 0.1689 lb/day

Trace Metal Concentrations in Aggregate Released From Storage Piles

Source ID	Source Description	AB2588 Toxic Air Contaminant	Ci (ppmw)	Ci (lbs/lb)	EF[1] (lb/acre/day)	Emissions (lb/hr)	Emissions (lb/day)	Emissions (ton/yr)
SP-1	Primary Storage Pile	Arsenic	22	2.20E-05	9.15E-05	1.55E-07	3.72E-06	6.78E-07
		Beryllium	1	1.00E-06	4.16E-06	7.04E-09	1.69E-07	3.08E-08
		Cadmium	1	1.00E-06	4.16E-06	7.04E-09	1.69E-07	3.08E-08
		Hex-Chromium	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Chromium	28	2.80E-05	1.17E-04	1.97E-07	4.73E-06	8.63E-07
		Copper	37	3.70E-05	1.54E-04	2.60E-07	6.25E-06	1.14E-06
		Lead	50	5.00E-05	2.08E-04	3.52E-07	8.45E-06	1.54E-06
		Manganese	530	5.30E-04	2.21E-03	3.73E-06	8.95E-05	1.63E-05
		Mercury	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Nickel	28	2.80E-05	1.17E-04	1.97E-07	4.73E-06	8.63E-07
		Selenium	1	1.00E-06	4.16E-06	7.04E-09	1.69E-07	3.08E-08
Source ID	**Source Description**	**AB2588 Toxic Air Contaminant**	**Ci (ppmw)**	**Ci (lbs/lb)**	**EF[1] (lb/acre/day)**	**Emissions (lb/hr)**	**Emissions (lb/day)**	**Emissions (ton/yr)**
SP-2	Active Storage Pile	Arsenic	22	2.20E-05	9.15E-05	6.87E-08	1.65E-06	3.01E-07
		Beryllium	1	1.00E-06	4.16E-06	3.12E-09	7.49E-08	1.37E-08
		Cadmium	1	1.00E-06	4.16E-06	3.12E-09	7.49E-08	1.37E-08
		Hex-Chromium	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Chromium	28	2.80E-05	1.17E-04	8.74E-08	2.10E-06	3.83E-07
		Copper	37	3.70E-05	1.54E-04	1.15E-07	2.77E-06	5.06E-07
		Lead	50	5.00E-05	2.08E-04	1.56E-07	3.74E-06	6.83E-07
		Manganese	530	5.30E-04	2.21E-03	1.65E-06	3.97E-05	7.24E-06
		Mercury	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Nickel	28	2.80E-05	1.17E-04	8.74E-08	2.10E-06	3.83E-07
		Selenium	1	1.00E-06	4.16E-06	3.12E-09	7.49E-08	1.37E-08
Source ID	**Source Description**	**AB2588 Toxic Air Contaminant**	**Ci (ppmw)**	**Ci (lbs/lb)**	**EF[1] (lb/acre/day)**	**Emissions (lb/hr)**	**Emissions (lb/day)**	**Emissions (ton/yr)**
Source ID	**Source Description**	**AB2588 Toxic Air Contaminant**	**Ci (ppmw)**	**Ci (lbs/lb)**	**EF[1] (lb/acre/day)**	**Emissions (lb/hr)**	**Emissions (lb/day)**	**Emissions (ton/yr)**
SP-3	Concrete Sand Pile	Arsenic	22	2.20E-05	9.15E-05	0.00E+00	0.00E+00	0.00E+00
		Beryllium	1	1.00E-06	4.16E-06	0.00E+00	0.00E+00	0.00E+00
		Cadmium	1	1.00E-06	4.16E-06	0.00E+00	0.00E+00	0.00E+00
		Hex-Chromium	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Chromium	28	2.80E-05	1.17E-04	0.00E+00	0.00E+00	0.00E+00
		Copper	37	3.70E-05	1.54E-04	0.00E+00	0.00E+00	0.00E+00
		Lead	50	5.00E-05	2.08E-04	0.00E+00	0.00E+00	0.00E+00
		Manganese	530	5.30E-04	2.21E-03	0.00E+00	0.00E+00	0.00E+00
		Mercury	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Nickel	28	2.80E-05	1.17E-04	0.00E+00	0.00E+00	0.00E+00
		Selenium	1	1.00E-06	4.16E-06	0.00E+00	0.00E+00	0.00E+00
Source ID	**Source Description**	**AB2588 Toxic Air Contaminant**	**Ci (ppmw)**	**Ci (lbs/lb)**	**EF[1] (lb/acre/day)**	**Emissions (lb/hr)**	**Emissions (lb/day)**	**Emissions (ton/yr)**
SP-4	Concrete Recycle Pile	Arsenic	22	2.20E-05	9.15E-05	6.87E-08	1.65E-06	3.01E-07
		Beryllium	1	1.00E-06	4.16E-06	3.12E-09	7.49E-08	1.37E-08
		Cadmium	1	1.00E-06	4.16E-06	3.12E-09	7.49E-08	1.37E-08
		Hex-Chromium	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Chromium	28	2.80E-05	1.17E-04	8.74E-08	2.10E-06	3.83E-07
		Copper	37	3.70E-05	1.54E-04	1.15E-07	2.77E-06	5.06E-07
		Lead	50	5.00E-05	2.08E-04	1.56E-07	3.74E-06	6.83E-07
		Manganese	530	5.30E-04	2.21E-03	1.65E-06	3.97E-05	7.24E-06

		Mercury	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Nickel	28	2.80E-05	1.17E-04	8.74E-08	2.10E-06	3.83E-07
		Selenium	1	1.00E-06	4.16E-06	3.12E-09	7.49E-08	1.37E-08

Notes:
1. Trace metal concentrations in aggregate, released from storage piles estimates are based upon test results from several San Diego County mineral product facilities provided to the District by AWR Consultants in July 1996. Trace metal values obtained from San Diego Air Pollution Control District Emission Factor Guidance, "Mineral Products Industry - Aggregate", modified December 30, 1998.

Example Storage Pile Calculation:
Arsenic (lb/acre/day): EF = PM10 EF x Ci x (1-e)
Arsenic (lb/day): E_{As} = EF x Pile Size (acres) x (1-control Eff)
= 2.10E-04 lb/acre/day x 0.406 acres x (1 - 0.9) = 3.35E-06 lb/day

Truck Loading Operations (Aggregate Loadout)

		Material Loaded		PM10 EF[4]	PM10 Emissions		
Group ID	Source	TPD	TPY	lb/ton	lb/hr	lb/day	TPY
PLO	Loading to haul trucks	3,000	549,000	0.00020	0.06	0.60	0.05

Trace Metal Concentrations in Aggregate Loadout Released From Truck Loading Operations

Source ID	Source Description	AB2588 Toxic Air Contaminant	Ci (ppmw)	Ci (lbs/lb)	EF[1] (lb/ton)	Emissions (lb/hr)	Emissions (lb/day)	Emissions (ton/yr)
PLO	Truck Loading	Arsenic	22	2.20E-05	4.37E-09	1.31E-06	1.31E-05	1.20E-06
		Beryllium	1	1.00E-06	1.99E-10	5.96E-08	5.96E-07	5.45E-08
		Cadmium	1	1.00E-06	1.99E-10	5.96E-08	5.96E-07	5.45E-08
		Hex-Chromium	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Chromium	28	2.80E-05	5.56E-09	1.67E-06	1.67E-05	1.53E-06
		Copper	37	3.70E-05	7.34E-09	2.20E-06	2.20E-05	2.02E-06
		Lead	50	5.00E-05	9.93E-09	2.98E-06	2.98E-05	2.72E-06
		Manganese	530	5.30E-04	1.05E-07	3.16E-05	3.16E-04	2.89E-05
		Mercury	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		Nickel	28	2.80E-05	5.56E-09	1.67E-06	1.67E-05	1.53E-06
		Selenium	1	1.00E-06	1.99E-10	5.96E-08	5.96E-07	5.45E-08

Notes:
1. The following calculation procedures to estimate transfer point toxic emissions is based on AP-42 5th Ed. Section 13.2.4.3 Equation 1, January 1995, for the calculation of particulate matter. This equation has been modified by the San Diego Air Pollution Control District to incorporate toxic emissions, based on trace metal concentrations in aggregate dust, based upon test results from several San Diego County mineral product facilities provided to the District by AWR Consultants in July 1996.

Ea = Ua x [k x 0.0032 x (u/5)1.3 / (m/2)1.4] x Ci x (1 - e)
Eh = Uh x [k x 0.0032 x (u/5)1.3 / (m/2)1.4] x Ci x (1 - e)

Where:
Ea = Annual emissions of each listed substance, (lbs/year)
Eh = Maximum hourly emissions of each listed substance, (lbs/hour)
Ua = Annual material throughput for each transfer point, (tons/year)
Uh = Maximum hourly throughput for each transfer point, (tons/hour)
k = Particulate size multiplier, (dimensionless), k = 0.35 for PM10
u = Mean wind speed, (miles/hour) = 3.04 mph.
m = Material moisture content, (weight %) = 7.9%
Ci = Concentration of each listed substance in each material processed, (lbs/lb)
e = Control equipment efficiency, (%) (none)
a) Annual average wind speed of 3.04 mph obtained from Lake Elsinore Station #3171.

Example Truck Loading Calculation:
Arsenic (lb/ton): EF = PM10 EF x Ci
Arsenic (lb/day): E_{As} = EF x Material Loaded (TPD)
E_{As} = 4.37E-09 x 9.262 TPD = 4.05E-05 lb/day

Summary Totals

Toxic	Emissions (lb/hr)	Emissions (lb/day)	Emissions (ton/yr)
Arsenic	1.60E-06	2.01E-05	2.48E-06
Beryllium	7.28E-08	9.14E-07	1.13E-07
Cadmium	7.28E-08	9.14E-07	1.13E-07
Hex-Chromium	0.00E+00	0.00E+00	0.00E+00
Chromium	2.04E-06	2.56E-05	3.15E-06
Copper	2.69E-06	3.38E-05	4.17E-06
Lead	3.64E-06	4.57E-05	5.63E-06
Manganese	3.86E-05	4.85E-04	5.97E-05
Mercury	0.00E+00	0.00E+00	0.00E+00
Nickel	2.04E-06	2.56E-05	3.15E-06
Selenium	7.28E-08	9.14E-07	1.13E-07
Zinc	0.00E+00	0.00E+00	0.00E+00
Phosphorus	0.00E+00	0.00E+00	0.00E+00

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APPENDIX E

HARP2 OUTPUT DATA

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HARP2 - HRACalc (dated 19044) 9/9/2020 7:38:43 PM - Output Log

GLCs loaded successfully
Pollutants loaded successfully
Pathway receptors loaded successfully
****
RISK SCENARIO SETTINGS

Receptor Type: Resident
Scenario: NCAcute
Calculation Method: Derived

****
EXPOSURE DURATION PARAMETERS FOR CANCER
Exposure duration are only adjusted for cancer assessments

****
PATHWAYS ENABLED

NOTE: Inhalation is always enabled and used for all assessments. The remaining pathways are only used for cancer and noncancer chronic assessments.

Inhalation: True
Soil: False
Dermal: False
Mother's milk: False
Water: False
Fish: False
Homegrown crops: False
Beef: False
Dairy: False
Pig: False
Chicken: False
Egg: False

****
INHALATION

Daily breathing rate: LongTerm24HR

Worker Adjustment Factors
Worker adjustment factors enabled: NO

Fraction at time at home
NOTE: Exposure duration (i.e., start age, end age, ED, & FAH) are only adjusted for cancer assessments.

****
TIER 2 SETTINGS
Tier2 not used.

****

Calculating acute risk
Acute risk breakdown by pollutant and receptor saved to: C:\AQ files\Air Projects\Vail Dam RCW1902\HRA\VAIL DAM SEISMIC AND HYDROLOGIC REMEDIATION\hra\30yrResidentialNCAcuteRisk.csv
Acute risk total by receptor saved to: C:\AQ files\Air Projects\Vail Dam RCW1902\HRA\VAIL DAM SEISMIC AND HYDROLOGIC REMEDIATION\hra\30yrResidentialNCAcuteRiskSumByRec.csv
HRA ran successfully

HARP2 - HRACalc (dated 19044) 9/9/2020 7:40:11 PM - Output Log

GLCs loaded successfully
Pollutants loaded successfully
Pathway receptors loaded successfully
****
RISK SCENARIO SETTINGS
Receptor Type: Worker
Scenario: Cancer
Calculation Method: Derived

****
EXPOSURE DURATION PARAMETERS FOR CANCER

Start Age: 16
Total Exposure Duration: 25

Exposure Duration Bin Distribution
3rd Trimester Bin: 0
0<2 Years Bin: 0
2<9 Years Bin: 0
2<16 Years Bin: 0
16<30 Years Bin: 0
16 to 70 Years Bin: 25

****
PATHWAYS ENABLED
NOTE: Inhalation is always enabled and used for all assessments. The remaining pathways are only used for cancer and noncancer chronic assessments.

Inhalation: True
Soil: True
Dermal: True
Mother's milk: False
Water: False
Fish: False
Homegrown crops: False
Beef: False
Dairy: False
Pig: False
Chicken: False
Egg: False

****
INHALATION
Daily breathing rate: Moderate8HR

Worker Adjustment Factors
Worker adjustment factors enabled: NO

Fraction at time at home
3rd Trimester to 16 years: OFF
16 years to 70 years: OFF

****
SOIL & DERMAL PATHWAY SETTINGS
Deposition rate (m/s): 0.02
Soil mixing depth (m): 0.01
Dermal climate: Mixed

****
TIER 2 SETTINGS
Tier2 not used.

****

Calculating cancer risk
Cancer risk breakdown by pollutant and receptor saved to: C:\AQ files\Air Projects\Vail Dam RCW1902\HRA\VAIL DAM SEISMIC AND HYDROLOGIC REMEDIATION\hra\25yrWorkerCancerRisk.csv
Cancer risk total by receptor saved to: C:\AQ files\Air Projects\Vail Dam RCW1902\HRA\VAIL DAM SEISMIC AND HYDROLOGIC REMEDIATION\hra\25yrWorkerCancerRiskSumByRec.csv
HRA ran successfully

HARP2 - HRACalc (dated 19044) 9/9/2020 7:39:19 PM - Output Log

GLCs loaded successfully
Pollutants loaded successfully
Pathway receptors loaded successfully
****
RISK SCENARIO SETTINGS
Receptor Type: Resident
Scenario: Cancer
Calculation Method: Derived

****
EXPOSURE DURATION PARAMETERS FOR CANCER

Start Age: -0.25
Total Exposure Duration: 9

Exposure Duration Bin Distribution
3rd Trimester Bin: 0.25
0<2 Years Bin: 2
2<9 Years Bin: 7
2<16 Years Bin: 0
16<30 Years Bin: 0
16 to 70 Years Bin: 0

****
PATHWAYS ENABLED
NOTE: Inhalation is always enabled and used for all assessments. The remaining pathways are only used for cancer and noncancer chronic assessments.

Inhalation: True
Soil: True
Dermal: True
Mother's milk: True
Water: False
Fish: False
Homegrown crops: False
Beef: False
Dairy: False
Pig: False
Chicken: False
Egg: False

****
INHALATION
Daily breathing rate: LongTerm24HR

Worker Adjustment Factors
Worker adjustment factors enabled: NO

Fraction at time at home
3rd Trimester to 16 years: OFF
16 years to 70 years: OFF

****
SOIL & DERMAL PATHWAY SETTINGS
Deposition rate (m/s): 0.02
Soil mixing depth (m): 0.01
Dermal climate: Mixed

****
TIER 2 SETTINGS
Tier2 not used.

****
Calculating cancer risk
Cancer risk breakdown by pollutant and receptor saved to: C:\AQ files\Air Projects\Vail Dam RCW1902\HRA\VAIL DAM SEISMIC AND HYDROLOGIC REMEDIATION\hra\9yrChildrenCancerRisk.csv
Cancer risk total by receptor saved to: C:\AQ files\Air Projects\Vail Dam RCW1902\HRA\VAIL DAM SEISMIC AND HYDROLOGIC REMEDIATION\hra\9yrChildrenCancerRiskSumByRec.csv
HRA ran successfully

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APPENDIX C

BIOLOGICAL RESOURCES REPORT

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WESTERN RIVERSIDE COUNTY MULTIPLE SPECIES HABITAT CONSERVATION PLAN CONSISTENCY ANALYSIS AND BIOLOGY REPORT

VAIL DAM SEISMIC AND HYDROLOGIC REMEDIATION PROJECT RIVERSIDE COUNTY, CALIFORNIA

APPLICANT FOR MSHCP PARTICIPATING SPECIAL ENTITY STATUS: RANCHO CALIFORNIA WATER DISTRICT

Prepared for:

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Prepared by:

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LSA Project No. RCW1902

November 2022

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1.0 EXECUTIVE SUMMARY

LSA was retained by Rancho California Water District (RCWD) to conduct a Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP) consistency analysis and general biological resources study for the Vail Dam Seismic and Hydrologic Remediation Project (project) in unincorporated Riverside County (County), California. RCWD proposes to remediate seismic and hydrologic hazards associated with the existing Vail Dam, an arch dam, by constructing a new straight-axis gravity concrete dam immediately downstream of the existing dam. The study was conducted to address compliance with the MSHCP, the California Environmental Quality Act (CEQA), and the National Environmental Policy Act (NEPA). Results of the MSHCP consistency analysis and general biological study for the 681-acre biological study area[1] are summarized below.

1.1 MSHCP CRITERIA AREAS/CELL GROUPS

The project site is within the MSHCP Criteria Area, specifically in Cell Groups C and D within the Vail Lake Subunit of the Southwest Area Plan. Project components are located within portions of Criteria Cells 6917, 7014, 6913, 6911, and 7010 in Cell Group C and 6909, 7001, 6992, 7119, and 7117 in Cell Group D. Additionally, Criteria Cells 7377, 7378, 6986, 7102, 7107, 7109, 7190, 7191, 7193, 7164, 7198, 7284, 7285, 7286, and 7287 in Cell Group D are within the limits of Vail Lake at spillway capacity. Cell Groups C and D are part of Proposed Core 7 in the MSHCP. Implementation of the project would not preclude assembly of the MSHCP Reserve Area or impede any of the conservation objectives for Proposed Core 7. Implementation of the project would remediate seismic and hydrologic hazards to reduce the risk of dam failure; dam failure could result in flooding and/or scour impacts to downstream resources as well as impacts to habitat and species associated with the loss of water in Vail Lake.

1.2 PUBLIC/QUASI-PUBLIC (PQP) LANDS

Vail Lake is mapped as Public/Quasi-Public (PQP) Land owned by RCWD. The extent of the lake mapped as PQP lands in the MSHCP roughly correlates with the approximate maximum limit imposed by the California Department of Water Resources Division of Safety of Dams (DSOD), 1,457.6 feet North American Vertical Datum of 1988 (NAVD88). The project area includes Vail Lake; however, with the exception of slightly increasing the area of the lake through the addition of approximately 0.66 acre between the existing dam and the proposed dam, it would not change the storage capacity of the lake, and it will not affect the overall use of the area for water storage and recreation. RCWD is not proposing any changes to the current operation of the lake.

1.3 REQUIRED SURVEYS AND RESULTS

1.3.1 Narrow Endemic Plants

The biological study area is within the MSHCP Narrow Endemic Plant Species Survey Area (NEPSSA). Due to the presence of suitable habitat for NEPSSA plant species, focused surveys for rare plants, including NEPSSA species, were conducted within suitable habitat in the biological study area

[1] The biological study area includes both the project site as well as the area surrounding Vail Lake.

(including the project site and an approximately 100-foot buffer and the area surrounding Vail Lake). No NEPSSA species occur within the area surveyed. Therefore, the project will have no effects on NEPSSA plant species.

1.3.2 Criteria Area Species

The biological study area is within a Criteria Area Species Survey Area (CASSA) plant species survey area. Due to the presence of suitable habitat for CASSA plant species, focused surveys for rare plants, including CASSA species, were conducted. Nevin's barberry (*Berberis nevinii*), federally- and State-listed as endangered, was the only CASSA plant species present within the area surveyed, which includes the project site and an approximately 100-foot buffer as well as the area surrounding Vail Lake. The project is anticipated to impact seven Nevin's barberry individuals that occur within the project site. The preparation and submittal of a Determination of Biologically Equivalent or Superior Preservation (DBESP) Report for impacts to CASSA species will be required under the MSHCP.

Portions of the biological study area, primarily surrounding Vail Lake and its tributaries, are within the amphibian species survey area. Due to the presence of suitable habitat for arroyo toad (*Anaxyrus californicus*), federally-listed as endangered, surveys for this species were conducted. This species was found within and adjacent to Temecula Creek and Arroyo Seco Creek upstream of Vail Lake, but not in Temecula Creek downstream of the lake or in the four unnamed drainages on the north side of the lake. Specifically, at least five arroyo toad were observed within Temecula Creek upstream of Vail Lake, and three were observed within the Arroyo Seco area. All of these locations are outside of the impact footprint of the project (i.e., not within the project site); no direct impacts would occur in the locations where arroyo toads were detected.

Portions of the biological study area, primarily the western area, are within the burrowing owl (*Athene cunicularia*) survey area. Burrowing owl is a California Species of Special Concern. Due to the presence of suitable habitat for burrowing owl, focused burrowing surveys were conducted. No burrowing owls, burrowing owl sign, or burrows or similar features suitable for burrowing owl occupation were identified in the survey areas. The project is not anticipated to impact burrowing owl. Because suitable habitat occurs within the project site, a pre-construction burrowing owl survey will be required no more than 30 days prior to ground disturbance.

Portions of the biological study area, primarily within the Arroyo Seco Creek area and along the eastern edge of Vail Lake, are within the mammal survey area. Due to the presence of suitable habitat, surveys were conducted for Los Angeles pocket mouse (*Perognathus longimembris brevinasus*), a California Species of Special Concern, and Aguanga kangaroo rat (*Dipodomys merriami collinus*), a species covered by the MSHCP but with no State or federal listing status. Neither of these species was detected during focused surveys, and the project is not anticipated to impact these species. The project site itself is not within the mammal survey area.

1.3.3 Riparian/Riverine Areas

The biological study area contains riparian/riverine resources, riparian bird habitat, and fairy shrimp habitat as defined in the MSHCP. Temporary and permanent impacts to riparian/riverine resources

would occur to alluvial fan sage scrub, riparian scrub, and unvegetated streambed and lakeshore areas within the project site.

Due to the presence of suitable habitat, focused surveys were conducted for least Bell's vireo (*Vireo bellii pusillus*), southwestern willow flycatcher (*Empidonax traillii extimus*), and vernal pool branchiopods. Southwestern willow flycatcher and least Bell's vireo are federally- and State-listed as endangered. Within the biological study area, 16 singing (male) least Bell's vireos were detected during the surveys along the eastern side of Vail Lake and in scattered locations along Temecula Creek downstream of Vail Dam; however, the nesting status of these individuals was not determined. One singing (male) southwestern willow flycatcher was detected during surveys to the southeast of Vail Lake; however, there was no evidence of a female. Direct impacts would occur within the project site in proximity to areas along Temecula Creek downstream of Vail Dam where four least Bell's vireo were detected; no direct impacts would occur to the areas along the eastern edge where the remaining individuals were observed. Impacts to least Bell's vireo would be avoided and minimized by clearing vegetation in potentially suitable habitat outside of the breeding season and implementation of MSHCP Standard Best Management Practices (BMPs) (see Section 10.0 of this document) to avoid indirect impacts to adjacent areas. No direct impacts would occur to the location where the individual southwestern willow flycatcher was observed, as it is not within the project site. Indirect impacts to species detected around Vail Lake would be limited to noise from activities associated with constructing the proposed dam and the partial removal of the existing dam's arch structure, including potential activities at the existing boat ramp in the southeast corner of the lake associated with launching and removing barge segments for dam removal activities.

Suitable fairy shrimp habitat was identified in a seasonal pool along the North Access Road. Protocol wet and dry season surveys were conducted, and fairy shrimp of the Genus *Branchinecta* were identified. Protocol dry season and wet season surveys were inconclusive, so a laboratory hatching study was conducted. No federally-listed as endangered San Diego fairy shrimp (*Branchinecta sandiegonensis*) were found to be present within the pool; only versatile fairy shrimp (*Branchinecta lindahli*), which is not a special-status species, were identified during the hatching study. No impacts to listed fairy shrimp are anticipated as a result of the project.

The preparation and submittal of a DBESP for impacts to riparian/riverine resources and riparian birds will be required under the MSHCP.

1.3.4 Jurisdictional Areas

The biological study area contains drainage features, a seasonal pool, Vail Lake, and riparian habitat potentially subject to jurisdiction by the California Department of Fish and Wildlife (CDFW), Regional Water Quality Control Board (RWQCB), and U.S. Army Corps of Engineers (USACE). A jurisdictional delineation was conducted. Permits will be required pursuant to Sections 401 and 404 of the federal Clean Water Act and Section 1600 of the California Fish and Game Code. The project would result in 0.61 acre of permanent and 1.85 acres of temporary impacts to areas subject to USACE jurisdiction; 0.80 acre of permanent and 1.86 acres of temporary impacts to areas subject to RWQCB jurisdiction; and 1.27 acres of permanent and 3.36 acres of temporary impacts to areas subject to CDFW jurisdiction. Areas subject to RWQCB jurisdiction are inclusive of areas subject to USACE jurisdiction, and CDFW jurisdictional areas include RWQCB and USACE jurisdictional areas. Following

construction, the total surface area of Vail Lake would increase by approximately 0.66 acre with the addition of the area between the existing arch structure and proposed straight axis dam structure. In addition, the portion of Temecula Creek immediately downstream of the proposed dam would be permanently affected by the proposed dam. The outlet from the proposed dam would convey flows approximately 38 feet further to the north than the existing channel, in an area that currently supports riparian scrub that is potentially subject to CDFW jurisdiction but is outside of RWQCB and USACE areas. Riparian vegetation would be restored adjacent to the realigned channel. Following project completion and implementation of on-site habitat restoration, the additional lake area and realigned stream channel are anticipated to be subject to USACE, RWQCB, and CDFW jurisdiction, and would partially offset permanent impacts to these resources (see Section 11.3).

1.4 SUMMARY OF IMPACTS

The project would affect approximately 72.15 acres. Impacts to 59.78 acres would be temporary, and impacts to 12.37 acres would be permanent. Table A presents the impacts to vegetation community/land cover by project element.

Table A: Impacts to Vegetation Communities/Land Cover

Vegetation Community/Land Cover[1]	Permanent Impact Area (acres)[2]	Temporary Impact Area (acres)[3]	Total Impact Area (acres)
UPLAND AREAS			
Riversidian Sage Scrub	4.70	13.20	17.90
DEVELOPED/DISTURBED AREAS			
Bare Ground	2.70	4.64	7.34
Developed	0.67	2.01	2.68
Disturbed	3.19	18.95	22.14
Agriculture	-	0.01	0.01
RIPARIAN/RIVERINE AREAS			
Alluvial Fan Sage Scrub	-	14.31	14.31
Riparian Scrub	1.10	5.92	7.03
Open Water	-	0.67	0.67
Lakeshore	-	0.07	0.07
TOTAL			
Total	**12.37**	**59.78**	**72.15**

Source: LSA (2022).
Values rounded to nearest hundredth of an acre. Values of 0.00 indicate impacts that are less than 0.005 acre. Totals may not equal sums due to rounding.

[1] Areas of chaparral, non-native grassland, unvegetated streambed, and riparian forest were mapped within the study area; however, no impacts would occur in these areas.

[2] Permanent impacts include all construction areas that will not be restored following project completion, such as the proposed dam, new and realigned access roads, and widened areas along access roads. Areas that would be graded and restored out-of-kind (i.e., areas of riparian scrub that would be revegetated with Riversidian sage scrub due to inadequate hydrology following project construction) are included as permanent impacts.

[3] Temporary impacts include all construction areas that will be restored to pre-project conditions or better, such as staging/laydown areas, vehicle turnouts along the Canyon Access Road, and graded areas associated with the South Access Road realignment that would be revegetated in-kind.

Temporary impacts are areas where habitat would be fully restored to pre-project conditions or better following construction; these include staging and laydown areas, temporary road widening/truck turnouts that will be fully restored following construction, and temporary construction areas. Temporary impacts also include graded areas that would be fully revegetated in-kind (i.e., with the same vegetation communities as are currently present) following construction, resulting in no permanent loss of habitat, such as portions of the areas to be graded for road realignment and temporary truck turnouts where vegetation would be established at the finished grade. Permanent impacts include areas that would not support habitat following construction and include the proposed dam and the associated construction site, new and realigned access roads, improvements to access roads that would remain following construction, and the area between the existing dam and proposed dam that would be inundated. Temporary areas that do not currently support habitat, such as developed areas, open water, and bare ground, would not be revegetated following construction.

Permanent impacts also include graded areas associated with the South Access Road realignment that would be revegetated out-of-kind (i.e., with different vegetation communities than are currently present); specifically, this refers to areas on the graded slope that would lack suitable hydrology to support riparian scrub habitat and would therefore be replanted with Riversidian sage scrub vegetation. Additionally, areas surrounding dam facilities (within 10 feet of concrete structures) that are subject to vegetation removal as part of DSOD maintenance required were included as permanent impacts, although this activity is ongoing, because these areas would not be revegetated.

1.5 AVOIDANCE, MINIMIZATION, AND MITIGATION MEASURES

RCWD is seeking Take Authorization under the Federal Endangered Species Act as a Participating Special Entity under the MSHCP for direct impacts to seven (7) Nevin's barberry, as well as potential impacts to Quino checkerspot butterfly (*Euphydryas editha quino*), which is federally-listed as endangered; coastal California gnatcatcher (*Polioptila californica californica*), which is federally-listed as threatened; least Bell's vireo, which is State- and federally- listed as endangered; and southwestern willow flycatcher, which is State- and federally-listed as endangered. RCWD will comply with all applicable requirements of the MSHCP, as indicated below.

The project is subject to MSHCP Urban/Wildlands Interface Guidelines because it is within an identified Conservation Area. The project will comply with applicable requirements (refer to Section 9.0 of this document).

RCWD will implement applicable MSHCP Standard BMPs from the MSHCP Volume 1, Appendix C. These measures are summarized below (refer to Section 10.0 of this document for the complete text of each measure):

- Worker environmental awareness training;
- Development and implementation of water pollution and erosion control plans;
- Minimizing the project footprint of disturbance;
- Demarcating the limits of project disturbance;

- Avoiding the placement of personnel and equipment in streams and sensitive habitat areas/ avoiding such during the breeding season;
- Diverting stream flows using methods requiring minimal instream impacts;
- Locating equipping storage, fueling, stockpiling, and staging areas in upland areas with minimal risks of direct drainage into riparian areas or sensitive habitats;
- Prohibiting the deposit of erodible fill material into watercourses and prohibiting stockpiling brush, loose soils, or similar materials within the stream or on its banks;
- Monitoring of construction activities by a qualified biologist for the duration of the project;
- Avoiding and minimizing the removal of native habitat and revegetating temporary impact areas with appropriate native species;
- Removing invasive exotic species that prey upon or displace target species to the extent feasible;
- Maintaining the project site as clean of debris as possible/placing all food-related trash items into sealed containers that are regularly removed from the site;
- Limit all construction employees' activities, vehicles, equipment, and construction materials to the project footprint, staging areas, and routes of travel; and
- Allowing access and inspection of the project site and any restoration/enhancement areas for compliance with approval conditions by the Western Riverside County Regional Conservation Authority (RCA).

The following mitigation measures have been included to avoid, minimize, and mitigate impacts associated with the project. These measures are discussed further in Section 4.3 (BIO-1 through BIO-3), Section 5.4.3 (BIO-4 and BIO-5), Section 7.1.3 (BIO-6), Section 7.3.3 (BIO-7), Section 11.3 (BIO-8 through BIO-10), Section 13.3 (BIO-11 and BIO-12), and Section 13.8 (BIO-13).

BIO-1 RCWD shall apply for and obtain status as a Participating Special Entity of the MSHCP through the RCA. Prior to construction, all required surveys, reports, and other documentation shall be completed and submitted to the RCA to its satisfaction, and Take Authorization will be obtained. RCWD shall comply with any conditions of the Take Authorization stipulated by the RCA, in addition to complying with the requirements of the MSHCP as set forth in Section 6.1.2 (Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools), Section 6.1.3 (Protection of Narrow Endemic Plant Species), Section 6.1.4 (Guidelines Pertaining to Urban/Wildlands Interface), Section 6.1.6 (Mitigation Responsibilities, Requirements for Participating Special Entities), Section 6.3.2 (Additional Survey Needs and Procedures), and Section 7.3.9 (Future Facilities) of Volume I. RCWD shall prepare a DBESP for impacts to riparian/riverine resources, narrow endemic plant species, and criteria area species as required pursuant to the MSHCP.

BIO-2 RCWD shall adhere to all applicable BMPs outlined in Appendix C of Volume 1 of the MSHCP. RCWD shall verify that all relevant BMPs are stated where appropriate on the project construction plans and shall be conveyed to all workers on site during pre-construction training sessions to be held prior to each phase of construction.

BIO-3 Prior to initiation of construction, RCWD shall retain a qualified restoration biologist to prepare a habitat restoration plan to restore to pre-project conditions or better all upland and wetland temporary impact areas where vegetation removal will occur. To ensure the habitat restoration plan addresses all impact areas, RCWD's biologist shall review the final anticipated temporary and permanent impact areas as part of the plan preparation based on final construction plans, including any changes in anticipated contractor staging configuration, utility work, disposal areas, access requirements, or revisions to construction methodology that could affect impact limits. The restoration plan will identify appropriate native vegetation communities to be installed based on existing and anticipated final conditions.

The plan shall include a plant palette using species native to the area that are appropriate for the habitat and should include locally-collected seeds or cuttings of any sensitive plant species that will be cleared by the project (e.g., chaparral sand-verbena, white rabbit-tobacco, and long-spined spineflower). The habitat restoration plan shall include specifications for planting methods, seed installation, and topsoil salvage and stockpiling, and will include a five-year maintenance and monitoring schedule with specific target and ultimate performance criteria to be met, including the percentage of vegetative cover; native species diversity; exclusion of exotic, non-native species; restoration of disrupted functions and values; and use of the restored habitat by indicator wildlife species. The habitat restoration plan shall be subject to review and approval by the permitting agencies (e.g., USACE, RWQCB, CDFW, and RCA) and shall address any specific requirements for mitigation of impacts to Nevin's barberry identified by these agencies.

BIO-4 RCWD shall avoid vegetation clearing for the project during the bird breeding season (typically February 1 through August 31) to the extent feasible. If vegetation clearing or initiation of construction activities is proposed during the breeding season, a qualified biologist shall be retained by RCWD to conduct a pre-construction survey of the impact area for nesting migratory birds not more than 3 days prior to vegetation clearing or initiation of construction activities. Should any nesting birds be detected within 100 feet of the impact area, a suitable buffer area (determined on a case-by-case, species-specific basis) shall be established by a qualified biologist within which no construction activity may take place until after a qualified biologist has determined that the young have fledged and the nest is no longer active. Nesting bird habitat within the project site shall be resurveyed during bird breeding season if there is a lapse in construction activities longer than seven days.

BIO-5 Consistent with the requirements of the MSHCP, no construction or vegetation clearing shall take place within suitable habitat (riparian scrub) for least Bell's vireo

during the breeding season (March 15 through September 15). Additionally, RCWD shall not clear occupied habitat (Riversidian sage scrub in proximity to species observations) for coastal California gnatcatcher during the breeding season (February 15 through August 15).

BIO-6 To offset impacts to the seven Nevin's barberry that are within the project impact limits, RCWD shall retain a qualified habitat restoration expert with experience in collecting seeds and/or cuttings for this species. Prior to impacts to the Nevin's barberry, seeds and/or cuttings shall be collected from the seven individuals to be removed as well as other individuals in the vicinity of Vail Lake to be propagated off-site. Once the propagated plants have reached a suitable size for transplant (as determined by the habitat restoration expert and subject to agency approval), Nevin's barberry shall be planted in suitable areas around Vail Lake at a minimum 10:1 ratio (i.e., 70 plants). These plantings shall be subject to maintenance and monitoring and agency sign-off consistent with the overall habitat restoration plan (see Mitigation Measure BIO-3).

To avoid impacts to any Nevin's barberry in proximity to the limits of construction, RCWD shall retain a qualified biologist to survey areas within 20 feet of the construction limits (as determined based on final project plans) within three months prior to construction. If any Nevin's barberry are identified within this area, the following measure shall be implemented. Prior to the commencement of construction activities, orange Environmentally Sensitive Area fencing or similar highly-visible material that delineates any locations of Nevin's barberry within 20 feet of impact areas along the Canyon Access Road and near the dam that are not within the impact area shall be placed by the construction contractor under the supervision of a qualified biologist retained by RCWD. The area within the fence line demarcating individual Nevin's barberry shall include an approximately 5-foot buffer.

BIO-7 RCWD shall retain a qualified biologist to conduct an MSHCP 30-day pre-construction survey for burrowing owl within suitable habitat prior to ground-disturbing activities to ensure that no burrowing owls have colonized the site. The pre-construction survey(s) shall be conducted no more than 30 days prior to the start of construction activities. If burrowing owls have colonized the project site prior to the initiation of ground-disturbing activities, the project proponent will immediately inform and coordinate with CDFW. A Burrowing Owl Protection and Relocation Plan may be necessary prior to initiating ground disturbance. If ground-disturbing activities occur but the site is left undisturbed for more than 30 days, a pre-construction survey will again be necessary to ensure the burrowing owl has not colonized the site since it was last disturbed. If burrowing owl is found, the same coordination described above will be necessary.

BIO-8 Prior to construction activities in proximity to jurisdictional waters of the U.S., RCWD shall apply for and obtain a Section 404 Nationwide Authorization or Individual Permit from the USACE. RCWD shall comply with all requirements stated

in the Section 404 permit, including standard provisions and any additional special conditions such as specific mitigation standards or project-specific BMPs. Permanent impacts to wetland waters of the U.S. will be offset by wetland creation at a minimum 1:1 ratio.

BIO-9 Prior to construction activities in proximity to jurisdictional waters of the State, RCWD shall apply for and obtain a Section 401 Water Quality Certification or Waste Discharge Requirements from the RWQCB. RCWD shall comply with all requirements stated in the Section 401 certification or Waste Discharge Requirements, including standard provisions and any additional special conditions such as specific mitigation standards or project-specific BMPs. Permanent impacts to wetland waters of the State will be offset by wetland creation at a minimum 1:1 ratio.

BIO-10 Prior to construction activities in proximity to CDFW jurisdictional areas, RCWD shall apply for and obtain a Lake or Streambed Alteration Agreement from CDFW. The project proponent shall comply with all the requirements stipulated in the agreement, including standard provisions and any additional special conditions such as specific mitigation standards or project-specific BMPs.

BIO-11 RCWD shall retain a CDFW-approved bat biologist to conduct a focused habitat assessment at buildings, rock outcrops, and mature trees and snags that will be subject to project-related impacts. The focused habitat assessment shall be conducted prior to or during the maternity season (April 1 through August 31). At locations where suitable roosting habitat is identified, the CDFW-approved bat biologist retained by RCWD shall conduct follow-up nighttime surveys for roosting bats. The nighttime surveys shall include a combination of acoustic and exit count methods, and shall take place during the bat maternity season to enable detection of maternity-roosting bats. If maternity roosts are identified within the project area, the following measures shall be implemented:

RCWD shall retain a CDFW-approved bat biologist to confirm the absence of roosting bats prior to removal of buildings or rock outcrops with potential to house roosting bats. If bats are found or if the absence of bats cannot be confirmed, the bat biologist shall install or directly supervise installation of humane eviction devices and exclusionary material or other method(s) to prevent bats from roosting in these areas. Implementation of the humane eviction/exclusions is typically performed in the fall (September or October) preceding construction activity at a given location to avoid impacts to hibernating bats during the winter months or during the maternity season (April through August 31), when nonvolant (flightless) young are present. Any humane eviction/exclusion methods shall be implemented at least 10 days prior to the demolition of a structure or rock outcrop housing bats to allow sufficient time for the bats to vacate the roost feature(s).

Removal of mature trees and snags shall occur during the fall months (September or October) to the greatest extent feasible, to avoid the bat maternity season (April 1

through August 31) and avoid the potential for "take" of nonvolant (flightless) young. Trees and snags that have been identified as confirmed or potential roost sites require a two-step removal process and the involvement of a CDFW-approved bat biologist, retained by RCWD, to minimize the potential for roosting bat mortality during this activity. This two-step removal shall occur over two consecutive days as follows: on Day 1, branches and limbs not containing cavities, as identified by the CDFW-approved bat biologist, shall be removed. On Day 2, the remainder of the tree shall be removed without supervision by a bat biologist. The disturbance caused by limb removal, followed by an interval of one evening, will allow bats to safely abandon the roost.

BIO-12 RCWD's biologist shall review the final anticipated temporary and permanent impact areas as part of the plan preparation based on final construction plans, including any changes in anticipated contractor staging configuration, utility work, disposal areas, access requirements, or revisions to construction methodology that could affect impact limits. In the event that impacts are reduced, RCWD may coordinate with applicable resource agencies to determine whether compensatory mitigation requirements should be reduced. In the event that work is proposed beyond the identified limits of impact, RCWD shall retain a qualified biologist to determine the potential for special-status resources to occur, including riparian/ riverine areas, special-status species, identified Critical Habitat, jurisdictional waters or wetlands, or CDFW jurisdictional riparian or streambed areas. Additional surveys for special-status species shall be conducted if required prior to initiation of construction activities in the area beyond the limits of impact. If additional special-status resources would be affected, compensatory mitigation shall be adjusted in coordination with appropriate resource agencies, including the RCA. Upon completion of construction and prior to habitat restoration, RCWD's biologist shall conduct a review of the final impact areas to determine whether total impacts differ from those identified in this report. If appropriate, compensatory mitigation totals shall be adjusted in consultation with appropriate resource agencies.

BIO-13 Prior to the start of construction activities, orange Environmentally Sensitive Area fencing or similar highly-visible material that delineates sensitive biological resources that occur within 5 feet of project impact areas shall be placed by the construction contractor under the supervision of a qualified biologist retained by RCWD. Such areas will be treated as "off-limits" during construction, in accordance with the MSHCP Standard BMPs.

In addition to the measures specified above, RCWD will comply with applicable provisions of the Stephens' Kangaroo Rat Habitat Conservation Plan (SKR HCP), including payment of the appropriate mitigation fee.

2.0 INTRODUCTION

LSA was retained by Rancho California Water District (RCWD) to conduct an MSHCP consistency analysis and general biological assessment to summarize biological data and document the project's consistency with the goals and objectives of the Western Riverside County MSHCP for the Vail Dam Seismic and Hydrologic Remediation Project (project).

RCWD proposes to remediate seismic and hydrologic hazards associated with the existing Vail Dam, an arch dam, by constructing a new straight-axis gravity concrete dam[2] immediately downstream of the existing dam. Hydrologic and seismic evaluations of the existing dam, conducted by the California Department of Water Resources Division of Safety of Dams (DSOD), indicate that the existing dam's spillway is insufficient to pass the Probable Maximum Flood (PMF)[3] without overtopping the dam and that the existing concrete arch dam may not resist the stresses induced by the Maximum Credible Earthquake (MCE). Dam failure would result in downstream flooding and the loss of Vail Lake, which would adversely affect water supply throughout RCWD's service area.

The proposed project has multiple benefits, including enhanced regional water supply reliability, groundwater recharge, passive flood protection, and improved water supply reliability. The proposed project is needed to protect residents, structures, transportation infrastructure, and other downstream resources from potential dam failure that could result from one of the extreme events described above.

RCWD is the Lead Agency pursuant to the California Environmental Quality Act (CEQA). The Federal Emergency Management Agency (FEMA) will be the federal Lead Agency for compliance with the National Environmental Policy Act (NEPA).

Initial fieldwork was conducted by LSA biologists in the spring of 2020, with focused surveys extending into 2021 and subsequent visits conducted in 2022 to verify on-site conditions. Survey dates are provided in the corresponding topical discussions.

2.1 PROJECT AREA

The project site is located east of Interstate 15 (I-15) and north of State Route 79 (SR-79) in an unincorporated area of Riverside County east of the City of Temecula, California (Figure 1, all figures are provided in Appendix A). Pertinent information is summarized below.

Township/Range/Section: Sections 3, 4, 5, 6, 9, 11, 14, 15, and 16 in Township 8 South, Range 1 West, San Bernardino Baseline and Meridian, as depicted on the United States Geological Survey

[2] A gravity dam is a designed to hold back water by primarily using the weight of the dam material to resist the horizontal water pressure. Gravity dams are designed for each section of the dam to be stable and independent of any other dam section.

[3] The PMF is the flood that may be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible in the drainage basin under study (FEMA 2004).

(USGS) *Vail Lake, California* (USGS 1988a), *Pechanga, California* (USGS 1988b) *Sage, California* (USGS 1954), and *Bachelor Mountain, California* (USGS 1978) 7.5-minute topographic quadrangles

Assessor's Parcel Numbers (APNs): The project site is located on all or portions of the following APNs: 927-150-010, 927-150-018, 927-150-018, 927-150-036, 927-150-037, 927-150-038, 927-150-048, 927-320-040, 927-320-045, 927-320-080, 927-320-081, and 929-320-039. Additionally, Vail Lake is located on all or portions of APNs: 927-320-039, 927-320-079, 927-320-083, 927-320-086, 927-320-087, 927-320-088, 927-320-089, 927-380-023, 927-680-002, 927-680-004, 927-680-005, 927-680-007, 927-680-010, and 927-680-011.

Survey Area (overall): 681 acres

Project Impact Areas: 72.15 acres total (59.78 acres temporary/to be revegetated, 12.37 acres permanent); Figure 2 in Appendix A illustrates the project elements.

MSHCP Criteria Cells: Project elements are located within Criteria Cells 6917, 7014, 6913, 6911, and 7010 in Cell Group C and Criteria Cells 6909, 7001, 6992, 7119, and 7117 in Cell Group D. Figure 3 in Appendix A depicts the project in relation to the MSHCP Criteria Cells.

Soil types present on the project site are shown in Table B and on Figure 4 in Appendix A.

2.2 PROJECT DESCRIPTION

RCWD proposes to remediate seismic and hydrologic hazards associated with the existing Vail Dam, a concrete arch dam, by constructing a new straight-axis gravity concrete dam immediately downstream of the existing dam. The proposed dam would be constructed of Roller Compacted Concrete (RCC), would connect to the existing concrete dam abutments, and would be 6.8 feet higher than the original dam in order to route the PMF entirely through the existing spillway system. A 3.5-foot-high parapet wall would be located on both sides of the crest. Reservoir water would not normally be against the upstream parapet wall, but the parapet wall would prevent overtopping of the dam during the PMF. The downstream parapet wall would be constructed to serve primarily as a guardrail for vehicles traversing the crest.

The width of the dam crest (between parapet walls) would be 16 feet in most locations, up to 20 feet near the outlet tower. The crest width would allow vehicular access for construction and maintenance of the dam structure. Vehicular access would be provided by wrapping the dam around the existing right (i.e., northern) gravity abutment and providing access from the North Access Road (see below for additional description of access roads). The existing left gravity abutment downstream of the proposed dam would also need to be raised. The surface area of the lake would increase slightly (approximately 0.66 acre) with the addition of the area between the existing arch dam and the proposed straight-axis gravity dam.

The downstream face of the dam would be stepped concrete. The proposed dam would include new outlet works that would be designed to meet the emergency reservoir drawdown requirements. In addition, a concrete apron would be utilized to armor the area below the ogee and overpour weirs.

Table B: Soils

Soil Type	Percentage Slope
Arlington and Greenfield fine sandy loams	2 to 8 percent slopes, eroded
Arlington and Greenfield fine sandy loams	8 to 15 percent slopes, eroded
Auld clay	8 to 15 percent slopes
Auld cobbly clay	8 to 50 percent slopes
Badland	
Cajalco rocky fine sandy loam	15 to 50 percent slopes, eroded
Gorgonio loamy sand	0 to 8 percent slopes
Gorgonio loamy sand, channeled	2 to 15 percent slopes
Grangeville fine sandy loam, drained	0 to 2 percent slopes
Grangeville fine sandy loam	poorly drained, saline-alkali, 0 to 5 percent slopes
Gullied land	
Hanford coarse sandy loam	0 to 2 percent slopes
Hanford coarse sandy loam	2 to 8 percent slopes
Hanford coarse sandy loam	8 to 15 percent slopes, eroded
Hanford loamy fine sand	0 to 8 percent slopes
Las Posas rocky loam	15 to 50 percent slopes, severely eroded
Lodo rocky loam	25 to 50 percent slopes, eroded
Metz gravelly sandy loam	2 to 15 percent slopes
Metz loamy sand, channeled	0 to 15 percent slopes
Monserate sandy loam	15 to 25 percent slopes, severely eroded
Monserate sandy loam, shallow	15 to 25 percent slopes, severely eroded
Pachappa fine sandy loam	0 to 2 percent slopes
Pachappa fine sandy loam	2 to 8 percent slopes, eroded
Riverwash	
Rough broken land	
San Emigdio fine sandy loam	8 to 15 percent slopes, eroded
San Emigdio loam	2 to 8 percent slopes
San Emigdio loam	8 to 15 percent slopes, eroded
San Timoteo loam	25 to 50 percent slopes, eroded
San Timoteo loam	8 to 25 percent slopes, eroded
Tujunga loamy sand	0 to 8 percent slopes, channeled

Source: Natural Resource Conservation Service (2006).

In addition to the proposed straight-axis gravity concrete dam, the proposed project includes improvements to on-site access roads, relocation of pipelines within the footprint of the new dam foundation excavation, provision for on-site construction staging and material disposal areas, rerouting of Southern California Edison (SCE) electrical lines, and partial demolition of the existing arch dam.

2.2.1 Access Roads

Improvements are proposed to the existing on-site access roads to accommodate construction traffic and existing access by RCWD light-duty vehicles; however, no improvements to public roadways are required. Refer to Figure 2 in Appendix A for a depiction of the construction areas, as well as project access.

Existing on-site roadways that provide access from De Portola Road to the dam include the Secondary Entry Road (the existing, unpaved access road from De Portola Road to the Pond Access Road), the Pond Access Road, the Canyon Access Road, and the North Access Road. The South Access Road connects to Vail Dam Road, providing access to Vail Lake Road (which connects to SR-79) via the campground area. Construction access from SR-79 is limited to delivery of modular barges to Vail Lake. Improvements to the South Access Road would consist of realigning the existing road, and no improvements are proposed to Vail Dam Road or Vail Lake Road. Oak Mountain Road, an existing private dirt road accessed off De Portola Road, would not be used for construction access. Improvements are proposed to these existing access roads to accommodate construction traffic and existing access by RCWD light-duty vehicles.

One new road segment would be constructed. The Primary Entry Road (50 Acre Parcel) is a proposed alternate access point from De Portola Road that would connect to the Pond Access Road at the edge of the Upper Valle De Los Caballos (VDC) Recharge Basins. Once construction of the Primary Entry Road (50 Acre Parcel) has been completed, all construction access for the project area would be provided along that route. The existing Secondary Entry Road at De Portola Road would provide a secondary access for RCWD vehicles only. RCWD intends to maintain both the Primary Entry Road (50 Acre Parcel) and the Secondary Entry Road after completion of the proposed project. Improvements are described in more detail below.

2.2.1.1 Primary Entry Road (50 Acre Parcel)

The proposed Primary Entry Road (50 Acre Parcel) across the RCWD's 50 Acre Parcel is a short segment across the RCWD's 50 Acre Parcel that would connect the Pond Access Road to De Portola Road (an existing, paved roadway) and would be constructed within property owned by RCWD, south of the future Upper VDC Regional Pump Station and Chlorine Contact Tank Project (RCWD Project No. D1903) to avoid conflict with that project. The first order of work will be to construct this access road for construction access to the dam. The Primary Entry Road (50 Acre Parcel) would provide two travel lanes (25 feet total width) and include gravel surfacing, and it would also provide access to one of the construction staging areas. RCWD would demolish one unused building, formerly a horse stable, to allow construction of the Primary Entry Road.

2.2.1.2 Secondary Entry Road

An existing unpaved access road from De Portola Road located adjacent to the RCWD's Los Caballos Pump Station will continue to provide access for RCWD vehicles only from De Portola Road to the Pond Access Road. This unpaved roadway is 20 feet wide in its existing condition; improvements would be limited to scraping the surface and placing a 4-inch gravel wear surface within the existing road limits. This road would be used during daytime hours and would not provide routine construction access. Construction-related activities would be limited to installation of a noise barrier

and potential occasional delivery of oversized equipment; daily construction traffic would be routed along the Primary Entry Road (50 Acre Parcel).

2.2.1.3 North Access Road

An existing unimproved North Access Road traverses about 2 miles from the northeast corner of the Upper VDC percolation ponds to the right abutment of the existing dam. The existing connection between the North Access Road and the Pond Access Road would be improved to facilitate the turning radius of a truck with a 40-foot wheelbase. The details of the proposed improvement to this area are shown on Figure 2. The existing North Access Road would be improved to provide vehicular access to the crest of the proposed dam. The North Access Road would be the primary vehicular access route to the crest of the proposed dam after project completion. Vehicular access is not feasible from the left abutment due to the height of the existing left gravity abutment.

Project improvements would include gravel surfacing and temporary improvements in drainage crossings. The road would remain a single-lane road. As shown on Figure 2, realignment would be needed where the road is outside of the property boundary and where excavation through a rock knob would be required. In addition, prior to completion of biological surveys, RCWD identified a design alternative for a portion of the North Access Road to avoid an existing seasonal pool that provides habitat for fairy shrimp (see Sheet 3 of Figure 5 in Appendix A). As no evidence of special-status fairy shrimp was identified during focused surveys (refer to Section 5.3), and because this alternative would result in greater impacts to native vegetation communities and may result in other environmental impacts, it is not the preferred option; however, it has been retained pending coordination with the CDFW, the United States Fish and Wildlife Service (USFWS), and the RCA. The North Access Road design alternative is also shown on Figure 2.

2.2.1.4 Canyon Access Road

The existing unpaved access road through the canyon below the dam is approximately 2 miles long. It is currently a single-lane road bound on both sides by vegetation with limited sight lines. This access road would need to be widened to two lanes (25 feet total width) for construction traffic, with several turnouts to allow vehicles to pass. Widening would be accomplished through removal of the existing vegetation on both sides of the existing road. This widening is only for construction purposes, and the sides of the access road would be revegetated at the completion of construction. The roadway would be restored to its existing single-lane configuration after construction of the dam is complete. Other improvements to the Canyon Access Road would include gravel surfacing. The existing five Arizona-type crossings of the creek would remain. However, temporary culverts or placement of clean rock within the channel may be required during construction at the five Arizona crossings to provide construction vehicle crossings. Any temporary culverts or fill would be removed following completion of construction, and the creek would be restored to approximate pre-project contours and habitat conditions or better. Within approximately 550 feet of the new dam, the elevation of the Canyon Access Road would be raised by up to 7 feet to avoid overtopping during high-volume lake water release. Vegetated riprap would be placed within the Temecula Creek channel along the southern side of the raised road portion to reduce potential erosion.

2.2.1.5 Pond Access Road

The Pond Access Road is an existing unpaved road providing access to the Upper VDC Recharge Basins and connecting to the North Access Road and Canyon Access Road. It is 20–25 feet wide in the existing condition. The roadway surface would be scraped or lightly graded to smooth the roadway surface, and vegetation that has encroached onto the roadway from the slopes of the road would be removed as part of the proposed project. Vegetated slopes on the sides of the roadway would not be scraped or graded. The Pond Access Road would not be widened as part of the proposed project with the exception of three turnouts to allow trucks to pass and a small area near the northeast corner of the ponds where there is insufficient turning radius for the larger trucks turning onto the North Access Road.[4] At the maximum curve, this area would be widened from approximately 25 feet (including shoulders) to 50 feet as part of the proposed project; the location of the widening is shown on Figure 2. The Pond Access Road would provide two travel lanes for light utility vehicles and one travel lane for heavy hauling trucks. During construction, on-site construction flag persons may be required to facilitate heavy hauling truck use of the Pond Access Roads.

2.2.1.6 South Access Road

The existing South Access Road connects to Vail Dam Road, which is a gravel one-lane roadway used by RCWD service vehicles that connects to Vail Lake Road via the campground (this route would not be used except as a possible delivery route for the modular barge system). The South Access Road would need to be relocated as it is within the footprint of the foundation excavation of the proposed dam. A new roadway embankment would be constructed along the north-facing slope of the canyon, approximately 150 feet downstream of the existing access road. The proposed realignment of the South Access Road is shown on Figure 2. This location was selected to provide access from the spillway area and to provide a construction staging area immediately downstream of the proposed dam. After relocation, the South Access Road would maintain a connection to Vail Dam Road for use by RCWD service vehicles. Following construction, the graded slopes on the side of the South Access Road would be revegetated with appropriate native vegetation. Vegetated riprap would be placed at the foot of the embankment along Temecula Creek to reduce potential erosion. The graded slopes would result in a realignment of the channel of Temecula Creek downstream of the dam approximately 36 feet to the north of its existing location.

It is anticipated that the South Access Road embankment would be constructed using native materials excavated from the new dam foundation. This road would also have gravel surfacing and drainage improvements. The South Access Road would be inundated in the event the reservoir spills; therefore, during operation, major erosion would need to be repaired on this road in the event of spill events. Implementation of the project would give RCWD greater control over the lake water level in the event of an emergency release, and would substantially decrease the likelihood of a spill event. Therefore, damage to the South Access Road during a major weather event is considered to be a low risk.

[4] For purposes of impact calculations in this report, the widened “turn radius” area that will allow large vehicles to turn from the Pond Access Road onto the North Access Road is included as part of the Pond Access Road impacts.

2.2.2 Construction Staging and On-Site Disposal

Project implementation would include staging areas to support construction and demolition activities. Material disposal areas are also planned for placement of excess foundation excavation spoils.

2.2.2.1 Staging Areas

Limited area is available immediately adjacent to the proposed dam and downstream due to the narrow width of this portion of the canyon. Therefore, staging areas have been identified in various locations, including the relatively level area downstream of the spillway, wider portions of the canyon downstream of the dam, within a vacant portion of RCWD's property adjacent to De Portola Road, and within the Temecula Valley Flyers RC Air Field ("Flyers Field") north of Basin U-4 in the Upper VDC Recharge Basins, which is currently leased to the Temecula Flyers for remote-controlled aircraft use. The proposed staging areas are shown on Figure 2 (Appendix A). Staging areas include aggregate stockpile areas, laydown areas, topsoil stockpile areas, and access and staging areas. It is anticipated that the contractor would determine the optimal locations within the staging areas for each activity. With the exception of staging areas located within disturbed/developed areas, all staging areas would be revegetated to pre-project habitat conditions or better following completion of construction. Staging areas would be required to provide the following:

RCC Mix Plant Area: This area would contain a portable concrete mix plant with silos of cement and fly ash and stockpiles of aggregate in 3 to 4 sizes. This mix plant area is anticipated to be located within the Flyers Field (see Figure 2) in the Upper VDC Recharge Basins. The RCC would be hauled from the mix plant to the dam site with off-road trucks.

Foundation Grout Mix Plant: This area would contain a small mix plant for the grout used in the foundation grouting. This grout mix plant would be located adjacent to the dam site.

Crushing Plant: This area would contain a portable rock crushing plant for crushing materials excavated from the dam foundation. Because of the limited space available adjacent to the dam, it is likely that the crushing plant would be located in a mid-canyon area.

Contractor Trailers: Both the contractor's and engineer's field offices would be located within staging areas.

Laydown Areas: These areas would provide material laydown/storage areas and space for activities such as fabricating rebar and assembling concrete forms, etc.

Crane Access Areas: Portions of the staging and laydown area near the dam spillway may be graded to provide flat areas for crane access during the partial demolition of the existing arch dam. Cranes may be used to lift modular barge components from flatbed trucks into the lake and to move demolition debris from barges onto trucks for disposal.

Topsoil Stockpile Areas: Topsoil from areas within the impact limits that support native vegetation will be salvaged and stockpiled during construction. Following construction, the salvaged topsoil will be spread onto areas to be restored to native habitat.

2.2.2.2 Disposal Areas

Approximately 58,400 cubic yards of materials (including the previous foundation spoils, alluvium, fill, and moderately weathered rock) would be generated for excavation for the dam foundation. Most of this material would be used to grade the new alignment of the South Access Road and to provide flat areas near Vail Dam to support crane access for demolition activities. The balance of the excavation materials would require removal from the dam area and subsequent disposal. RCWD currently plans to keep the excess materials on its property for possible future reuse. The disposal areas are anticipated to be located within the staging and laydown area near De Portola Road on RCWD's 50 acre parcel as shown on Figure 2. Off-site disposal, if needed, would be at a nearby licensed landfill.

2.2.3 Electrical, Mechanical, and Instrumentation for the Dam

The existing dam facilities have overhead electrical service provided by SCE. The existing overhead service would need to be rerouted to accommodate the footprint of the proposed dam and outlet works facilities. New power poles would be provided to route the existing service up the downstream side of the right abutment to the proposed dam Control Building. If needed, permanent access (unpaved roads) from existing access roads to the new poles would be established. All new electrical utility facilities would be designed per SCE standards. Power is used for lighting, security cameras, gate actuators, trash rack hoists, and monitoring and control systems.

2.2.4 Existing Dam Demolition

The three central monoliths of the existing arch dam would be partially removed to allow for the hydraulic connection of the reservoir with the new outlet tower. The remainder of the existing arch dam would remain in place. The demolition would likely include saw cutting the arch monoliths into manageable sizes that can be removed with a barge-supported crane. Auxiliary barges would transport the demolition debris to the shoreline, likely to the spillway staging area. All the demolition debris will be removed from the site for off-site disposal via the Canyon Access Road. Upon completion, water will fill the area between the existing and proposed dam, slightly increasing the overall size of the reservoir by 0.66 acre.

It is anticipated that the contractor would support the demolition equipment on a modular pontoon system that would be trucked to the site and then assembled to form a larger barge. Multiple barges may be required to transport equipment and demolition debris to/from the shoreline and the dam. The barges could be launched from the existing launch ramp (in the southeast part of the reservoir) or lofted into the reservoir with a crane located in the staging/laydown area planned in the spillway area (see Figure 2). Use of the existing launch ramp will not be feasible if the water level is too low. No improvements are planned to the existing launch ramp, Vail Lake Road (the access road to the ramp), or Vail Dam Road south of the ramp. Any grading performed in the vicinity of the staging area to prepare a flat area for crane access will use on-site materials (e.g., dam foundation excavation materials) and will be revegetated with native vegetation at the end of the demolition.

Demolition of the existing gravity abutments would also occur where the proposed dam contacts those abutments. This would consist of hydroblasting and removing 2–3 inches of concrete on the

sloping downstream faces of the abutments and removing the upper 6 inches of the crests of both the right and left gravity abutments.

2.2.5 Spillway Modifications

The existing spillway would be used as the spillway for the new gravity dam. Concrete aprons would be installed to armor the area below the ogee and overpour weirs.

2.2.6 Vail Lake Water Storage

The replacement dam would be constructed so the resultant storage capacity and maximum reservoir level would be essentially equal to the capacity and elevation prior to the water level restriction, with a slight increase in lake surface area of approximately 0.66 acre between the existing dam and the proposed dam. Currently, water levels are restricted to between a high of 1,457.6 feet NAVD88[5] (15 feet below the spillway crest) and a low of 1,437.6 feet NAVD88. Remediation of seismic and hydrologic hazards at Vail Dam would allow for the removal of the water level restrictions. However, RCWD would continue to maintain 1,457.6 feet NAVD88 (15 feet below the spillway crest) as the maximum operating level (e.g., if the lake level exceeds 1,457.6 feet, water would be released to reduce the lake to that level or below) to allow capacity for rainfall inflow.

The operating level of the reservoir is dependent on a variety of factors, including restrictions on pumping into the reservoir to prevent introduction of quagga mussel (*Dreissena rostriformis bugensis*),[6] requirements to recharge groundwater to reduce evaporation of stored water, and the amount of precipitation. As such, the reservoir would continue to be subject to semiregular fluctuations in water level.

2.2.7 Project Schedule

Construction of the proposed project is anticipated to be initiated in the summer of 2023 and completed in late 2025. The total duration of project construction is estimated to be 31 months. It is anticipated that the new dam and outlet works would be substantially complete in approximately 23 months. The existing dam would then be partially demolished after completion of the new Vail Dam outlet tower. Once the proposed project is complete, Vail Lake and Vail Dam would not require any part-time construction workers or full-time, dedicated RCWD staff on site. Revegetation of temporary impact areas would occur following construction, with maintenance and monitoring occurring over a 5-year period following plant installation.

2.2.8 Weed Abatement and Fuel Modification

Vail Lake, Vail Dam, and the ancillary structures associated with the dam do not require fuel modification, and no new fuel modification is proposed as part of this project. Consistent with current DSOD requirements, vegetation within 10 feet of concrete structures associated with the dam (including ancillary facilities and weirs) would be periodically cleared to allow for structural

[5] NAVD88 = North American Vertical Datum of 1988.

[6] The quagga mussel is an aquatic invasive species, which is known to clog water intake structures (e.g., pipes and screens), disrupt native ecosystems, and inhibit recreational activities.

inspections. Weed abatement is anticipated to be a required component of revegetation of temporary impact areas and would be conducted in accordance with habitat restoration plans to be approved by the regulatory agencies (e.g., USACE, RWQCB, CDFW, and RCA). Additional weed abatement may occur for on- or off-site mitigation areas in accordance with agency-approved plans.

2.2.9 Avoidance and Conservation Areas

In locations where project impact areas occur adjacent to sensitive biological resources, project impact limits will be delineated using orange Environmentally Sensitive Area (ESA) fencing or similar highly-visible materials and will be treated as off-limits during construction, in accordance with the MSHCP Standard BMPs (see Section 10.0). Similar barriers will be placed around the dripline of trees to be preserved within or adjacent to temporary impact areas. Any locations of Nevin's barberry along the Canyon Access Road and near the dam that are not within the impact area will be fenced off or appropriately demarcated, including an approximately 5-foot buffer (where feasible). It is anticipated that locations where Nevin's barberry is planted off-site as mitigation would be conserved in accordance with agency-approved plans developed during RCA permitting.

2.3 COVERED ROADS

The proposed project does not include the construction of or improvements to any Covered Roads.

2.4 COVERED PUBLIC ACCESS ACTIVITIES

The proposed project would not alter public access to Vail Lake. Improvements to existing access roads would be limited to those necessary to accommodate construction vehicles and equipment. These access roads do not currently serve as official trails within the area. Figure 7-3 of the MSHCP, Existing Community Trails Within Criteria Area, includes a community trail that extends along the north side of Vail Lake, beginning on the west end at approximately De Portola Road just to the north of the Pond Access Road and extending north of Vail Lake and beyond to the east of the lake. Improvements to the Pond Access Road and North Access Road would be for the purpose of accommodating construction equipment and materials and providing RCWD with long-term access to the dam crest; the project would not affect public access to existing trails upon project completion.

2.5 GENERAL SETTING

Vail Dam and Vail Lake are located in unincorporated southwestern Riverside County, east of the City of Temecula, in Southern California (see Figure 1). Vail Dam and Vail Lake are located in unincorporated southwestern Riverside County, east of the City of Temecula, in Southern California. Vail Dam spans Temecula Creek, a northwesterly draining tributary of the Santa Margarita River that drains the north side of Palomar Mountain. The watershed for Vail Lake is approximately 318 square miles, and the lake is fed by Temecula Creek, Wilson Creek, Kolb Creek, and Arroyo Seco.

RCWD acquired approximately 7,700 acres of the Vail and Sundance Ranch properties surrounding Vail Lake in 2014 (RCWD 2016). Including Vail Lake, RCWD land holdings total 8,444 acres in the

vicinity of Vail Lake; this area is referred to as the Vail Property in the Property Guidance Document prepared by RCWD in 2016.[7] The Vail Property is located approximately 3 miles east of the city limits of Temecula and approximately 7 miles east of I-15. SR-79 South traverses the southern portion of the property.

In addition to the lake, the terrain includes nearly flat stream valleys, step-like alluvial fan and terrace deposits, canyons, steep-sided river gorges, and moderate to steep mountain slopes. The topography slopes in all directions from various peaks and canyons in the vicinity of the lake. Vail (Oak) Mountain is located on the western portion of the property, and the area generally separates the Lancaster and Aguanga Valleys on the east from the Pauba and Temecula Valleys on the west.

Vegetation and wildlife are diverse in the area, with scrub communities (inland sage scrub, chamise chaparral, and alluvial fan scrub) dominant. Woodland vegetation is limited but present, including both oak and riparian woodland communities. Native and non-native grasslands occur, along with freshwater marsh and reservoir semiaquatic plant communities. The area supports several rare, threatened, and endangered species.

2.5.1 Vail Dam and Reservoir

Vail Lake was created through the construction of the existing Vail Dam by the Vail Company in 1948 and 1949 to store local runoff for irrigation and water supply. The lake and dam were acquired by the RCWD in 1978 and have been used since that time for water supply and replenishment of RCWD's groundwater basins. In addition, Vail Dam has provided passive downstream flood protection for the City of Temecula and the United States Marine Corps Base Camp Pendleton under more frequently recurring storm conditions. Vail Lake is also utilized for recreation.

Vail Dam spans Temecula Creek, a northwesterly draining tributary of the Santa Margarita River that drains the north side of Palomar Mountain. Vail Dam is a concrete arch dam spanning between concrete and rock abutments, approximately 120 feet high in the middle. The dam, at elevation 1,481.7 feet NAVD88,[8] has a maximum height of 152 feet from the dam crest to the lowest point in the foundation and has a 3.5-foot-high concrete parapet wall extending above the upstream dam crest (elevation 1,485.2 feet NAVD88). The dam has eight outlets, including a low-level outlet.

The spillway[9] is located beyond the left abutment and connects to the left abutment[10] gravity block at a right angle. The spillway, at elevation 1,472.6 feet NAVD88, is comprised of a 119-foot-long ogee[11] weir[12], a 343-foot-long flat-crested weir, and a 65-foot-long concrete overpour weir. A

7 Rancho California Water District (RCWD). 2016. *Vail Property and Sundance Ranch Property, Final Guidance Document* (Property Guidance Document). Volume I, February 2016.

8 NAVD88 = North American Vertical Datum of 1988.

9 A spillway is a structure used to provide the controlled release of flows from a dam or levee into a downstream area.

10 Abutment refers to the substructure at each end of the dam.

11 Ogee refers to the weir shape. An ogee is a curve shaped similar to the letter S, consisting of two arcs that curve in opposite directions.

12 A weir is a dam across the width of a river or stream to raise the water level or divert its flow.

concrete pier separates the flat-crested weir from the overpour weir. The flat-crested weir includes a 5-foot-wide concrete sill along its length. The concrete overpour weir is approximately 20 feet high and was constructed across a saddle in the ridge line.

Access to the dam is currently available from De Portola Road via the Upper VDC Pond Access Road, and from that point, along the Canyon Access Road to access the left side of the dam or the North Access Road to access the right side of the dam. The left side of the dam can also be accessed from SR-79 at Vail Lake Road, then via the campground area to Vail Dam Road (a gated access road) and then to the South Access Road.

Vail Lake impounds up to 42,680 acre-feet of water with the reservoir at the spillway crest. The 318-square-mile drainage area rapidly fills the reservoir in wet years. Water released from Vail Lake is typically re-stored in the Pauba Valley groundwater basin via the Upper VDC Recharge Basins. The average water level from 1978 (the year during which RCWD took ownership of Vail Dam) through May 2020 has been 1,445.1 feet NAVD88. The operating level of the reservoir is dependent on a variety of factors, including restrictions on pumping into the reservoir to prevent introduction of quagga mussel, requirements to recharge groundwater to reduce evaporation of stored water, mandated releases between May and October to maintain the water flow in the creek, and the amount of precipitation.

3.0 RESERVE ASSEMBLY ANALYSIS

3.1 CELL AND CRITERIA ANALYSIS

The MSHCP serves as a Habitat Conservation Plan (HCP) pursuant to Section 10(a)(1)(B) of the Federal Endangered Species Act and as a Natural Communities Conservation Plan (NCCP) under the NCCP Act of 2001. The MSHCP allows the participating jurisdictions to authorize "Take" of plant and wildlife species identified within the MSHCP area. The approval of the MSHCP and execution of the Implementing Agreement (IA) by the USFWS and CDFW (collectively, Wildlife Agencies) allowed them to issue Take Authorizations to the signatories of the IA. RCWD is not a signatory to the IA. However, the MSHCP provides a mechanism by which non-signatories can obtain coverage under the MSHCP on a project-by-project basis as a Participating Special Entity. This process requires adhering to the requirements of the MSHCP in terms of studies and reports, submittal of an application, and payment of impact fees or other measures as may be agreed to by the RCA and the Wildlife Agencies.

The MSHCP provides for the assembly of a Conservation Area consisting of Core Areas and Linkages for the conservation of covered species. The Conservation Area is to be assembled from portions of the MSHCP Criteria Area, which consist of quarter-section (i.e., approximately 160-acre) Criteria Cells, each with specific criteria for the species conservation within that cell.

The project site is located within the MSHCP *Southwest Area Plan* in Cell Groups C and D. Cell Groups C and D are part of the Vail Lake Subunit (Subunit 3) of the Southwest Area Plan. Table C provides an overview of Subunit 3.

The Vail Lake Subunit is part of Proposed Core 7. According to the MSHCP, Proposed Core 7 is comprised of a mosaic of upland and wetland habitat types in the Vail Lake, Sage, and Wilson Valley areas. The proposed large intact habitat blocks provide live-in habitat for a number of planning species and movement for species connecting to other core areas located in the Agua Tibia Wilderness, the San Bernardino National Forest, and the Beauty Mountain Management Area. This core supports Quino checkerspot butterfly, coastal California gnatcatcher, Stephens' kangaroo rat (*Dipodomys stephensi*), least Bell's vireo, bobcat (*Lynx rufus*), mountain lion (*Felis concolor*), and several narrow endemic plant species occurring on Travers-Willow-Domino soil series. Maintenance of large intact interconnected habitat blocks and wetland functions and values of Vail Lake and portions of Tucalota Creek, Temecula Creek, Tule Creek, Cottonwood Creek, Arroyo Seco Creek, Kolb Creek, and Wilson Creek is important for these species. Areas not affected by edge conditions within this core total approximately 48,510 acres of the total 50,000 acres occupied by this core. For portions of core areas adjacent to development, treatment and management of edge conditions will be necessary to ensure habitat quality for species using the core.

The proposed project is located within Criteria Cells in Cell Groups C and D (see Figure 3 in Appendix A). A small portion of the North Access Road (0.38 acre) is located outside of the Criteria Area, north of Criteria Cell 6992. Table D notes the overall area and total developed and undeveloped areas within each Criteria Cell, indicates the project elements within each of the cell groups, and notes the extent of impacts within developed and undeveloped areas.

Table C: Vail Lake Subunit Information

Target Acreage for Additional Reserve Lands Within Subunit	10,065–12,930 acres
Cell Groups within Subunit	B, C, and D
Planning Species	**Amphibians:** arroyo toad; California red-legged frog **Birds:** bald eagle; Bell's sage sparrow; cactus wren; coastal California gnatcatcher; Cooper's hawk; double-crested cormorant; downy woodpecker; least Bell's vireo; osprey; peregrine falcon; prairie falcon; purple martin; southwestern willow flycatcher; tree swallow; tricolored blackbird; white-tailed kite; yellow-breasted chat; yellow warbler **Invertebrates:** Quino checkerspot butterfly **Fish:** arroyo chub **Mammals:** Aguanga kangaroo rat; bobcat; Los Angeles pocket mouse; mountain lion; Stephens' kangaroo rat **Reptiles:** San Diego mountain kingsnake; western pond turtle; **Plants:** Nevin's barberry; Parry's spine flower; slender-horned spine flower; Vail Lake ceanothus
Biological Issues and Considerations	• Establish a Core Area providing Live-In Habitat for identified Planning Species and other species. • Conserve connections to Agua Tibia Wilderness, Arroyo Seco, and Wilson Valley. • Conserve key populations of Vail Lake ceanothus, slender-horned spine flower, and Nevin's barberry. • Conserve alluvial scrub and chaparral for Parry's spine flower. • Conserve nesting location for purple martin at Dripping Springs. • Maintain Core Area for bobcat. • Maintain Core Area for mountain lion. • Maintain Core and Linkage Habitat for Stephens' kangaroo rat. • Determine presence of potential populations of Aguanga kangaroo rat in Temecula Creek, Vail Lake, and its tributaries. • Determine presence of potential Core Area for Los Angeles pocket mouse in Temecula Creek and around Vail Lake. • Maintain Core and Linkage Habitat for arroyo toad. • Maintain Core Area for San Diego mountain kingsnake. • Maintain Core and Linkage Habitat for western pond turtle. • Maintain Core and Linkage Habitat for Quino checkerspot butterfly.

Source: Riverside County Transportation and Land Management Area (2003).

Table D: Project Elements in Criteria Cells

Criteria Cell No. and Criteria Cell[1] Area	Existing Developed Area[1] (acres)	Existing Undeveloped Area[1] (acres)	Project Elements within Criteria Cell	Project Impacts (acres)
Cell Group C				
6917 156.54 acres	111.03	45.51	Staging and Laydown Areas, Primary Entry Road, Secondary Entry Road, Pond Access Road	Developed Areas: 0.12 permanent, 0.88 temporary Undeveloped Areas: 1.85 permanent, 8.47 temporary
7014 152.24 acres	77.05	75.18	Staging and Laydown Areas, Primary Entry Road	Developed Areas: 0.23 permanent, 4.84 temporary Undeveloped Areas: 0.01 permanent, 0.12 temporary
6913 166.25 acres	64.39	101.86	Pond Access Road, Disposal Area	Developed Area: 0.88 temporary Undeveloped Areas: 1.68 permanent, 5.67 temporary
6911 162.88 acres	-	162.88	North Access Road, Pond Access Road	Undeveloped Areas: 0.52 permanent
7010 159.80 acres	-	159.80	Staging and Laydown Areas, Canyon Access Road, North Access Road, Pond Access Road	Undeveloped Areas: 1.59 permanent, 8.92 temporary
TOTAL 797.71 acres	252.47	545.23	Staging and Laydown Areas, Primary Entry Road, Secondary Entry Road, Pond Access Road, Canyon Access Road, North Access Road, Disposal Area	Developed: 0.35 permanent, 6.20 temporary Undeveloped Areas: 5.64 permanent, 23.17 temporary
Cell Group D				
6909 164.83 acres	-	164.83	North Access Road	Undeveloped Areas: 0.99 permanent
7001 162.78	-	162.78	Staging and Laydown Areas, Canyon Access Road	Undeveloped Areas: 3.51 temporary
6992 163.82 acres	-	163.82	Staging and Laydown Areas, Canyon Access Road, North Access Road	Undeveloped Areas: 0.62 permanent, 10.28 temporary
7119 144.96 acres	-	144.96	Staging and Laydown Areas, Canyon Access Road	Undeveloped Areas: 3.48 temporary
7117 151.94 acres	1.42	150.51	Staging and Laydown Areas, South Access Road (including South Access Road Construction Area), Canyon Access Road, Dam Construction Area (including Proposed Dam and area between existing and Proposed Dam), Temporary Construction Area	Developed Areas: 0.67 permanent; 0.74 temporary Undeveloped Areas: 3.48 permanent; 11.38 temporary

Table D: Project Elements in Criteria Cells

Criteria Cell No. and Criteria Cell[1] Area	Existing Developed Area[1] (acres)	Existing Undeveloped Area[1] (acres)	Project Elements within Criteria Cell	Project Impacts (acres)
6989 176.43 acres	-	176.43	North Access Road	Undeveloped Areas: 0.24 permanent
TOTAL 964.75 acres	1.42	963.33	Staging and Laydown Areas, North Access Road, Canyon Access Road, South Access Road, Dam Construction Area, Temporary Construction Area	Developed Areas: 0.67 permanent; 0.74 temporary Undeveloped Areas: 5.71 permanent; 28.66 temporary
7377, 7378, 6986, 7102, 7107, 7109, 7190, 7191, 7193, 7194, 7198, 7284, 7285, 7286, 7287 2,341.13 acres	2.29	2,338.85	Vail Lake (no changes proposed)	None

Sources: Riverside County Transportation and Land Management Area (2003); RCA (2021).
Totals may not equal sum due to rounding.
[1] Developed and undeveloped areas were identified and mapped using GIS, recent aerial photographs, and the Vicinity JPR data from RCA. Areas where intensive agriculture was observed (e.g., vineyards, orchards) were mapped as developed.
JPR = Joint Projects Review
RCA = Western Riverside County Regional Conservation Authority

The acreages identified in Table D are considered best estimates and were determined using Geographic Information Systems (GIS) software and current aerial photograph base map, as well as the RCA Information Map[13] and Vicinity Joint Projects Review (JPR) Data obtained from RCA in March 2021.

3.1.1 Impact Overview

During the preliminary design phase and throughout project development, RCWD retained qualified biologists familiar with the project area and the MSHCP to provide guidance on minimizing the project's impacts to sensitive species and habitat. Consistent with the MSHCP Standard BMPs (see Section 10.0 of this report), access to the project site is proposed along existing roads wherever feasible, permanent impacts to natural vegetation communities have been minimized, and temporary impact areas have been located in disturbed or developed areas where possible. Temporary staging and laydown areas within the canyon downstream of the dam have been located in areas that avoid, to the extent possible, the locations of sensitive biological resources.

Permanent impacts to riparian and riverine areas will require mitigation, and will be addressed in the DBESP for this project. Temporary impact areas will be revegetated with natural vegetation communities in accordance with a habitat restoration plan subject to regulatory agency approval, consistent with the MSHCP Standard BMPs (refer to Section 10.0 of this document). The following is

[13] Western Riverside County Regional Conservation Authority (RCA). Information Map. Website: http://wrcrca.maps.arcgis.com (accessed September 2021).

an overview of project-related impacts (refer to Table A in Section 1.4 for impact acreages quantified by project element; refer to Figure 2 for the location of the various project elements and to Figure 5, both provided in Appendix A, for the locations of temporary and permanent impacts to vegetation/land cover).

3.1.1.1 Access Roads

The proposed Primary Entry Road (50 Acre Parcel) is located within previously-developed areas (buildings and associated access areas) and disturbed areas (pastures, turnouts) associated with the former horse ranch property. The construction of an additional access road through this previously-disturbed area would not affect any areas with long-term conservation value or otherwise conflict with the conservation goals for Cell Group C.

Improvements to existing access roads (Secondary Entry Road, Pond Access Road, Canyon Access Road, and North Access Road) would not appreciably increase the overall developed area within Cell Groups C or D. Impacts would be associated with increasing the width of the roads during construction, widening an area of the Pond Access Road where it connects to the North Access Road to accommodate a larger vehicle-turning radius, some minor realignment of the North Access Road to avoid a rock outcrop/geologic feature, and constructing various turnouts to accommodate larger vehicles during construction (see Figure 2). Following construction, temporarily widened areas along the Canyon Access Road, including turnouts, would be revegetated and the road would be returned to its approximate pre-project width. Within approximately 550 feet of the new dam, the elevation of the Canyon Access Road would be permanently raised by up to 7 feet to avoid overtopping during high-volume lake water release. Vegetated riprap would be placed within the Temecula Creek channel along the southern side of the raised road portion to reduce potential erosion. Most improvements to the Pond Access Road and North Access Road would remain following construction, although areas where the Pond Access Road would be temporarily widened to accommodate larger vehicles during construction would be revegetated with Riversidian sage scrub where appropriate. Based on the limited extent of impacts and their proximity to existing disturbance, improvements to the existing access roads are not anticipated to adversely affect the conservation goals for Cell Groups C or D.

The realignment of the South Access Road is needed to accommodate the location of the proposed dam structure. The realigned road would result in the loss of some native upland vegetation. Existing vegetation communities adjacent to the road would be affected due to grading; however, the graded areas would be restored with appropriate native vegetation communities. In the area downstream of the dam, the embankment for the realigned South Access Road would result in permanent impacts to riparian scrub, which would be restored out-of-kind with Riversidian sage scrub in locations where suitable hydrology would no longer be present to support riparian vegetation (such areas are classified as permanent impacts.) Where appropriate, the areas adjacent to the realigned channel of Temecula Creek downstream of the dam would be revegetated with riparian scrub. The impacts associated with the South Access Road realignment are contiguous with the staging/laydown area associated with dam construction, and would not adversely affect the conservation goals for Cell Group D.

3.1.1.2 Staging and Laydown Areas

The staging and laydown area adjacent to De Portola Road is located within previously-disturbed areas associated with a former horse ranch property. This staging and laydown area has been identified as the location for disposal areas for excess foundation spoils (up to 35 cubic yards of materials including previous foundation spoils, alluvium, fill, and moderately weathered rock) discussed in Section 2.2.2.2. This area does not support intact natural vegetation communities or provide high-quality habitat for sensitive species, and the temporary use of the area for staging/ laydown and on-site disposal in support of the project would not conflict with the conservation goals of Cell Group C. The Primary Entry Road (50 Acre Parcel) traverses this staging and laydown area.

Staging and laydown areas proposed in several locations along the Canyon Access Road would be subject to temporary impacts associated with vegetation clearing, equipment and materials staging, and access, and would be restored with natural vegetation communities following project completion. The use of these areas for staging and laydown would not adversely impact the overall conservation goals for Cell Group D as these areas would be restored to pre-project habitat conditions or better following construction and as sufficient habitat is present in the vicinity to maintain wildlife connectivity through the area.

Staging and laydown areas are proposed in the vicinity of the existing dam and between the South Access Road realignment and the lake. Impacts would be associated with vegetation clearing, equipment and materials staging, and access, including a temporary launch area and/or crane pad areas to provide lake access for demolition of portions of the existing dam (see Section 2.2.4). The temporary use of these areas would not adversely impact the overall conservation goals for Cell Group D, as these areas would be restored to pre-project habitat conditions or better following construction and as sufficient habitat is present in the vicinity to maintain connectivity through the area.

The concrete batch plant and aggregate and fly ash stockpiles are anticipated to be located within the staging and laydown area in the Flyers Field, north of Basin U-4 in the Upper VDC Recharge Basins (see Figure 2). Following completion of construction, this area would be restored to pre-project conditions or better, potentially including reconstruction of the Temecula Valley Flyers facilities (e.g., runway for remote-controlled aircraft, etc.). The temporary use of this area for the concrete batch plant and materials stockpiling is not anticipated to adversely affect the conservation goals for Cell Group C, as the area is already in a predominantly disturbed condition.

3.1.1.3 Dam Construction Areas

The dam construction area is located in the vicinity of the existing dam and the area downstream and includes both permanent impacts and a temporary construction area. Within the temporary construction area, grading would occur, and the final topography would differ from existing conditions; however, this area would be revegetated with natural vegetation communities. Within the permanent impact area, the proposed dam would be installed, resulting in a permanent loss of vegetation within the dam footprint and in the area between the existing dam and proposed dam. Upon completion of construction, 0.66 acre of additional open water habitat would be established between the proposed dam and the existing dam. Although it would result in permanent impacts to

0.98 acre of riparian scrub and 1.64 acres of Riversidian sage scrub (also including the permanent impacts associated with the realigned South Access Road), construction of the proposed dam would not appreciably alter the surrounding habitat, nor would it restrict connectivity or otherwise conflict with the conservation goals for Cell Group D.

3.1.2 Cell Group C

According to the MSHCP, "Conservation within this Cell Group will contribute to assembly of Proposed Core 7 and Proposed Constrained Linkage 24. Conservation within this Cell Group will focus on Riversidean alluvial fan sage scrub, riparian scrub, woodland, and forest habitat along Temecula Creek and adjacent chaparral, coastal sage scrub, grassland, woodland, and forest habitat. Areas conserved within this Cell Group will be connected to chaparral, coastal sage scrub, riparian scrub, woodland, and forest habitat proposed for conservation in Cell Group D to the southeast and to Riversidian alluvial fan sage scrub habitat proposed for conservation in Cell #7134 to the southwest. Conservation within this Cell Group will range from 60 percent-70 percent of the Cell Group focusing in the southern and central portions of the Cell Group."

Cell Group C comprises 11 Criteria Cells with a total area of 1,780.66 acres. Project components are located within five Criteria Cells in Cell Group C: 6917, 7014, 6913, 6911, and 7010 (see Figure 3 in Appendix A). In total, these cells comprise 797.71 acres and are in the central and southern portion of Cell Group C. Much of the area within the cells is undeveloped; however, the majority (111.03 acres) of Criteria Cell 6917 and portions of Criteria Cells 6913 and 7014 are developed with residential land use (including four proposed developments along the west side of De Portola Road identified in the JPR data, see Figure 3), agricultural land use, and water facility use. The target conservation of 60 percent to 70 percent for these five cells would range from 478.63 acres to 558.40 acres, with a mid-range goal (65 percent) of 518.51 acres.

As noted in Table D, project components located within these cells consist of a staging/laydown area adjacent to De Portola Road, portions of a disposal area, improvements to existing access roads, and construction of the Primary Entry Road (50 Acre Parcel). Table E provides a detailed breakdown of the permanent and temporary impacts anticipated within Cell Group C.

Permanent impacts within the five Criteria Cells in Cell Group C would consist of 11.84 acres, or 1.48 percent of the total area of the five Criteria Cells (797.72 acres). Of these impacts, 1.95 acres (0.20 percent of the five Criteria Cells, 0.10 percent of Cell Group C overall) would be to natural vegetation communities (Riversidian sage scrub), and the remainder would be to disturbed, developed, or bare ground areas. Permanent impacts to natural vegetation communities are associated with improvements to and minor realignment of existing access roads and disposal of excess foundation spoils within disturbed and developed areas, and would not introduce new development within the Criteria Area. Existing development comprises approximately 252.47 acres, or 31.6 percent of the total area of the five Criteria Cells. Following project implementation, sufficient undeveloped areas would remain available to meet the targets for conservation within Cell Group C (60–70 percent), and connectivity with the adjacent cells in Cell Group D or with the alluvial fan sage scrub in Criteria Cell 7134 to the southwest would not be restricted.

Table E: Project Impacts within Cell Group C

Criteria Cell	Vegetation	Impacts (acres)		
		Permanent	Temporary	Total
6917	Agriculture	-	0.00	0.00
	Bare Ground	1.05	-	1.05
	Developed	0.01	0.00	0.01
	Disturbed	0.69	8.95	9.64
	Riversidian Sage Scrub	0.21	-	0.21
	Total	**1.96**	**8.95**	**10.91**
7014	Developed	0.08	0.32	0.40
	Disturbed	0.16	4.64	4.80
	Total	**0.24**	**4.95**	**5.20**
6913	Agriculture	-	0.01	0.01
	Bare Ground	0.66	0.05	0.71
	Developed	-	0.85	0.85
	Disturbed	0.29	5.37	5.65
	Riversidian Sage Scrub	0.73	0.28	1.01
	Total	**1.68**	**6.55**	**8.25**
6911	Bare Ground	0.14	-	0.14
	Disturbed	0.27	-	0.27
	Riversidian Sage Scrub	0.11	-	0.11
	Total	**0.52**	**-**	**0.52**
7010	Alluvial Fan Sage Scrub	-	5.71	5.71
	Bare Ground	0.42	0.79	1.21
	Disturbed	0.27	-	0.27
	Riversidian Sage Scrub	0.90	2.41	3.31
	Total	**1.59**	**8.91**	**10.50**
Total Cell Group C	Agriculture	-	0.01	0.01
	Alluvial Fan Sage Scrub	-	5.71	5.71
	Bare Ground	2.27	0.84	3.11
	Developed	0.10	1.17	1.26
	Disturbed	1.68	18.95	20.63
	Riversidian Sage Scrub	1.95	2.69	4.64
	Grand Total	**5.99**	**29.37**	**35.37**

Source: LSA (2022).
Totals may not equal sums due to rounding. Values of 0.00 indicate impacts that are less than 0.005 acre.

Temporary impacts would occur to 29.37 acres within the five criteria cells in Cell Group C. Of these impacts, 8.41 acres would be to natural vegetation communities (Riversidian sage scrub and alluvial fan sage scrub). Temporary impact areas are located along existing access roads or in existing disturbed and developed areas and are not anticipated to obstruct wildlife movement through the area. The limits of impact areas adjacent to natural vegetation communities would be delineated in the field using orange construction fencing or other highly visible means to prevent encroachment into adjacent areas. The contractor will implement the MSHCP Standard BMPs (refer to Section 10.0

in this report). Temporary impacts to natural vegetation communities would be restored to pre-project habitat conditions or better following construction through the implementation of a habitat restoration plan subject to regulatory agency approval, and the project would comply with all applicable MSHCP policies related to urban/wildland interface (refer to Section 9.0 in this report).

3.1.3 Cell Group D

According to the MSHCP, "Conservation within this Cell Group will contribute to assembly of Proposed Core 7. Conservation within this Cell Group will focus on water habitat associated with Vail Lake and surrounding habitat including chaparral, coastal sage scrub, grassland, Riversidean alluvial fan sage scrub, riparian scrub, woodland, and forest. Areas conserved within this Cell Group will be connected to chaparral, coastal sage scrub, riparian scrub, woodland, and forest habitat proposed for conservation in Cell Group C to the northwest and to upland habitat proposed for conservation in Cell Groups F', G', H', and I' in the REMAP Area Plan to the north and in Cell Groups E', F" and G" in the REMAP Area Plan to the east. Conservation within this Cell Group will range from 75 percent-85 percent of the Cell Group focusing in the central portion of the Cell Group."

Cell Group D comprises 72 Criteria Cells with a total area of 11,354.23 acres, and project components are located within six of these: 6909, 7001, 6992, 7119, 7117, and 6989 (see Figure 3 in Appendix A). Additionally, 15 cells (7377, 7378, 6986, 7102, 7107, 7109, 7190, 7191, 7193, 7194, 7198, 7284, 7285, 7286, and 7287), include areas that are within Vail Lake if the lake is filled to the spillway elevation; however, no project-related impacts would occur within these areas. Table F provides a detailed breakdown of the permanent and temporary impacts anticipated within Cell Group D.

Permanent impacts within the six Criteria Cells in Cell Group D would consist of 6.00 acres, or 0.62 percent of the total area of the six Criteria Cells (964.75 acres). Of these impacts, 3.72 acres (0.39 percent of the six Criteria Cells, 0.03 percent of Cell Group D) would be to natural vegetation communities (Riversidian sage scrub and riparian scrub), and the remainder would be to disturbed, developed, or bare ground areas. Permanent impacts to natural vegetation communities are associated with construction of the proposed dam downstream of the existing dam and improvements to and minor realignment of existing access roads, and would not change the overall land use within the Criteria Area. Existing development comprises 1.42 acres, or 0.15 percent of the total area of the six Criteria Cells. Following project implementation, sufficient undeveloped areas would remain available to meet the targets for conservation within Cell Group D (75–85 percent), and connectivity with the adjacent cells in Cell Group C would not be restricted.

Furthermore, this project supports the ongoing presence of water in Vail Lake by addressing the seismic and hydrologic hazards of the existing dam, reducing the risk of dam failure. No changes are proposed to lake operations.

Table F: Project Impacts within Cell Group D

Criteria Cell	Vegetation	Impacts (acres)		
		Permanent	Temporary	Total
6909	Disturbed	0.70	-	0.70
	Riversidian Sage Scrub	0.29	-	0.29
	Total	**0.99**	**-**	**0.99**
6989	Disturbed	0.08	-	0.08
	Riversidian Sage Scrub	0.17	-	0.17
	Total	**0.24**	**-**	**0.24**
6992[1]	Alluvial Fan Sage Scrub	-	6.70	6.70
	Bare Ground	-	0.88	0.88
	Disturbed	0.49	-	0.49
	Riparian Scrub	-	2.69	2.69
	Riversidian Sage Scrub	0.13	0.02	0.15
	Total	**0.62**	**10.28**	**10.90**
7001	Alluvial Fan Sage Scrub	-	0.53	0.53
	Bare Ground	-	1.39	1.39
	Riparian Scrub	-	1.13	1.13
	Riversidian Sage Scrub	-	0.67	0.67
	Total	**-**	**3.72**	**3.72**
7117	Bare Ground	0.43	0.36	0.79
	Developed	0.58	0.84	1.42
	Lakeshore	-	0.07	0.07
	Open Water	-	0.67	0.67
	Riparian Scrub	1.10	2.09	3.19
	Riversidian Sage Scrub	2.04	8.53	10.57
	Total	**4.15**	**12.55**	**16.70**
7119	Alluvial Fan Sage Scrub	-	1.37	1.37
	Bare Ground	-	1.18	1.18
	Riparian Scrub	-	0.02	0.02
	Riversidian Sage Scrub	-	1.28	1.28
	Total	**-**	**3.85**	**3.85**
Total Cell Group D	Alluvial Fan Sage Scrub	-	8.60	8.60
	Bare Ground	0.43	3.80	4.24
	Developed	0.58	0.84	1.42
	Disturbed	1.51	-	1.51
	Lakeshore	-	0.07	0.07
	Open Water	-	0.67	0.67
	Riparian Scrub	1.10	5.92	7.03
	Riversidian Sage Scrub	2.75	10.51	13.26
	Grand Total	**6.38**	**30.41**	**36.78**

Source: LSA (2022).
Totals may not equal sums due to rounding.
[1] Note that a portion of the North Access Road would permanently affect 0.25 acre of Disturbed and 0.13 acre of Riversidian Sage Scrub outside of the Criteria Area, north of Criteria Cell 6992. Those impacts are not included in the total as they are outside of Cell Group D.

Temporary impacts would occur to 30.41 acres within the six Criteria Cells in Cell Group D. Of these impacts, 25.09 acres would be to natural vegetation communities (Riversidian sage scrub, alluvial fan sage scrub, lakeshore, and riparian scrub). Temporary impact areas are located along existing access roads or in existing disturbed and developed areas, as well as in the area downstream of the existing dam and near the existing dam abutments, and are not anticipated to obstruct wildlife movement through the area. The limits of impact areas adjacent to natural vegetation communities would be delineated in the field using orange construction fencing or other highly visible means to prevent encroachment into adjacent areas. The contractor will implement all applicable BMPs identified in Appendix C of the MSHCP (refer to Section 10.0 in this report). Temporary impacts to natural vegetation communities would be restored to pre-project conditions or better following construction through the implementation of a habitat restoration plan subject to regulatory agency approval, and the project would comply with all applicable MSHCP policies related to urban/ wildland interface (refer to Section 9.0 in this report).

3.2 PUBLIC/QUASI-PUBLIC LANDS ANALYSIS

The MSHCP classifies the water body of Vail Lake as PQP lands. The purpose of the project is to remediate seismic and hydrologic hazards at the existing Vail Dam, which will facilitate the ongoing presence of water within Vail Lake. Portions of the lake in the vicinity of the existing dam may be subject to temporary impacts associated with removal of portions of the dam following completion of the proposed dam downstream. During construction, measures will be implemented to protect water quality within Vail Lake and within adjacent ESAs (refer to Section 5.3.1). No changes are proposed to lake operations, although the overall surface area of the lake will increase by approximately 0.66 acre with the addition of the area between the existing dam and the proposed dam. The project is not expected to adversely affect Vail Lake or its conservation value within Proposed Core Area 7 of the MSHCP.

4.0 VEGETATION

4.1 METHODS

Preliminary vegetation mapping of the biological study area was conducted using aerial photography collected by an unmanned aerial vehicle (UAV) and desktop analysis, with subsequent field verification. UAV data were collected on April 13 through 21, 2020. Field verification was conducted by LSA biologists Jaime Morales and Anthony Greco on June 16 and 29, 2020, using preliminary vegetation maps. Subsequent site visits were conducted by LSA biologist Jaime Morales on August 6, 2021, March 24, 2022, and June 16, 2022, to supplement mapping and verify site conditions.

4.2 EXISTING CONDITIONS AND RESULTS

The vegetation/land cover within the biological study area includes upland and riparian/riverine areas, as well as disturbed and developed areas. Upland areas include non-native grassland, Riversidian sage scrub, and chaparral vegetation communities. Disturbed and developed areas include agriculture, bare ground, disturbed habitat, and developed areas, and are located mainly within uplands. Riparian and riverine areas include alluvial fan sage scrub, riparian forest, and riparian scrub vegetation communities, as well as unvegetated areas associated with the lakeshore, open water, and streambed. Table G, below, provides the acreage of each vegetation/land cover type as well as project impacts, and the vegetation/land cover mapped within the project study area is described in more detail below. Figure 5 in Appendix A shows land cover and photograph locations; site photographs are provided in Figure 6. Table A in Section 1.4 provides a breakdown of impacts to vegetation/land cover by project component. Appendix B includes a list of plant and animal species observed.

4.2.1 Upland Areas

Non-native grassland is dominated by native and non-native herbaceous species such as ripgut brome (*Bromus diandrus*), foxtail chess (*Bromus madritensis*), common fiddleneck (*Amsinckia intermedia*), mouse barley (*Hordeum murinum*), shortpod mustard (*Hirschfeldia incana*), flixweed (*Descurainia sophia*), Maltese star-thistle (*Centaurea melitensis*), and redstem stork's bill (*Erodium cicutarium*). These areas have greater diversity and include more native herbaceous species than do areas mapped as disturbed. Non-native grassland is located sporadically in areas surrounding the reservoir.

Riversidian sage scrub is dominated by California buckwheat (*Eriogonum fasciculatum*), brittlebush (*Encelia farinosa*), California sagebrush (*Artemisia californica*), big sagebrush (*Artemisia tridentata*), and yellow bush penstemon (*Keckiella antirrhinoides*). Riversidian sage scrub is located throughout the biological study area.

Chaparral is dominated by chamise (*Adenostoma fasciculatum*), California sagebrush, and yellow bush penstemon. This vegetation community was observed within the biological study area but is located entirely outside of the impact area.

Table G: Impacts to Vegetation/Land Cover in the Project Study Area

Vegetation Community/Land Cover[1]	Total within Study Area (acres)	Permanent Impact Area (acres)[2]	Temporary Impact Area (acres)[3]	Total Impact Area (acres)
Upland Areas				
Non-native Grassland	18.01	-	-	-
Riversidian Sage Scrub	42.14	4.70	13.20	17.90
Chaparral	0.30	-	-	-
Developed/Disturbed Areas				
Bare Ground	8.84	2.70	4.64	7.34
Developed	2.91	0.67	2.01	2.68
Disturbed	29.75	3.19	18.95	22.14
Agriculture	0.01	-	0.01	0.01
Riparian/Riverine Areas				
Alluvial Fan Sage Scrub	14.61	-	14.31	14.31
Riparian Forest	280.10	-	-	-
Riparian Scrub	235.00	1.10	5.92	7.03
Open Water[4]	1.98	-	0.67	0.67
Streambed	18.80	-	-	-
Lakeshore	28.56	-	0.07	0.07
Total	**681.02**	**12.37**	**59.78**	**72.15**

Source: LSA (2022).
Values rounded to nearest hundredth of an acre. Values of 0.00 indicate impacts that are less than 0.005 acre. Totals may not equal sums due to rounding.

[1] Areas of chaparral, non-native grassland, unvegetated streambed, and riparian forest were mapped within the study area; however, no impacts would occur in these areas.

[2] Permanent impacts include all construction areas that will not be restored following project completion, such as the proposed dam, new and realigned access roads, and widened areas along access roads. Areas that would be graded and restored out-of-kind (i.e., areas of riparian scrub that would be revegetated with Riversidian sage scrub due to inadequate hydrology following project construction) are included as permanent impacts.

[3] Temporary impacts include all construction areas that will be restored to pre-project conditions or better, such as staging/laydown areas, vehicle turnouts along the Canyon Access Road, and graded areas associated with the South Access Road realignment that would be revegetated in-kind.

[4] The total open water within the study area excludes most of Vail Lake, as biological studies were conducted primarily within terrestrial areas. Only the jurisdictional delineation included the entirety of the lake.

4.2.2 Disturbed and Developed Areas

Areas mapped as **agriculture** consist of existing row crops, orchards, plant nurseries, and equestrian facilities. Agriculture land cover is located near and along De Portola Road and north of the Upper VDC Recharge Basins.

Areas mapped as **bare ground** consist of dirt roads, turnouts, and other areas largely devoid of vegetation due to disturbance or weed control. Bare ground is primarily located in the portion of the survey area located west of Vail Dam.

Areas mapped as **developed** consist of existing structures and pavement. Developed land cover is located around Vail Dam and areas near and along De Portola Road.

Areas mapped as **disturbed** consist of vegetated areas subject to frequent, intense disturbance such as disking. They have relatively low species diversity consisting mostly of ruderal non-natives such as ripgut brome, mouse barley, shortpod mustard, flixweed, and Maltese star-thistle. Disturbed land cover is primarily located in the portion of the survey area located west of Vail Dam.

4.2.3 Riparian/Riverine Areas

The predominant plant communities in riparian habitat within the project survey area are riparian forest, riparian scrub, and alluvial fan sage scrub. Riparian forest predominates at the east end of the study area and south of the lake along the south shore and in Arroyo Seco and Temecula Creek. Riparian scrub predominates along the west, north, and east lake shores. Vegetation below the dam within Temecula Creek consists of a mixture of riparian forest, riparian scrub, and alluvial fan sage scrub.

Dominant species in the **riparian forest** include black willow (*Salix gooddingii*) and Fremont cottonwood (*Populus fremontii*). Dominants in the **riparian scrub** include Mediterranean tamarisk (*Tamarix ramosissima*), mule fat (*Baccharis salicifolia*), narrowleaf willow (*Salix exigua*), and arrowweed (*Pluchea sericea*), with nearly pure stands of tamarisk covering large areas of this plant community along the east shore. Dominants in the **alluvial fan sage scrub** include California buckwheat (*Eriogonum fasciculatum*), big saltbush (*Atriplex lentiformis*), and scalebroom (*Lepidospartum squamatum*).

Land covers associated with aquatic resources within the project survey area are open water, streambed, and lakeshore. The area mapped as **open water** consists of the portion of the reservoir near the existing dam that was inundated at the time of vegetation mapping (spring of 2020). Areas mapped as **streambed** consist of portions of Temecula Creek and Arroyo Seco Creek that are mostly devoid of vegetation due to scouring. Areas mapped as **lakeshore** consist of sparsely vegetated areas at the edge of the reservoir.

4.3 IMPACTS AND MITIGATION

As indicated in Table G and illustrated on Figure 5 in Appendix A, temporary and permanent impacts would occur to upland areas, disturbed and developed areas, and riparian/riverine areas. Mitigation for impacts to developed and disturbed areas is not required. RCWD intends to obtain Participating Special Entity status under the MSHCP for the purpose of this project; participation in the MSHCP will address impacts to MSHCP Covered Species and vegetation communities. *MSHCP Section 6.1.6 Mitigation Responsibilities, Requirements for Participating Special Entities* states: "In addition to the requirements set forth in *MSHCP Sections 6.1.2, 6.1.3, 6.1.4, and 6.3.2*, Participating Special Entities shall also contribute to Plan implementation through payment of a fee based upon the type of proposed activity, which shall be applicable to all activities in the Plan Area." This section of the MSHCP also provides guidelines on the fees for various project types, and includes some flexibility by including an option to allow "other appropriate measures as may be agreed to by the RCA and the Wildlife Agencies."

BIO-1 RCWD shall apply for and obtain status as a Participating Special Entity of the MSHCP through the RCA. Prior to construction, all required surveys, reports, and other documentation shall be completed and submitted to the RCA to its satisfaction, and Take Authorization will be obtained. RCWD shall comply with any conditions of the Take Authorization stipulated by the RCA, in addition to complying with the requirements of the MSHCP as set forth in Section 6.1.2 (Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools), Section 6.1.3 (Protection of Narrow Endemic Plant Species), Section 6.1.4 (Guidelines Pertaining to Urban/Wildlands Interface), Section 6.1.6 (Mitigation Responsibilities, Requirements for Participating Special Entities), Section 6.3.2 (Additional Survey Needs and Procedures), and Section 7.3.9 (Future Facilities) of Volume I. RCWD shall prepare a Determination of Biologically Equivalent or Superior Preservation for impacts to riparian/riverine resources, narrow endemic plant species, and criteria area species as required pursuant to the MSHCP.

BIO-2 RCWD shall adhere to all applicable BMPs outlined in Appendix C of Volume 1 of the MSHCP. RCWD shall verify that all relevant BMPs are stated where appropriate on the project construction plans and shall be conveyed to all workers on site during pre-construction training sessions to be held prior to each phase of construction.

BIO-3 Prior to initiation of construction, RCWD shall retain a qualified restoration biologist to prepare a habitat restoration plan to restore to pre-project conditions or better all upland and wetland temporary impact areas where vegetation removal will occur. To ensure the habitat restoration plan addresses all impact areas, RCWD's biologist shall review the final anticipated temporary and permanent impact areas as part of the plan preparation based on final construction plans, including any changes in anticipated contractor staging configuration, utility work, disposal areas, access requirements, or revisions to construction methodology that could affect impact limits. The restoration plan will identify appropriate native vegetation communities to be installed based on existing and anticipated final conditions.

The plan shall include a plant palette using species native to the area that are appropriate for the habitat and should include locally-collected seeds or cuttings of any sensitive plant species that will be cleared by the project (e.g., chaparral sand-verbena, white rabbit-tobacco, and long-spined spineflower). The habitat restoration plan shall include specifications for planting methods, seed installation, and topsoil salvage and stockpiling, and will include a five-year maintenance and monitoring schedule with specific target and ultimate performance criteria to be met, including the percentage of vegetative cover; native species diversity; exclusion of exotic, non-native species; restoration of disrupted functions and values; and use of the restored habitat by indicator wildlife species. The habitat restoration plan shall be subject to review and approval by the permitting agencies (e.g., USACE, RWQCB, CDFW, and RCA) and shall address any specific requirements for mitigation of impacts to Nevin's barberry identified by these agencies.

5.0 PROTECTION OF SPECIES ASSOCIATED WITH RIPARIAN/RIVERINE AREAS AND VERNAL POOLS (MSHCP SECTION 6.1.2)

Section 6.1.2 of the MSHCP requires assessment of impacts to riparian habitats, riverine areas, and vernal pools, including focused surveys for sensitive riparian bird and fairy shrimp species when suitable habitat is present. The intent of the assessment requirement is to provide for the protection of resources used by MSHCP-covered species, as well as existing and future downstream conservation areas. Riverine/riparian areas and vernal pools are defined in Section 6.1.2 of the MSHCP as follows:

> Riparian/Riverine Areas are lands which contain Habitat dominated by trees, shrubs, persistent emergents, or emergent mosses and lichens, which occur close to or which depend upon soil moisture from a nearby fresh water source; or areas with fresh water flow during all or a portion of the year.
>
> Vernal pools are seasonal wetlands that occur in depression areas that have wetlands indicators of all three parameters (soils, vegetation and hydrology) during the wetter portion of the growing season but normally lack wetlands indicators of hydrology and/or vegetation during the drier portion of the growing season. Obligate hydrophytes and facultative wetlands plant species are normally dominant during the wetter portion of the growing season, while upland species (annuals) may be dominant during the drier portion of the growing season. The determination that an area exhibits vernal pool characteristics, and the definition of the watershed supporting vernal pool hydrology, must be made on a case-by-case basis. Such determinations should consider the length of the time the area exhibits upland and wetland characteristics and the manner in which the area fits into the overall ecological system as a wetland. Evidence concerning the persistence of an area's wetness can be obtained from its history, vegetation, soils, and drainage characteristics, uses to which it has been subjected, and weather and hydrologic records.
>
> *Fairy Shrimp.* For Riverside, vernal pool and Santa Rosa fairy shrimp, mapping of stock ponds, ephemeral pools and other features shall also be undertaken as determined appropriate by a qualified biologist.
>
> With the exception of wetlands created for the purpose of providing wetlands Habitat or resulting from human actions to create open waters or from the alteration of natural stream courses, areas demonstrating characteristics as described above which are artificially created are not included in these definitions.

5.1 RIPARIAN/RIVERINE AREAS

5.1.1 Methods

MSHCP objectives reviewed for consistency during the survey included Section 6.1.2, *Riparian/Riverine Areas and Vernal Pools*. The biological study area was assessed for riparian/

riverine areas during surveys conducted on June 16 and 19, 2020, and on July 12, 2020, by LSA biologists Jaime Morales, Anthony Greco, and Dr. Stanley Spencer. Subsequent site visits were conducted by LSA biologist Jaime Morales on August 6, 2021, March 24, 2022, and June 16, 2022, to supplement mapping and verify site conditions. The assessment included identification and mapping of plant communities within the biological study area as well as any riparian/riverine features and the open water associated with Vail Lake, including a formal jurisdictional delineation (included as Appendix C; regulatory agency jurisdiction is discussed in Section 11.0 of this report). Data were recorded directly on a field map containing a 2020 UAV-captured aerial photograph base at a scale of 1 inch = 200 feet.

5.1.2 Existing Conditions and Results

Drainage features identified within the biological study area include Temecula Creek (upstream and downstream of Vail Lake), Arroyo Seco Creek, and Wilson Creek, along with several unnamed drainage features on the northern side of Vail Lake that contribute ephemeral flows into the lake. Temecula Creek, Arroyo Seco Creek, and Wilson Creek display defined streambed and banks and convey flows intermittently into Vail Lake. Water from the lake is released periodically by RCWD into Temecula Creek downstream of the dam. Temecula Creek conveys flows into the Santa Margarita River, which conveys flows into the Pacific Ocean.

Wetland vegetation was present within Temecula Creek, Wilson Creek, and Arroyo Seco Creek and around the perimeter of Vail Lake in areas categorized as lakeshore (sparsely vegetated), riparian forest, and riparian scrub. A seasonal pond lacking wetland vegetation was identified along the North Access Road. Refer to Figures 5 and 7 in Appendix A for the location of riparian/riverine vegetation communities and potentially jurisdictional waters, respectively.

5.1.3 Impacts and Mitigation

As discussed in Section 4.3 and quantified in Table G, temporary and permanent impacts would occur to riparian/riverine areas within the project site. RCWD intends to obtain Participating Special Entity status under the MSHCP. Compliance with the requirements in Mitigation Measures BIO-1, BIO-2, and BIO-3 (refer to Section 4.3) will address impacts to riparian/riverine areas. Refer to Section 11.0 of this document for a discussion of impacts to jurisdictional resources.

5.2 VERNAL POOLS

5.2.1 Methods

The biological study area was assessed for vernal pools during surveys conducted on June 16 and 19, 2020, and on July 12, 2020, by LSA Senior Biologists Jaime Morales and Anthony Greco and LSA Associate Biologist Dr. Stanley Spencer. The assessment included a search for depressions, indicators of wetland hydrology, suitable soils, and hydrophytic vegetation. The assessment also included a review of seasonally appropriate aerial photographs (Google Earth) from 1996 through 2018.

5.2.2 Existing Conditions and Results

Vernal pools are depressions in areas where a hard underground layer prevents rainwater from draining downward into subsoils. When rain fills the pools in the winter and spring, the water

collects and remains in depressions that will gradually evaporate away in the springtime, until the pools become completely dry in the summer and fall. Vernal pools tend to have an impermeable layer that results in ponded water. The soil texture typically contains higher amounts of fine silts and clays with low percolation rates. Pools that retain water for a sufficient length of time will develop hydric cells, which form when the soil is saturated from flooding for extended periods of time and anaerobic conditions develop.

One seasonal pond was identified within the project site along the North Access Road (see Figure 5 and Figure 7 in Appendix A). It exhibited evidence of wetland hydrology and some vernal pool plant species, such as smooth boisduvalia (*Boisduvalia pygmaea* formerly *Epilobium pygmaea*) and wooly marbles (*Psilocarphus brevissimus*); however, it was not dominated by wetland vegetation nor did it display hydric soils, so it is not considered to be a vernal pool. Soils mapped in the vicinity of the seasonal pond include Auld clay, 8 to 15 percent slopes, and Las Posas rocky loam, 15 to 50 percent slopes, severely eroded (see Figure 4 in Appendix A).

5.2.3 Impacts and Mitigation

Vernal pools are not present on the project site; therefore, no impacts to vernal pools would occur, and no mitigation is required.

5.3 FAIRY SHRIMP

5.3.1 Methods

LSA conducted a protocol-level dry season survey, wet season survey, and laboratory hatching study as described below. Appendix D contains the detailed dry and wet season survey results and laboratory hatching study results for vernal pool branchiopods.

5.3.1.1 Dry Season Survey

The 2020 dry season survey was conducted in accordance with the terms of Federal 10(a)(1)(A) Permits TE-777965 issued to LSA biologist Dr. Stanley Spencer and TE-839213-3 issued to LSA biologist David Muth, and the May 31, 2015, Survey Guidelines for the Listed Large Branchiopods.

Soil samples were collected by Dr. Spencer and processed by Mr. Muth. Dr. Spencer collected a series of 50 0.05-liter samples of soil from the ponding feature. The soil was dry at the time of collection. The 50 samples from the feature were combined and stored in a plastic zip-lock bag marked to indicate the site and date of collection.

The soil was processed and initially analyzed by Mr. Muth on September 3, 2020. Samples were processed by placing the collected material into 5-gallon buckets filled with 1 to 2 gallons of 5 percent brine solution to resaturate soils. During the approximately 10- to 15-minute saturation period, the bucket was occasionally stirred to ensure all biological material was released and floated to the surface. In small aliquots, the biological material was poured through a series of four sieves with mesh sizes of 710, 355, 212, and 150 microns. The sieves were stacked with the largest mesh size at the top and the smallest mesh size on the bottom. Material was washed through the set with water. Particles trapped in the three smallest sieve sizes were saved for analysis by washing them onto blotter paper to dry.

The sieved material was examined by Mr. Muth on September 3 and 11, 2020, using a 10- to 40-power Olympus stereo microscope. A reference cyst collection was available for comparison of any cysts found in the samples.

5.3.1.2 Wet Season Survey

The wet season fairy shrimp survey was conducted for Riverside fairy shrimp (*Streptocephalus woottoni*) and vernal pool fairy shrimp (*Branchinecta lynchi*) by LSA Senior Biologist Dr. Stanley Spencer under LSA Federal 10(a)(1)(A) Permit TE 777965 and in accordance with the November 13, 2017, USFWS Survey Guidelines for the Listed Large Branchiopods. Site checks were conducted on December 30, 2020, and on January 28, February 3, and March 9 and 17, 2021, to determine if water was present in ponding features following storm events. Ponded features were sampled at required intervals until they had dried and remained dry.

Features were sampled by drawing a handheld net through the water columns, occasionally bumping the bottom to stir up any benthic organisms. The net was periodically removed from the water to check for aquatic species.

5.3.1.3 Laboratory Hatching Study

Soil samples were collected by Dr. Spencer during August of 2020 and July of 2021. The collected samples were stored dry in marked plastic bags. Mr. Muth processed the material on September 3, 2020 (as described above for the dry season survey), and on August 9, 2021, by saturating soils and pouring them through a series of four sieves with mesh sizes of 710, 355, 212, and 150 microns. Particles trapped in the three smallest sieve sizes were saved for analysis by washing them onto blotter paper to dry. The sieved material was examined by Mr. Muth to confirm the presence of *Branchinecta* eggs.

Egg hatching was conducted by Mr. Muth. Six 15-quart Sterilite tubs were each filled with two gallons of Arrowhead® spring water and placed in a cool area adjacent to a window. The blotter paper material containing the eggs was poured into the tubs on August 13, 2021. A mixture of yeast and fish food was provided daily beginning August 20, 2021. Animals were captured with an aquarium net and preserved in 95 percent ethyl alcohol on September 4, 2021. All preserved specimens were examined under an Olympus 10-60 stereo-optic microscope to determine species.

5.3.2 Existing Conditions and Results

The seasonal pond along the North Access Road provides suitable habitat for fairy shrimp. The feature is a seasonal pool intersected by a dirt road. Its estimated maximum size is 268 square meters (2,885 square feet). The estimated maximum depth is 20 centimeters (7.8 inches). No other ponding features were identified in adjacent lands. Water enters the feature as direct rainfall and as sheet flow from adjacent slopes. The feature is dominated by non-native, upland plants. Native hydrophytic plants that are present are mostly within the compacted soil of the intersecting dirt road.

5.3.2.1 Dry Season Survey

A total of 22 *Branchinecta* eggs were found in the feature sampled in August 2020. *Branchinecta* eggs are not considered differentiated enough to make a species determination. Given the location and habitat quality, the eggs most likely belong to versatile fairy shrimp (*Branchinecta lindahli*). The survey concluded that a wet season survey would be needed to make a conclusive determination of species. No eggs of *Streptocephalus* were found. Other invertebrates detected include ostracods and ants.

5.3.2.2 Wet Season Survey

The 2020–2021 wet season was extremely dry. In the 2020–2021 wet season through June 9, Temecula (west of the project site) received only 3.38 inches of rainfall compared to a seasonal average of 12.00 inches, and Anza (east of the project site) received only 5.54 inches compared to a seasonal average of 13.03 inches.[14] As a result, the feature did not pond water long enough for fairy shrimp to mature. Two individuals of the genus *Branchinecta* were observed in the feature on the February 3 visit but were too small to identify to species. No other invertebrate or amphibian species was observed in the feature.

Due to the inconclusive survey results, LSA requested permission from the USFWS to hatch fairy shrimp cysts collected during the dry season under laboratory conditions to allow identification of mature specimens.

5.3.2.3 Laboratory Hatching Study

The only species of fairy shrimp identified in this study was the versatile fairy shrimp, *Branchinecta lindahli*. All specimens raised and preserved were examined to ensure proper species identification. Eight of the preserved fairy shrimp were immature *Branchinecta* that could not be identified to species, while all 21 adult fairy shrimp were identified. All of the 13 adult females possessed brood pouches, some with fertile eggs. The size and shape of brood pouches were consistent with those of female *Branchinecta lindahli*. The antennal morphology of all 8 adult male specimens was identical to that of male *Branchinecta lindahli*.

5.3.3 Impacts and Mitigation

No evidence of listed fairy shrimp species was detected during protocol focused surveys and the subsequent hatching study; therefore, no impacts to this species are anticipated, and no mitigation is required. During project design, and prior to completion of the hatching study, RCWD identified a design alternative for the North Access Road in the event it is needed to avoid the existing fairy shrimp habitat. As no evidence of special-status fairy shrimp was identified during focused surveys, and because this alignment would result in increased impacts to native vegetation, it is not the preferred alternative; however, it has been retained pending coordination with the CDFW, USFWS, and RCA. The North Access Road realignment design alternative is also shown on Figure 2. If implemented, the design alternative would increase permanent impacts to Riversidian sage scrub by

[14] Weather Currents. 2021. Current Weather for Southern California Communities. Website: weather currents.com (accessed June 2021).

0.15 acre and decrease permanent impacts to disturbed areas by 0.16 acre, and would reduce permanent impacts to wetland waters of the State by 0.01 acre (see Section 11.0).

5.4 RIPARIAN BIRDS

5.4.1 Methods

The MSHCP requires habitat assessments for three special-status riparian bird species: least Bell's vireo, southwestern willow flycatcher, and yellow-billed cuckoo (*Coccyzus americanus*). These species generally require mature riparian habitat composed of mature willow and cottonwood species with a dense understory.

LSA conducted eight protocol least Bell's vireo surveys from April 23 through July 30, 2020 in suitable habitat within the biological study area. Additionally, five protocol southwestern willow flycatcher surveys were conducted concurrently with the least Bell's vireo surveys. Focused surveys for western yellow-billed cuckoo were not conducted because there was no suitable habitat for this species within the project study area.

The study area was surveyed on foot and by boat along the Vail Lake shoreline. During each of the surveys, the biologist(s) moved slowly along the edge of riparian habitat, listening for least Bell's vireos and southwestern willow flycatchers. A recording of southwestern willow flycatcher songs was played periodically along the survey route during all the flycatcher surveys. The surveying biologist, with the aid of binoculars for viewing wildlife species, waited for several minutes after each playing to look and listen for both least Bell's vireos and southwestern willow flycatchers. On concurrent surveys, southwestern willow flycatchers were the focus of early morning/beginning of the survey (from the starting point to the end point) and least Bell's vireo were the focus of the survey back to the start point.

5.4.2 Existing Conditions and Results

The approximately 602-acre riparian bird study area is primarily undeveloped and consists of riparian habitats along the shore of Vail Lake, Temecula Creek upstream and downstream from Vail Lake, Arroyo Seco Creek upstream from Vail Lake, Wilson Creek upstream from Vail Lake, Temecula Creek Upstream from Vail Lake, and unnamed drainage features on the north side of Vail Lake. The study area was broken down into seven survey areas ranging from 30 to 123 acres in size. Appendix E Figure 2 shows the study area and survey areas.

The predominant plant communities in riparian habitat within the survey area are riparian forest, riparian scrub, and alluvial fan sage scrub. Riparian forest predominates at the east end of the study area and south of the lake along the south shore and in Arroyo Seco and Temecula Creek. Riparian scrub predominates along the west, north, and east lake shores. Vegetation below the dam within Temecula Creek consists of a mixture of riparian forest, riparian scrub, and alluvial fan sage scrub. Dominant species in the riparian forest include black willow and Fremont cottonwood. Dominants in the riparian scrub include Mediterranean tamarisk, mule fat, narrowleaf willow, and arrowweed, with nearly pure stands of tamarisk covering large areas of this plant community along the east shore. Dominants in the alluvial fan sage scrub include California buckwheat, big saltbush, and scalebroom.

Sixteen singing least Bell's vireos were detected during the surveys (see Figure 8 in Appendix A). The nesting status of these individuals was not determined. One male singing southwestern willow flycatcher was detected. There was no evidence of a female associated with this willow flycatcher. In addition, five little willow flycatcher (*Empidonax traillii brewsteri*) were detected. Appendix E contains the detailed results of protocol surveys for the least Bell's vireo and southwestern willow flycatcher conducted by LSA for this project.

5.4.3 Impacts and Mitigation

Most of the least Bell's vireo observations (twelve of the sixteen) were in riparian scrub to the east of Vail Lake, associated with the Wilson Creek and Temecula Creek drainages. Within or in proximity to the project impact area, least Bell's vireo was detected primarily in riparian scrub along the Canyon Access Road near staging and laydown areas. Therefore, suitable habitat (riparian scrub) within the project footprint is presumed to be occupied. As noted in Table A in Section 1.4, the project would result in impacts to 7.03 acres of riparian scrub. Impacts to riparian scrub include 1.10 acre of permanent impacts and 5.92 acres of temporary impacts. This suitable habitat has long-term conservation value for least Bell's vireo and will be addressed in the DBESP prepared pursuant to Mitigation Measure BIO-1 (refer to Section 4.3).

Southwestern willow flycatcher was detected in riparian scrub habitat at one location along Temecula Creek, upstream of Vail Lake (not within the project site). The breeding status of this individual was undetermined; however, the project would not result in direct impacts to riparian scrub habitat outside of the project site. Therefore, no impacts to this species are anticipated.

The following mitigation measures would avoid and minimize impacts to nesting birds generally and least Bell's vireo specifically.

BIO-4 RCWD shall avoid vegetation clearing for the project during the bird breeding season (typically February 1 through August 31) to the extent feasible. If vegetation clearing or initiation of construction activities is proposed during the breeding season, a qualified biologist shall be retained by RCWD to conduct a pre-construction survey of the impact area for nesting migratory birds not more than 3 days prior to vegetation clearing or initiation of construction activities. Should any nesting birds be detected within 100 feet of the impact area, a suitable buffer area (determined on a case-by-case, species-specific basis) shall be established by a qualified biologist within which no construction activity may take place until after a qualified biologist has determined that the young have fledged and the nest is no longer active. Nesting bird habitat within the project site shall be resurveyed during bird breeding season if there is a lapse in construction activities longer than seven days.

BIO-5 Consistent with the requirements of the MSHCP, no construction or vegetation clearing shall take place within suitable habitat (riparian scrub) for least Bell's vireo during the breeding season (March 15 through September 15). Additionally, RCWD shall not clear occupied habitat (Riversidian sage scrub in proximity to species observations) for coastal California gnatcatcher during the breeding season (February 15 through August 15).

6.0 PROTECTION OF NARROW ENDEMIC PLANT SPECIES (MSHCP SECTION 6.1.3)

Section 6.1.3 of the MSHCP requires focused surveys for specified sensitive plant species if the project is located within a NEPSSA and suitable habitat is present. The project study area is located within a NEPSSA survey area, specifically NEPSSA 5, which indicates the need for habitat assessment for the following plant species:

- Slender-horned spineflower (*Dodecahema leptoceras*); and
- Many-stemmed dudleya (*Dudleya multicaulis*).

6.1 METHODS

The biological study area was assessed for suitable habitat for slender-horned spineflower and many-stemmed dudleya during the June 16 and 29, 2020, site visits. The assessment included evaluation of soils, identification of plant species and communities, and investigation of landforms and evidence of past hydrologic conditions on the project site relative to the habitat requirements summarized for each narrow endemic plant species. The assessment also included a review of aerial photographs to look at historical vegetation patterns and for areas of ponding that could provide habitat for vernal pool plants. It was determined that suitable habitat was present for both slender-horned spineflower and many-stemmed dudleya, and focused surveys for the two species were conducted.

The focused plant survey was conducted by LSA botanist Dr. Stanley Spencer, with assistance from LSA biologists Denise Woodard, Jaime Morales, and Jeremy Rosenthal. The survey was conducted to coincide with the expected flowering times of the target species. Survey dates and times are summarized in Table H, below. The plant survey area consisted of the biological study area plus a 100-foot survey buffer (Appendix F, Figure 2). The project area consisted of three distinct areas:

- The project area, including construction, staging, laydown, and disposal areas;
- The access roads, including turnouts; and
- The perimeter of the reservoir between the current water level (approximately 1,424.5 feet NAVD88) and the spillway crest elevation (1,472.6 feet NAVD88).

The survey was conducted on foot by walking transects spaced 10 to 50 feet apart in areas of potentially suitable habitat. Areas of potentially suitable habitat for the target species in the plant survey area consist of alluvial fan sage scrub, Riversidean sage scrub, and chaparral. The areas of Riversidean sage scrub and chaparral are mostly outside the project area but within the 100-foot-buffer. Much of the biological study area consists of dense riparian vegetation. These areas do not provide suitable habitat for the target species and were not surveyed with transects. They were instead surveyed from their edges in order to document plant species throughout the site. Slopes that could not be safely accessed or walked were surveyed with binoculars. The survey was floristic in nature, and all species observed in the survey area were identified to the degree required to determine rarity status.

Table H: 2020 Plant Survey Dates and Times

Date	Area of Site Surveyed	Surveyors	Time (24-hour) (start/finish)
4/14	Southeast of lake, southern edge of lake (eastern part)	SS	1230/1400
4/17	Canyon west of dam	SS, JR	0800/1100
4/21	North edge of lake	SS	1100/1600
4/23	Southern edge of lake	SS	1035/1600
4/27	Southwest of lake, western edge of lake, southern edge of lake (western part)	SS/JM	1200/1700
4/28	Agricultural area west of dam	SS/DW	1000/1400
4/29	Northeast of lake	SS	1100/1300
5/1	Canyon west of dam	SS	1100/1345
5/7	Eastern edge of lake, southeast of lake	SS	0700/1200
5/12	Canyon west of dam, hills northwest of dam	SS	0830/1500
6/1	Southern edge of lake (western part)	SS	0600/0800
6/4	Southeast of lake	SS	0830/0930
6/11	Hills northwest of dam, agricultural area west of dam	SS	0830/1730
6/15	Southern edge of lake (central part)	SS	1000/1430
6/30	Hills northwest of dam	SS	1000/1150
7/16	Southern edge of lake (eastern part)	SS	0630/1400
7/17	Canyon west of dam	SS	0730/1530
7/23	Southwest of lake, western edge of lake	SS	1100/1630
7/24	Southern edge of lake (central part)	SS	1100/1530
7/30	Northeast of lake, eastern edge of lake, southeast of lake, hills northwest of dam	SS	1100/1900
7/31	Canyon west of dam, northern edge of lake	SS	0700/1900
8/3	Southwest of lake	SS	0930/1330

Source: LSA (2021).
Surveyors: SS=Stanley Spencer, DW=Denise Woodard, JM=Jaime Morales, JR=Jeremy Rosenthal

Locations of target species observed during the survey were mapped using a global positioning system device or by plotting their locations directly on aerial images. A list of plant species observed in the survey area is provided in Appendix B.

Total 2019–2020 wet season precipitation in the Temecula area was 19.3 inches, compared to an average season value of 12.3 inches (Weather Currents 2020).

6.2 EXISTING CONDITIONS AND RESULTS

Slender-horned spineflower, many-stemmed Dudleya, or other NEPSSA species were not observed during focused plant surveys. Table I, below, describes habitat requirements for each species, along with an assessment of habitat and the likelihood that the species is present on the site. As noted in Table I, potentially suitable habitat exists for these species but neither was observed during focused surveys. The rare plant survey report is included as Appendix F.

Table I: MSHCP Narrow Endemic Plant Survey Species

Species	Status	MSHCP Habitat	Growth Form and Blooming Period	Occurrence Probability
Slender-horned spineflower *Dodecahema leptoceras*	US: FE CA: SE/1B MSHCP: S	In the Vail Lake area, occurs in gravel soils of Temecula arkose deposits in openings in chamise chaparral. In other areas, occurs in sandy cobbly riverbed alluvium in alluvial fan sage scrub (usually late seral stage), on floodplain terraces and benches that receive infrequent overbank deposits from generally large washes or rivers, where it is most often found in shallow silty depressions dominated by leather spineflower (*Lastarriaea coriacea*) and other native annual species, and is often associated with cryptogamic soil crusts composed of bryophytes, algae, and/or lichens. Occurs at 200 to 760 meters (600 to 2,500 feet) elevation. Known only from Los Angeles, Riverside, and San Bernardino Counties, California.	Blooms April through June (annual herb)	**Absent.** Not observed during focused surveys. Sparse chaparral patches occur on the western portion of the study area. Riverbed alluvium and Riversidian sage scrub within tributaries to Vail Lake occur in the biological study area. All suitable habitat is located outside the proposed impact area (i.e., project site).
Many-stemmed dudleya *Dudleya multicaulis*	US: – CA: 1B MSHCP: S	Heavy, often clay soils or around granitic outcrops in chaparral, coastal sage scrub, and grassland below 790 meters (2,600 feet) elevation. Known only from Los Angeles, Orange, Riverside, San Bernardino, and San Diego Counties.	Blooms April through July (perennial herb)	**Absent.** Not observed during focused surveys. Riversidian sage scrub occurs throughout the study area. Sparse chaparral patches occur on the western portion of the study area.

Source: LSA (2021).
US: Federal Classifications
FE Listed as endangered.
CA: State Classifications
SE State-listed as Endangered.
1B California Rare Plant Rank 1B – rare, threatened or endangered in California and elsewhere.
MSHCP: Western Riverside County MSHCP Status
S Species is covered and adequately conserved under the MSHCP, but surveys are required within indicated habitats and/or survey areas.

6.3 IMPACTS AND MITIGATION

NEPSSA species were not detected during focused surveys; therefore, no further action is required.

7.0 ADDITIONAL SURVEY NEEDS AND PROCEDURES (MSHCP SECTION 6.3.2)

MSHCP Section 6.3.2 requires surveys for additional plants, amphibians, small mammals, and burrowing owl for projects located within mapped survey areas. Figure 9 (see Appendix A) illustrates the MSHCP additional survey areas that overlap the project location.

7.1 CRITERIA AREA PLANT SPECIES

The project is within a mapped survey area for Criteria Area Species Survey Area (CASSA) plant species, specifically CASSA 5, which indicates the need for habitat assessment for the following plant species:

- Nevin's barberry (*Berberis nevinii*);
- Vail Lake ceanothus (*Ceanothus ophiochilus*); and
- Round-leaved filaree (*Erodium macrophyllum*).

7.1.1 Methods

The methodology used for CASSA plant species followed the same methodology as that used for NEPSSA plant species as described in Section 6.1.

7.1.2 Results

Nevin's barberry was the only CASSA species observed during the focused plant surveys. Neither Vail Lake ceanothus nor round-leaved filaree was observed during focused plant surveys. Table J describes habitat requirements for each species, along with an assessment of habitat and the likelihood that the species is present on the site.

As noted in Table J, below, potentially suitable habitat exists for Vail Lake ceanothus and round-leaved filaree, but neither was observed during focused surveys. The locations of the 311 Nevin's barberry observed during focused surveys are shown in Figure 8 (Appendix A). The rare plant survey report is included as Appendix F.

7.1.3 Impacts and Mitigation

Seven Nevin's barberry will be affected as part of project activities within the project site, located just downstream of Vail Lake Dam. Impacts to Nevin's barberry are subject to mitigation in a DBESP, which will be prepared in accordance with Mitigation Measure BIO-1 (see Section 4.3). No impacts are anticipated to the 304 individuals observed upstream of the dam (not within the project site). In the event that additional Nevin's barberry become established adjacent to the project site prior to construction, the following measure has been included to avoid indirect impacts to Nevin's barberry.

Table J: MSHCP Criteria Area Plant Survey Species

Species	Status	MSHCP Habitat	Growth Form and Blooming Period	Occurrence Probability
Nevin's barberry *Berberis nevinii*	US: FE CA: SE/1B MSHCP: S	Gravelly wash margins in alluvial scrub or coarse soils and rocky slopes in chaparral at 70 to 825 meters (220 to 2,700 feet) elevation. Known occurrences at higher elevations are planted (not natural). Known only from Los Angeles, San Bernardino, Riverside, and San Diego Counties, California.	Blooms March through June (evergreen shrub, survey year-round)	**Present.** Observed primarily south of Vail Lake but also observed downstream of the dam and east of the lake. Riversidian sage scrub occurs throughout the biological study area.
Vail Lake ceanothus *Ceanothus ophiochilus*	US: FT CA: SE/1B MSHCP: S	Chaparral; known from only three locations near Vail Lake, Riverside County; 580 to 1,065 meters (1,900 to 3,500 feet) elevation.	Blooms mid-February through March (evergreen shrub)	**Absent.** Not observed during focused surveys. Sparse chaparral patches occur on the western portion of the study area. All suitable habitat is located outside the proposed impact area (i.e., project site).
Round-leaved filaree *Erodium macrophyllum*	US: - CA: CBR MSHCP: S	Usually clay or clay loam soils in woodland, scrub, and grassland communities from 15 to 1,200 meters (50 to 4,000 feet) elevation. Known from central and south coastal areas and the Central Valley in California. Also occurs in Oregon and Mexico.	Blooms March through May (annual herb)	**Absent.** Not observed during focused surveys. Riversidian sage scrub occur throughout the study area. Sparse chaparral patches occur on the western portion of the biological study area.

Source: LSA (2021).
US: Federal Classifications
FE Listed as endangered.
CA: State Classifications
SE State-listed as Endangered.
1B California Rare Plant Rank 1B – rare, threatened, or endangered in California and elsewhere.
CBR California Rare Plant Rank: Considered But Rejected
MSHCP: Western Riverside County MSHCP Status
S Species is covered and adequately conserved under the MSHCP, but surveys are required within indicated habitats and/or survey areas.

BIO-6 To offset impacts to the seven Nevin's barberry that are within the project impact limits, RCWD shall retain a qualified habitat restoration expert with experience in collecting seeds and/or cuttings for this species. Prior to impacts to the Nevin's barberry, seeds and/or cuttings shall be collected from the seven individuals to be removed as well as other individuals in the vicinity of Vail Lake to be propagated off-site. Once the propagated plants have reached a suitable size for transplant (as determined by the habitat restoration expert and subject to agency approval), Nevin's barberry shall be planted in suitable areas around Vail Lake (as shown in Figure 10) at a minimum 10:1 ratio (i.e., 70 plants). These plantings shall be subject to maintenance and monitoring and agency sign-off consistent with the overall habitat restoration plan (see Mitigation Measure BIO-3).

To avoid impacts to any Nevin's barberry in proximity to the limits of construction, RCWD shall retain a qualified biologist to survey areas within 20 feet of the construction limits (as determined based on final project plans) within three months prior to construction. If any Nevin's barberry are identified within this area, the following measure shall be implemented. Prior to the commencement of construction activities, orange Environmentally Sensitive Area fencing or similar highly-visible material that delineates any locations of Nevin's barberry within 20 feet of impact areas along the Canyon Access Road and near the dam that are not within the impact area shall be placed by the construction contractor under the supervision of a qualified biologist retained by RCWD. The area within the fence line demarcating individual Nevin's barberry shall include an approximately 5-foot buffer.

7.2 AMPHIBIANS

7.2.1 Methods

Focused surveys for the federally-listed as endangered arroyo toad (*Anaxyrus californicus*) were conducted within the MSHCP amphibian species survey areas in the biological study area (see Figure 9, Appendix A). Surveys were conducted within four separate arroyo toad survey areas where the MSHCP amphibian species survey areas overlap with biological study areas surrounding the reservoir; in addition, surveys were conducted within the biological study area downstream of the lake, which extends westward beyond the MSHCP amphibian species survey area and includes additional suitable habitat with the potential to support arroyo toad. Survey areas are shown in Appendix G, Figures 1 and 2.

LSA conducted nighttime arroyo toad protocol surveys at four areas upstream and downstream of Vail Lake. The arroyo toad habitat suitability assessments for each of the four arroyo toad survey areas were conducted on April 13–16, 2020. Nighttime arroyo toad protocol surveys were conducted as follows: two nighttime surveys within the arroyo toad survey areas of Temecula Creek upstream of Vail Lake on April 20 and 22, 2020; one nighttime survey within the arroyo toad survey areas of Arroyo Seco Creek upstream of Vail Lake on April 15, 2020; six nighttime surveys within the arroyo toad survey areas of Temecula Creek downstream of Vail Lake on April 14 and 21, May 5 and 21, and June 9 and 24, 2020; and five nighttime surveys within the arroyo toad survey areas in the unnamed tributaries on the north side of Vail Lake on April 16, 2020.

7.2.2 Results

At least five arroyo toad individuals were identified during the 2020 protocol surveys within the arroyo toad survey areas of Temecula Creek upstream of Vail Lake. They were identified either through direct visual observation and/or aural observations of calling males. Within the arroyo toad survey areas of Arroyo Seco Creek during the 2020 protocol surveys, three arroyo toad individuals were observed. The 2020 protocol surveys did not reveal any positive arroyo toad evidence (e.g., calling males, amplexing [mating] toads, egg strings, or tadpoles) within the arroyo toad survey areas of Temecula Creek downstream of Vail Lake or in the unnamed tributaries on the north side of Vail Lake. No arroyo toad individuals were detected within the project impact areas (i.e., project site). Appendix G contains the detailed results of protocol surveys for the arroyo toad conducted by LSA for this project.

7.2.3 Impacts and Mitigation

Construction of the project would not result in permanent or temporary impacts to any locations where arroyo toad was detected during surveys. Therefore, no mitigation is required.

7.3 BURROWING OWL

7.3.1 Methods

LSA conducted protocol surveys for the western burrowing owl, a California Species of Special Concern, in accordance with the 2006 Western Riverside County MSHCP Burrowing Owl Survey Guidelines and the most current accepted burrowing owl protocol survey methodology presented in the California Department of Fish and Game *Staff Report on Burrowing Owl Mitigation* (California Burrowing Owl Consortium 2006 and CDFG 2012). The surveys were conducted by walking approximately 20-meter transects throughout areas of suitable habitat within the biological study area to look for burrowing owls, potential burrows (burrows greater than 11 centimeters in diameter and 150 centimeters in depth), and burrowing owl sign. The surveys were conducted during weather conducive to observing burrowing owl activity. No rain had fallen within 5 days prior to the site visits.

The survey area consisted of suitable habitat for burrowing owl within the overall biological study area (including a 150-meter survey buffer) that overlaps with the MSHCP Burrowing Owl Survey Area (depicted on Figure 9, Appendix A), and included adjacent and contiguous suitable burrowing owl habitat outside of the MSHCP Burrowing Owl Survey Area.

Most of the vegetation in the project area consists of riparian woodland, riparian scrub, or Riversidian alluvial fan sage scrub, which is not suitable to support burrowing owl due to the density of vegetation and presence of trees or large shrubs that provide cover for predators. Areas suitable for burrowing owl include areas mapped as disturbed, non-native grassland, and bare ground. Areas mapped as disturbed are dominated by non-native grasses and other non-native ruderal species, and areas mapped as non-native grassland are dominated by native and non-native herbaceous species. The burrowing owl survey area was separated into two distinct areas containing suitable habitat for the species identified as the Temecula Creek Survey Area and Arroyo Seco Creek Survey Area (Appendix H, Figure 2).

Surveys were conducted at the Temecula Creek Survey Area on April 28, May 12, May 26, and June 11, 2020 (Appendix H, Table A). Surveys were conducted at the Arroyo Seco Creek Survey Area on April 16, April 27, May 7, and May 26, 2020 (Appendix H, Table A).

7.3.2 Results

No burrowing owls, burrowing owl sign (e.g., whitewash, pellets, scat, tracks, prey remnants, and feathers), or burrows or similar features suitable for burrowing owl occupation were identified in the survey areas. Appendix H contains the detailed results of protocol surveys for burrowing owl conducted by LSA for this project.

7.3.3 Impacts and Mitigation

No burrowing owls, burrowing owl sign, or burrows or similar features suitable for burrowing owl occupation were identified in the survey areas, and impacts to this species are unlikely. However, because habitat suitable for burrowing owl is present, and because burrowing owl could occupy the site prior to construction, a pre-construction burrowing owl survey will be required no more than 30 days prior to ground disturbance.

BIO-7 RCWD shall retain a qualified biologist to conduct an MSHCP 30-day pre-construction survey for burrowing owl within suitable habitat prior to ground-disturbing activities to ensure that no burrowing owls have colonized the site. The pre-construction survey(s) shall be conducted no more than 30 days prior to the start of construction activities. If burrowing owls have colonized the project site prior to the initiation of ground-disturbing activities, the project proponent will immediately inform and coordinate with CDFW. A Burrowing Owl Protection and Relocation Plan may be necessary prior to initiating ground disturbance. If ground-disturbing activities occur but the site is left undisturbed for more than 30 days, a pre-construction survey will again be necessary to ensure the burrowing owl has not colonized the site since it was last disturbed. If burrowing owl is found, the same coordination described above will be necessary.

7.4 MAMMALS

7.4.1 Methods

Protocol presence/absence surveys were conducted for the Los Angeles pocket mouse (*Perognathus longimembris brevinasus*), a California Species of Special Concern, and Aguanga kangaroo rat (*Dipodomys merriami collinus*), a species covered by the MSHCP but with no State or federal listing status, in three areas surrounding Vail Lake. Surveys for the Los Angeles pocket mouse and Aguanga kangaroo rat were conducted within the biological study area where suitable habitat is present within the mammal species survey areas as identified in the MSHCP (Figure 9, Appendix A).

The survey area consists of three separate areas where the MSHCP mammal species survey areas occur within the biological study area. These areas, identified as Traplines 1, 2, and 3, are shown in Appendix I, Figures 1 and 2. Trapline 1 was within the Temecula Creek floodplain, approximately 1 mile southeast of Vail Lake. Trapline 2 was within the Arroyo Seco Creek drainage channel approximately 1,000 feet southwest of Vail Lake. Trapline 3 was within the Temecula Creek drainage upstream of Vail Lake (an area identified as Butterfield Valley on the USGS topographic map), approximately 1,000 feet south-southeast of Vail Lake. All traplines were within the spillway crest water level of approximately 1,472.6 feet NAVD88 (i.e., the level at which water will begin to flow past the dam spillway) which represents the maximum inundation area surrounding Vail Lake.

LSA conducted three protocol trapping sessions, each consisting of 5 nights of trapping, pursuant to LSA's CDFW attachment to Scientific Collecting Permit No. SC-000777 providing Conditions for Research on Listed Mammals (June 18, 2018–December 31, 2021). The first session, conducted from May 3 through May 8, 2020, consisted of 100 traps set in one continuous line. The second session, conducted from June 7 through June 12, 2020, also consisted of 100 traps set in one continuous line.

The final trapping session, conducted from June 23 through June 28, 2020, consisted of 70 traps set in one continuous line. Traps were baited with birdseed and wild oats. Trap checks took place near midnight and at dawn. All captured animals were identified and released, unharmed, at their capture sites.

7.4.2 Results

No Los Angeles pocket mice or Aguanga kangaroo rats were captured during the surveys. During Session 1, there were 161 rodent captures involving five species. Session 2 included 351 rodent captures involving 10 species. Session 3 had 180 rodent captures involving seven species. Appendix I contains the detailed results of protocol surveys for Los Angeles pocket mouse and Aguanga kangaroo rat.

7.4.3 Impacts and Mitigation

No impacts to Los Angeles pocket mouse or Aguanga kangaroo rat are anticipated, as these species were not detected in the project area. No mitigation is required.

8.0 INFORMATION ON OTHER SPECIES

8.1 DELHI SANDS FLOWER-LOVING FLY

The MSHCP requires surveys for Delhi sands flower-loving fly (*Rhaphiomidas terminatus abdominalis*) in most areas of mapped Delhi series soils where suitable habitat exists (MSHCP Section 9).

The biological study area is not within an area of mapped Delhi soils (see Table B in Section 2.1 and Figure 4 in Appendix A). Soils mapped and observed throughout the site are primarily loamy sand and sandy loam and other non-sandy soils, which is inconsistent with Delhi soils; therefore, no surveys or additional analysis are required for this species.

8.2 SPECIES NOT ADEQUATELY CONSERVED

Some species that will eventually have full coverage under the MSHCP are not considered adequately conserved until requirements of MSHCP Table 9-3 are met. In addition, there are other special-status species with limited coverage or with no take authorization under the MSHCP.

8.2.1 Methods

A literature review was conducted to investigate the potential occurrence of special-status species within the biological study area or in the vicinity. Database records for the *Vail Lake*, *Pechanga*, *Sage,* and *Bachelor Mountain*, *California* USGS 7.5-minute quadrangles and surrounding quadrangles were searched on July 31, 2020, using *Rarefind 5* (CDFW 2020).

8.2.2 Results

No MSHCP Table 9-3 species or species with limited coverage or no take authorizations were observed during the site visit and none of these species are expected to occur based on the habitat conditions.

There are California Natural Diversity Database (CNDDB) records for three MSHCP Table 9-3 species, rainbow manzanita (*Arctostaphylos rainbowensis*), Plummer's mariposa lily (*Calochortus plummerae*), and Parry's spineflower (*Chorizanthe parryi* var. *parryi*) known from within a 3-mile radius of the project site. Parry's spineflower and Plummer's mariposa lily have been determined to meet MSHCP Table 9-3 criteria and are currently considered adequately conserved under the MSHCP. Neither Plummer's mariposa lily nor Parry's spineflower were observed during rare plants surveys. While rainbow manzanita has not been determined to meet MSHCP Table 9-3 criteria to be considered adequately conserved, this species is not expected to occur in the project site due to the lack of suitable habitat. Rainbow manzanita is associated with gabbro chaparral, which does not occur in the project site. Rainbow manzanita, a perennial shrub that would have been identifiable during focused surveys for specified sensitive plant species conducted, was not observed. Therefore, the project will have no effects to Table 9-3 species or other special-status species with limited coverage or with no take authorization under the MSHCP.

9.0 GUIDELINES PERTAINING TO THE URBAN/WILDLANDS INTERFACE (MSHCP SECTION 6.1.4)

To preserve the integrity of areas described as existing or future MSHCP Conservation Areas, the guidelines contained in Section 6.1.4 (Urban Wildlands Interface Guidelines) are to be implemented for projects that are adjacent to either existing conservation or land described for conservation in the MSHCP Criteria Area.

The project site is adjacent to Public/Quasi-Public Conserved Lands. Consistency with the Urban Wildlands Interface Guidelines is discussed below.

9.1 DRAINAGE

Guideline: Proposed developments in proximity to the MSHCP Conservation Area shall incorporate measures, including measures required through the National Pollutant Discharge Elimination System (NPDES) requirements, to ensure that the quantity and quality of runoff discharged to the MSHCP Conservation Area is not altered in an adverse way when compared with existing conditions. In particular, measures shall be put in place to avoid discharge of untreated surface runoff from developed and paved areas into the MSHCP Conservation Area. Stormwater systems shall be designed to prevent the release of toxins, chemicals, petroleum products, exotic plant materials, or other elements that might degrade or harm biological resources or ecosystem processes within the MSHCP Conservation Area. This can be accomplished using a variety of methods including natural detention basins, grass swales, or mechanical trapping devices. Regular maintenance shall occur to ensure effective operations of runoff control systems.

Project Consistency: Construction of the proposed project would comply with existing NPDES regulations, which include preparation of a Stormwater Pollution Prevention Plan (SWPPP) and Erosion and Sediment Control Plans and implementation of Construction Best Management Practices (BMPs) to target and reduce pollutants of concern in stormwater runoff, and testing and treatment (if required) of any groundwater prior to discharge to surface waters. In combination, implementation of the proposed Site Design BMPs, proposed Structural Source Control BMPs, and proposed Low Impact Development (LID) principles would reduce pollutants of concern from runoff from the project site in compliance with the Regional Municipal Separate Storm Sewer Systems (MS4) Permit. In addition, as previously stated, pollutants of concern would remain similar to existing conditions as the proposed project is not changing the use of the project site. Compliance with the requirements of the Regional MS4 Permit, including incorporation of operational BMPs to target pollutants of concern, would avoid or minimize water quality impacts, degradation of water quality, and alteration of receiving water quality during project construction.

In addition, the proposed project is required to comply with the requirements of the Regional MS4 Permit and associated guidance documents. The Regional MS4 Permit requires that a Water Quality Management Plan (WQMP) be prepared for priority new development and redevelopment projects. WQMPs specify the Site Design, Source Control, LID, and Treatment Control BMPs that would be implemented to capture, treat, and reduce pollutants of concern in stormwater runoff.

Proposed Site Design BMPs include preservation of natural drainage patterns on site; protection of existing vegetation; preservation of natural infiltration capacity; minimization of impervious surface area; and dispersion of stormwater runoff to adjacent pervious areas or small collection areas. Proposed Structural Source Control BMPs include use of enclosures, containment structures, and impervious pavement; use of berms or grading to prevent run-on; and use of lined bins. Proposed LID principles include site grading; use of rock-lined ditches; and use of the energy dissipater basin. In combination, implementation of the proposed Site Design BMPs, proposed Structural Source Control BMPs, and proposed LID principles would reduce pollutants of concern from runoff from the project site in compliance with the Regional MS4 Permit. In addition, pollutants of concern would remain similar to existing conditions as the proposed project is not changing the use of the project site.

9.2 TOXICS

Guideline: Land uses proposed in proximity to the MSHCP Conservation Area that use chemicals or generate bioproducts such as manure that are potentially toxic or may adversely affect wildlife species, habitat, or water quality shall incorporate measures to ensure that application of such chemicals does not result in discharge to the MSHCP Conservation Area. Measures such as those employed to address drainage issues shall be implemented.

Project Consistency: The proposed project is not anticipated to substantially increase the use of chemicals or generation of toxic substances. Any use of herbicides or pesticides during habitat restoration activities within the MSHCP Conservation Area would be conducted under the guidance of a licensed Pest Control Advisor and applied by individuals in possession of a Qualified Applicator License, subject to the approval of regulatory agencies including the RWQCB, USACE, and CDFW. As discussed above, stormwater measures would be implemented during construction and operation in compliance with the NPDES and MS4 permit requirements to prevent or reduce the release of toxic substances into the environment.

9.3 LIGHTING

Guideline: Night lighting shall be directed away from the MSHCP Conservation Area to protect species within the Conservation Area from direct night lighting. Shielding shall be incorporated in project designs to ensure ambient lighting in the MSHCP Conservation Area is not increased.

Project Compliance: Similar to existing conditions, the project would include security lighting as appropriate at the dam facilities. The project site is located within Zone A of the Mount Palomar Lighting Zone (areas within 0 to 15 miles of the Palomar Observatory). Security lighting would be selected and installed in accordance with County of Riverside Ordinance No. 655 “Regulating Light Pollution” regulations applicable to Zone A. Security lighting would be directed downward and/or would be appropriately shielded and would not result in visible glare in the surrounding areas. Security lighting would be similar to existing conditions and would not result in any additional effects to wildlife.

9.4 NOISE

Guideline: Proposed noise-generating land uses affecting the MSHCP Conservation Area shall incorporate setbacks, berms, or walls to minimize the effects of noise on MSHCP Conservation Area resources pursuant to applicable rules, regulations, and guidelines related to land use noise standards. For planning purposes, wildlife within the MSHCP Conservation Area should not be subject to noise that would exceed residential noise standards.

Project Compliance: The proposed project would not result in new long-term noise sources. Following construction, there would be no substantial changes in noise-generating activities such as truck trips or operation and maintenance activities.

9.5 INVASIVES

Guideline: When approving landscape plans for development that is proposed adjacent to the MSHCP Conservation Area, Permittees shall consider the invasive, non-native plant species listed in Table 6-2 and shall require revisions to landscape plans (subject to the limitations of their jurisdiction) to avoid the use of invasive species for the portions of development that are adjacent to the MSHCP Conservation Area. Considerations in reviewing the applicability of this list shall include proximity of planting areas to the MSHCP Conservation Areas, species considered in the planting plans, resources being protected within the MSHCP Conservation Area and their relative sensitivity to invasion, and barriers to plant and seed dispersal, such as walls, topography, and other features.

Project Compliance: Following construction, native vegetation communities within the Conservation Area that are subject to temporary impacts would be revegetated with appropriate native species under the supervision of a qualified biologist. The revegetation plan is subject to the approval of regulatory agencies, and the plant palette would not contain any of the invasive, non-native plant species listed in Table 6-2.

9.6 BARRIERS

Guideline: Proposed land uses adjacent to the MSHCP Conservation Area shall incorporate barriers, where appropriate in individual project designs to minimize unauthorized public access, domestic animal predation, illegal trespass, or dumping in the MSHCP Conservation Area. Such barriers may include native landscaping, rocks/boulders, fencing, walls, signage, and/or other appropriate mechanisms.

Project Compliance: The proposed dam is located entirely within the MSHCP Conservation Area. During construction, temporary modifications may be needed to existing access control fencing and gates; however, these would be replaced with facilities that would provide equal or greater access control.

9.7 GRADING/LAND DEVELOPMENT

Guideline: Manufactured slopes shall not extend across the parcel line of the MSHCP Conservation Area.

Project Compliance: The proposed project does not include manufactured slopes on the MSHCP parcel line; however, the proposed dam and the realigned South Access Road would result in new slopes entirely within the MSHCP Conservation Area. As a straight-axis gravity dam, the proposed dam requires sloped areas. Due to the constrained space within the canyon and change in elevation between the base of the dam and the abutment, the realigned South Access Road includes a graded embankment. Following construction, this embankment would be revegetated with appropriate native upland vegetation.

10.0 STANDARD BEST MANAGEMENT PRACTICES (MSHCP VOLUME I, APPENDIX C)

The project is within MSHCP Criteria Cells and within and adjacent to Public/Quasi-Public Lands. Therefore, applicable best management practices specified in Appendix C of the MSHCP will be followed (as RCWD would be a Participating Special Entity for this project, references to "Permittee" herein are interpreted to refer to the RCA). These measures are as follows:

10.1 STANDARD BEST MANAGEMENT PRACTICES

1. A condition shall be placed on grading permits requiring a qualified biologist to conduct a training session for project personnel prior to grading. The training shall include a description of the species of concern and its habitats, the general provisions of the Endangered Species Act (Act) and the MSHCP, the need to adhere to the provisions of the Act and the MSHCP, the penalties associated with violating the provisions of the Act, the general measures that are being implemented to conserve the species of concern as they relate to the project, and the access routes to and project site boundaries within which the project activities must be accomplished.

2. Water pollution and erosion control plans shall be developed and implemented in accordance with RWQCB requirements.

3. The footprint of disturbance shall be minimized to the maximum extent feasible. Access to sites shall be via pre-existing access routes to the greatest extent possible.

4. The upstream and downstream limits of projects disturbance plus lateral limits of disturbance on either side of the stream shall be clearly defined and marked in the field and reviewed by the biologist prior to initiation of work.

5. Projects should be designed to avoid the placement of equipment and personnel within the stream channel or on sand and gravel bars, banks, and adjacent upland habitats used by target species of concern.

6. Projects that cannot be conducted without placing equipment or personnel in sensitive habitats should be timed to avoid the breeding season of riparian species identified in MSHCP Global Species Objective No. 7.

7. When stream flows must be diverted, the diversions shall be conducted using sandbags or other methods requiring minimal instream impacts. Silt fencing of other sediment trapping materials shall be installed at the downstream end of construction activity to minimize the transport of sediments offsite. Settling ponds where sediment is collected shall be cleaned out in a manner that prevents the sediment from reentering the stream. Care shall be exercised when removing silt fences, as feasible, to prevent debris or sediment from returning to the stream.

8. Equipment storage, fueling, and staging areas shall be located on upland sites with minimal risks of direct drainage into riparian areas or other sensitive habitats. These designated areas shall be located in such a manner as to prevent any runoff from entering sensitive habitat. Necessary precautions shall be taken to prevent the release of cement or other toxic substances into surface waters. Project-related spills of hazardous materials shall be reported to appropriate entities including but not limited to applicable jurisdictional city, USFWS, CDFW, and RWQCB and shall be cleaned up immediately and contaminated soils removed to approved disposal areas.

9. Erodible fill material shall not be deposited into watercourses. Brush, loose soils, or other similar debris material shall not be stockpiled within the stream channel or on its banks.

10. The qualified project biologist shall monitor construction activities for the duration of the project to ensure that practicable measures are being employed to avoid incidental disturbance of habitat and species of concern outside the project footprint.

11. The removal of native vegetation shall be avoided and minimized to the maximum extent practicable. Temporary impacts shall be returned to pre-existing contours and revegetated with appropriate native species.

12. Exotic species that prey upon or displace target species of concern should be permanently removed from the site to the extent feasible.

13. To avoid attracting predators of the species of concern, the project site shall be kept as clean of debris as possible. All food related trash items shall be enclosed in sealed containers and regularly removed from the site(s).

14. Construction employees shall strictly limit their activities, vehicles, equipment, and construction materials to the proposed project footprint and designated staging areas and routes of travel. The construction area(s) shall be the minimal area necessary to complete the project and shall be specified in the construction plans. Construction limits will be fenced with orange snow screen. Exclusion fencing should be maintained until the completion of all construction activities. Employees shall be instructed that their activities are restricted to the construction areas.

15. The Permittee shall have the right to access and inspect any sites of approved projects including any restoration/enhancement area for compliance with project approval conditions including these BMPs.

11.0 POTENTIAL JURISDICTIONAL WATERS AND STREAMBEDS

11.1 METHODS

A jurisdictional delineation was conducted on June 16 and 19, 2020, and on July 12, 2020, by LSA biologists Jaime Morales, Anthony Greco, and Dr. Stanley Spencer. Subsequent site visits were conducted by LSA biologist Jaime Morales on August 6, 2021, March 24, 2022, and June 16, 2022, to supplement mapping and verify site conditions. The assessment included a formal jurisdictional delineation (included as Appendix C). Data were recorded directly on a field map containing a 2020 drone aerial photograph base at a scale of 1 inch = 200 feet. Fieldwork was conducted to identify the extent of State and federal jurisdiction within the study area potentially subject to regulation by the USACE pursuant to Section 404 of the Federal Clean Water Act (CWA), the RWQCB pursuant to Section 401 of the CWA and/or the Porter-Cologne Water Quality Control Act, and the CDFW pursuant to Section 1600 et seq. of the California Fish and Game Code. LSA surveyed an approximately 1,090-acre Jurisdictional Study Area (JSA).

LSA evaluated areas supporting hydrology or species of plant life potentially indicative of wetlands according to routine wetland delineation procedures described in the USACE's 2008 Regional Supplement. Representative sample points were selected and examined in the field in those areas where wetland jurisdiction was in question or needed to be confirmed. At each sample point, the dominant and subdominant plant species were identified, and their wetland indicator status noted. When possible, a small sample pit (approximately 12 to 20 inches deep) was dug in order to examine soil characteristics and composition. Soil matrix colors were classified according to the Munsell Soil Color Charts (Munsell Color 2000). Hydrological conditions, including any surface inundation, saturated soils, groundwater levels, and/or other wetland hydrology indicators, were recorded. General site characteristics were also noted. Standard data forms were completed for each sample point; copies of these data forms are included in Appendix B of the Jurisdictional Delineation Report (included as Appendix C of this report).

Hydrophytic vegetation is plant life that grows and is typically adapted for life in permanently or periodically saturated soils. The hydrophytic vegetation criterion is met if more than 50 percent of the dominant plant species from all strata (tree, shrub, herb, and woody vine layers) are considered hydrophytic. Wetland indicator categories are shown in Table K.

Table K: Hydrophytic Vegetation

Category		Probability
Obligate Wetland	OBL	Almost always occur in wetlands (estimated probability > 99 percent)
Facultative Wetland	FACW	Usually occur in wetlands (estimated probability 67–99 percent)
Facultative	FAC	Equally likely to occur in wetlands and nonwetlands (estimated probability 34–66 percent)
Facultative Upland	FACU	Usually occur in nonwetlands (estimated probability 67–99 percent)
Obligate Upland	UPL	Almost always occur in nonwetlands (estimated probability > 99 percent)

Source: National Wetland Plant List (USACE 2018).
USACE = U.S. Army Corps of Engineers

11.2 RESULTS

Temecula Creek (upstream and downstream of Vail Lake), Arroyo Seco Creek, and Wilson Creek display defined streambeds and banks and convey flows intermittently into Vail Lake. Additionally, several unnamed drainage features on the northern side of Vail Lake contribute ephemeral flows into Vail Lake. Water from the lake is released periodically by RCWD into Temecula Creek downstream of the dam. Temecula Creek conveys flows into the Santa Margarita River, which conveys flows into the Pacific Ocean. The Pacific Ocean is a traditional navigable water of the U.S.

11.2.1 Vegetation

Wetland vegetation was present within Temecula Creek, Wilson Creek, and Arroyo Seco Creek and around the perimeter of Vail Lake in areas categorized as lakeshore (sparsely vegetated), riparian forest, and riparian scrub. Dominant wetland plant species within areas delineated as wetlands included blue elderberry (*Sambucus nigra* ssp. *caerulea* FACU), western ragweed (*Ambrosia psilostachya* FACU), mule fat (FAC), arrowweed (FACW), rough cocklebur (*Xanthium strumarium* FAC), salt heliotrope (*Heliotropium curassavicum* FACU), California sycamore (FAC), willow dock (*Rumex salicifolius* FACW), Fremont cottonwood (FAC), narrowleaf willow (FACW), Goodding's willow (FACW), red willow (*Salix laevigata* FACW), arroyo willow (*Salix lasiolepis* FACW), Mediterranean tamarisk (FAC), hoary nettle (*Urtica dioica* ssp. *holosericea* FAC), California bulrush (*Schoenoplectus californicus* OBL), tall flatsedge (*Cyperus eragrostis* FACW), annual rabbitsfoot grass (*Polypogon monspeliensis* FACW), and southern cattail (*Typha domingensis* OBL).

Wetland vegetation was absent from the area within and on either side of the North Access Road; however, this area was included in the JSA because it contains a seasonal pond.

11.2.2 Soils

Generally, hydric soils were present within Temecula Creek downstream of Vail Lake, at the lakeshore surrounding Vail Lake, and within the creeks that convey flows to Vail Lake. Due to the intermittent nature of the creeks conveying flows to the lake and because the lake water level is considerably lower than historic levels (water level at the time of surveys was 1,424.5 feet NAVD88; the average historic water level between 1978 and 2019 was 1,445.2 feet NAVD88), soils in these areas have ponded or flooded long enough during the growing season to develop anaerobic conditions. Evidence of these anaerobic conditions was characterized by dark soils meeting the Depleted Matrix (F3) and Redox Dark Surfaces (F6) hydric soils indicators, as outlined in the USACE Regional Supplement, and the presence of redox features that were identified as 5YR 5/6 at the sample points containing hydric soils.

11.2.3 Hydrology

Wetland hydrology was evident within Temecula Creek downstream of Vail Lake, at the perimeter around Vail Lake up to a discernable shelf or bank created by an old and presumably long-duration water level (beyond this shelf, wetland hydrology and hydric soils were generally absent and hydrophytic vegetation was less prevalent), and within the creeks that convey flows to Vail Lake. The following wetland hydrology indicators were observed: surface water (A1; primary indicator), saturation (A3; primary indicator), drift deposits (B3; primary indicator – nonriverine), surface soil

cracks (B6; primary indicator), inundation visible on aerial imagery (B7; primary indicator), water-stained leaves (B9; primary indicator), aquatic invertebrates (B13; primary indicator), oxidized rhizoshperes along living roots (C3; primary indicator), water marks (B1; secondary indicator), drift deposits (B3; secondary indicator - riverine), and saturation visible on aerial imagery (C9; secondary indicator).

11.2.4 Potential USACE Jurisdiction

11.2.4.1 Wetland Waters of the United States

There are several areas within the JSA where potential USACE jurisdictional wetland waters of the U.S. occur (i.e., areas that satisfy all three criteria for USACE jurisdictional wetlands). The majority of areas within the ordinary high-water marks (OHWMs) and the associated floodplains of Temecula Creek, Wilson Creek, and Arroyo Seco Creek that contain a predominance of wetland vegetation are considered potential USACE wetland waters of the U.S. Additionally, much of the shoreline around Vail Lake meets the USACE criteria for jurisdictional wetland waters of the U.S. At two points where Temecula Creek intersects the Canyon Access Road and the access to a proposed staging and laydown area near the western end of the canyon, wetland waters of the U.S. are absent due to the lack of a predominance of wetland vegetation.

The seasonal pond identified along the North Access Road (location of Sample Points 1 and 2) exhibited evidence of wetland hydrology and some vernal pool plant species, such as smooth boisduvalia and wooly marbles; however, it did not meet the USACE hydrophytic plant and hydric soils criteria, so it is not a vernal pool.

11.2.4.2 Nonwetland Waters of the United States

Within the JSA, nonwetland waters of the U.S. are present at the following locations: the open waters associated with Vail Lake and areas within the OHWMs of intermittent creeks (Temecula, Wilson, and Arroyo Seco) that do not contain a predominance of wetland vegetation. Ephemeral drainage features that do not meet the three criteria for USACE jurisdictional wetlands are mapped as nonwetland waters of the U.S. at this time. On August 30, 2021, the United States District Court for Arizona vacated the 2020 Navigable Waters Protection Rule, which reinstated federal wetland regulations and definitions originally adopted by the federal government in the 1980s. In light of this order, the Environmental Protection Agency (EPA) and USACE (collectively “agencies”) have halted implementation of the 2020 Navigable Waters Protection Rule and are interpreting waters of the U.S. consistent with the pre-2015 regulatory regime (and 2008 *Rapanos* Guidance) until further notice.

Table L displays the acreages of waters of the U.S. within the JSA and a summary of the anticipated temporary and permanent impacts. Due to the nature and location of anticipated project impacts from the Canyon Access Road (refer to Figure 7 in Appendix A), jurisdictional resources associated with Temecula Creek downstream of Vail Dam at the location of anticipated creek crossings are quantified separately.

Table L: Potential Waters of the U.S. within the JSA

Feature	Nonwetland Waters (acres)	Wetland Waters (acres)	Total Waters (acres)	Permanent Impacts (acres)	Temporary Impacts (acres)	Total Impacts (acres)
Temecula Creek (Downstream of Vail Dam)						
Canyon Access Road Crossing 1	0.01	-	**0.01**	-	0.01	**0.01**
Canyon Access Road Crossing 2	0.01	0.01	**0.02**	-	0.01	**0.01**
Canyon Access Road Crossing 3	0.02	0.04	**0.06**	-	0.05	**0.05**
Canyon Access Road Crossing 4	0.01	0.01	**0.02**	-	0.02	**0.02**
Canyon Access Road Crossing 5	0.01	0.03	**0.04**	-	0.03	**0.03**
Canyon Access Road Crossing 6	0.01	0.02	**0.04**	-	0.03	**0.03**
Additional Area within JSA	0.19	1.18	**1.38**	0.61	0.24	**0.84**
Vail Lake Area - including Arroyo Seco Creek, Wilson Creek, and Temecula Creek (upstream of Vail Dam)	412.20	284.44	**696.64**	-	1.46	**1.46**
Total JSA	**412.47**	**285.75**	**698.22**	0.61	1.84	**2.46**

Source: LSA (2022).
Note: Values rounded to nearest hundredth of an acre. Totals may not equal sums due to rounding. Values of 0.00 indicate totals less than 0.005 acre.
Crossings of Temecula Creek by the Canyon Access Road are numbered 1 through 6 from west to east; see Figure 7 in Appendix A.
JSA = Jurisdictional Study Area

11.2.5 Potential RWQCB Jurisdiction

All areas that satisfy the USACE jurisdictional criteria for wetland waters of the U.S. are also subject to RWQCB jurisdiction as wetland waters of the State. Additionally, unvegetated areas subject to continuous or recurrent saturation or the upper substrate for durations sufficient to cause anaerobic conditions are also subject to RWQCB jurisdiction as wetland waters of the State.

All areas that satisfy the USACE jurisdictional criteria for nonwetland waters of the U.S. are also subject to RWQCB jurisdiction as nonwetland waters of the State. However, there are instances where the jurisdictional limits of waters of the State may extend beyond the limits of waters of the U.S. Additionally, ephemeral drainage features that are not continuously saturated or present evidence of anaerobic conditions (including the seasonal pond identified along the North Access Road) are subject to RWQCB jurisdiction as nonwetland waters of the State.

Table M displays the acreages of waters of the State within the JSA and a summary of the anticipated temporary and permanent impacts.

Table M: Potential Waters of the State within the JSA

Feature	Nonwetland Waters (acres)	Wetland Waters (acres)	Total Waters (acres)	Permanent Impacts (acres)	Temporary Impacts (acres)	Total Impacts (acres)
Temecula Creek (Downstream of Vail Dam)						
Canyon Access Road Crossing 1	0.02	-	**0.02**	-	0.01	**0.01**
Canyon Access Road Crossing 2	-	0.03	**0.03**	-	0.02	**0.02**
Canyon Access Road Crossing 3	-	0.06	**0.06**	-	0.05	**0.05**
Canyon Access Road Crossing 4	-	0.02	**0.02**	-	0.02	**0.02**
Canyon Access Road Crossing 5	-	0.04	**0.04**	-	0.03	**0.03**
Canyon Access Road Crossing 6	-	0.04	**0.04**	-	0.03	**0.03**
Additional Area within JSA	0.18	1.38	**1.57**	0.79	0.24	**1.02**
Seasonal Pond along North Access Road	0.07	-	**0.07**	0.01	-	**0.01**
Vail Lake Area - including Arroyo Seco Creek, Wilson Creek, and Temecula Creek (upstream of Vail Dam)	412.47	284.49	**696.96**	-	1.46	**1.46**
Total JSA	**412.75**	**286.05**	**698.81**	**0.80**	**1.85**	**2.66**

Source: LSA (2022).
Notes: Values rounded to nearest hundredth of an acre. Totals may not equal sums due to rounding. Values of 0.00 indicate totals less than 0.005 acre.
Crossings of Temecula Creek by the Canyon Access Road are numbered 1 through 6 from west to east; see Figure 7 in Appendix A.
JSA = Jurisdictional Study Area

11.2.6 Potential CDFW Jurisdiction

With the exception of the seasonal pond along the North Access Road, which is too small and ephemeral to support wildlife, all of the areas satisfying the RWQCB jurisdictional criteria for waters of the State are also potentially subject to CDFW jurisdiction, pursuant to Section 1602 of the California Fish and Game Code. Additionally, associated riparian vegetation extending beyond the stream banks is considered subject to CDFW jurisdiction. The area surrounding the lake contains an abundance of riparian vegetation that extends far beyond the edge of the lake and the associated waters of the U.S. and State. Table N displays the acreage of potential CDFW jurisdiction present within the JSA and a summary of the anticipated temporary and permanent impacts.

Table N: Potential CDFW Jurisdiction within the JSA (acres)

Feature	Streambed/ Banks and Riparian (acres)	Open Water (acres)	Total CDFW Jurisdiction (acres)	Permanent Impacts (acres)	Temporary Impacts (acres)	Total Impacts (acres)
Temecula Creek (Downstream of Vail Dam)						
Canyon Access Road Crossing 1	0.02	-	**0.02**	-	0.01	**0.01**
Canyon Access Road Crossing 2	0.03	-	**0.03**	-	0.02	**0.02**
Canyon Access Road Crossing 3	0.09	-	**0.09**	-	0.07	**0.07**
Canyon Access Road Crossing 4	0.06	-	**0.06**	-	0.04	**0.04**
Canyon Access Road Crossing 5	0.08	-	**0.08**	-	0.07	**0.07**
Canyon Access Road Crossing 6	0.04	-	**0.04**	-	0.03	**0.03**
Additional Area within JSA	2.86	-	**2.86**	1.27	0.71	**1.99**
Vail Lake Area - including Arroyo Seco Creek, Wilson Creek, and Temecula Creek (upstream of Vail Dam)	556.52	412.20	**968.72**	-	2.41	**2.41**
Total JSA	**559.73**	**412.20**	**971.93**	1.27	3.36	**4.64**

Source: LSA (2022).
Note: Values rounded to nearest hundredth of an acre. Totals may not equal sum due to rounding. Values of 0.00 indicate totals less than 0.005 acre.
Crossings of Temecula Creek by the Canyon Access Road are numbered 1 through 6 from west to east; see Figure 7 in Appendix A.
CDFW = California Department of Fish and Wildlife
JSA = Jurisdictional Study Area

11.3 IMPACTS AND MITIGATION

Permanent and temporary impacts would occur to potential waters of the U.S., waters of the State, and CDFW jurisdiction (refer to Tables L, M, and N). Most of these are located along the Temecula Creek drainage downstream of Vail Dam, although a small area of open water on Vail Lake would be temporarily affected, and the seasonal pool along the North Access Road (waters of the State) would be permanently affected unless the North Access Road Design Alternative is implemented. Impacts associated with the Dam Construction Area and North Access Road would be permanent. Impacts to jurisdictional areas associated with the temporary widening of the Canyon Access Road (including turnouts), Staging and Laydown Areas, and portions of the South Access Road Construction Area would be temporary, with impact areas restored to approximate pre-construction contours and revegetated.

The South Access Road realignment would include a manufactured slope downstream of the dam that would result in permanent impacts to wetland and nonwetland waters of the U.S, wetland waters of the State, and CDFW riparian areas. The area affected consists of the Temecula Creek drainage downstream of the existing dam, which is fed primarily by dam releases and from a tributary drainage to the south (see Figure 7 in Appendix A). After construction, water would still be released from the dam into Temecula Creek, but the streambed/channel alignment would shift 38 feet to the north and would be located between the embankment and the Canyon Access Road.

Water released from the dam outlet would be conveyed first into a riprap-lined energy dissipater basin, then via culverts below the Canyon Access Road/South Access Road junction to another riprap area, then to a graded channel, and then in a natural channel along the toe of the embankment between the slope and the Canyon Access Road. Revegetation along the new channel alignment would include riparian scrub in areas where hydrology is anticipated to be adequate, and the first 5 to 9 feet of the toe of the embankment would consist of vegetated riprap (riprap with interstitial spaces filled with soil and covered with a soil cap and riparian cuttings installed). In addition, the area surrounding the dissipater basin downstream of the dam (within the "Dam Construction Area" impact area) would be vegetated with riparian vegetation.

Permanent impacts to potentially jurisdictional features include a portion of the graded area that is classified as a temporary impact to vegetation. In this case, the graded slope would eliminate a jurisdictional feature; and although the same vegetation type would be established following construction as presently exists, it is included as a permanent impact from the perspective of jurisdictional resources. The feature is classified as nonwetland waters of the U.S., nonwetland waters of the State, and CDFW streambed/banks that convey flows from the hillside southwest of the existing dam into Temecula Creek (see Figure 7 in Appendix A). The realigned South Access Road includes drainage features, including a lined V-ditch that would capture runoff and convey it to Temecula Creek near the same location as the existing feature. The embankment would also remove the bed and banks associated with the feature. Therefore, although most of the feature supports Riversidian sage scrub and would be revegetated in-kind, the impact to the jurisdictional feature is permanent. A similar condition occurs within a small portion of the jurisdictional area associated with Temecula Creek downstream of the dam; although that portion of the jurisdictional feature supports Riversidian sage scrub and would continue to support that vegetation community following construction, the creek channel would no longer be present in that location and, therefore, it would be counted as a permanent impact to the jurisdictional feature.

Impacts to jurisdictional areas are regulated under Sections 401 and 404 of the federal Clean Water Act and Section 1600 of the California Fish and Game Code. RCWD will obtain a Section 404 Permit from the USACE, a Section 401 Water Quality Certification from the RWQCB, and a Section 1602 Lake or Streambed Alteration Agreement from the CDFW, and will comply with all measures stipulated in these agreements. It is anticipated that mitigation for impacts will be required and will consist of restoration of disturbed areas, habitat creation, enhancement, and/or preservation. Permanent impacts to wetland waters of the U.S. and wetland waters of the State will be offset by wetland creation at a minimum 1:1 ratio to satisfy the requirement for no net loss of wetlands.

The DBESP and permit applications prepared for the project will consider and quantify the anticipated offsets to impacts provided by the realigned channel and associated riparian areas as well as the lined V-ditch along the realigned South Access Road.

As discussed in Section 5.1.3, mitigation for impacts to riparian/riverine resources as defined in the MSHCP will be addressed through a DBESP. The mitigation identified in the DBESP may be deemed sufficient by the USACE, RWQCB, and/or CDFW as mitigation for jurisdictional resources, or they may incorporate further requirements in their respective permits.

Implementation of the MSHCP Standard BMPs (see Section 10.0) and the Guidelines Pertaining to Urban/Wildlands Interface (see Section 9.0) will minimize impacts to jurisdictional areas. Mitigation Measure BIO-3 (see Section 4.3) requires the preparation and implementation of a habitat restoration plan for temporary impact areas, which includes potentially jurisdictional areas. The following additional mitigation measures address the need for permits from regulatory agencies.

BIO-8 Prior to construction activities in proximity to jurisdictional waters of the U.S., RCWD shall apply for and obtain a Section 404 Nationwide Authorization or Individual Permit from the USACE. RCWD shall comply with all requirements stated in the Section 404 permit, including standard provisions and any additional special conditions such as specific mitigation standards or project-specific BMPs. Permanent impacts to wetland waters of the U.S. will be offset by wetland creation at a minimum 1:1 ratio.

BIO-9 Prior to construction activities in proximity to jurisdictional waters of the State, RCWD shall apply for and obtain a Section 401 Water Quality Certification or Waste Discharge Requirements from the RWQCB. RCWD shall comply with all requirements stated in the Section 401 certification or Waste Discharge Requirements, including standard provisions and any additional special conditions such as specific mitigation standards or project-specific BMPs. Permanent impacts to wetland waters of the State will be offset by wetland creation at a minimum 1:1 ratio.

BIO-10 Prior to construction activities in proximity to CDFW jurisdictional areas, RCWD shall apply for and obtain a Lake or Streambed Alteration Agreement from CDFW. The project proponent shall comply with all the requirements stipulated in the agreement, including standard provisions and any additional special conditions such as specific mitigation standards or project-specific BMPs.

12.0 NESTING BIRDS

During the bird breeding season (typically February 1 through August 31), large trees on or adjacent to the project site may be used by hawks, ravens, or other large birds for nesting. Trees, shrubs, and other vegetation may provide nest sites for smaller birds, and burrowing owls may nest in ground squirrel burrows, pipes, or similar features. Most birds and their active nests are protected from "take" (meaning destruction, pursuit, possession, etc.) under the Migratory Bird Treaty Act and/or Sections 3503–3801 of California Fish and Game Code. Activities that cause destruction of active nests, or that cause nest abandonment and subsequent death of eggs or young, may constitute violations of one or both of these laws.

Compliance with the Guidelines Pertaining to Urban/Wildlands Interface (Section 9.0) and MSHCP Standard BMPs (Section 10.0) will avoid and minimize impacts to nesting birds. In addition, Mitigation Measures BIO-4 and BIO-5 (Section 5.4.3) and Mitigation Measure BIO-7 (Section 7.3.3) will be implemented to avoid potential effects during the breeding season to fully protected raptors, special-status bird species, and other nesting birds protected by the Migratory Bird Treaty Act and/or California Fish and Game Code, and for compliance with MSHCP Incidental Take Permit Condition 5.

13.0 CEQA COMPLIANCE

13.1 ADOPTED HABITAT CONSERVATION PLANS

Section 10(a)(2)(A) of the 1973 Federal Endangered Species Act requires the preparation of a habitat conservation plan (HCP) for incidental take of threatened or endangered species when there is no federal agency involvement in a project. Continuing land development may cause incidental take of listed species and, therefore, HCPs have been prepared for areas within western Riverside County. The MSHCP and the Stephens' Kangaroo Rat (SKR) HCP are the principal habitat conservation plans in western Riverside County. The USFWS regional office maintains a current list of habitat conservation plans for the southern California region.

The project site is within the MSHCP area and within the SKR HCP fee area. Focused surveys for SKR (*Dipodomys stephensi*) will not be required for this project; however, a fee associated with the SKR HCP is required. Suitable habitat occurs on the project site and this species is likely present. The project site is not subject to any other adopted HCP.

As stated in Mitigation Measure BIO-1, RCWD shall obtain status as a Participating Special Entity of the MSHCP. Prior to initiation of construction, RCWD will coordinate with the Riverside County Habitat Conservation Authority and/or the County of Riverside to pay the required fee (up to $500 per gross acre) in accordance with the requirements of the SKR HCP.

13.2 THREATENED AND ENDANGERED SPECIES

The USFWS and CDFW may list species as threatened or endangered under the Federal and California Endangered Species Acts, respectively. The USFWS can designate critical habitat that identifies specific areas, either occupied or unoccupied, that are essential to the conservation of a federally-listed species. Critical habitat areas may require special management considerations or protections. The USFWS and CDFW have issued permits for the take of most threatened and endangered species within the MSHCP area. The MSHCP covers impacts to these species. However, if a project has the involvement of a federal agency, that agency is required to address impacts to listed species and critical habitat by consulting with the USFWS. The USFWS has indicated in the permit issued for the MSHCP that, in such cases, the consultation will be expedited and that no restrictions will be imposed on the project beyond those specified in the MSHCP.

Critical habitat for Quino checkerspot butterfly and coastal California gnatcatcher occurs adjacent to the project site. Critical habitat for arroyo toad is located in the Arroyo Seco Creek, Temecula Creek, and Wilson Creek drainages upstream of Vail Lake. Figure 8 in Appendix A depicts the location of critical habitat relative to the project site. The project would not affect adjacent critical habitat for Quino checkerspot butterfly or coastal California gnatcatcher. Project activities within mapped arroyo toad critical habitat are limited to access for construction equipment along existing roads, and would not affect this species.

The following listed species have been reported within 3 miles of the project site according to CNNDB records, identified on the informally generated species list by the USFWS Information for

Planning and Consultation (IPaC)[15], or observed on the project site during surveys, and do not warrant further discussion as they have been discussed in previous sections of this report as noted:

- Arroyo toad, federally-listed as endangered – Section 7.2
- Nevin's barberry, federally- and State-listed as endangered – Section 7.1
- Stephens' kangaroo rat, federally-listed as endangered and State-listed as threatened – Section 13.1
- Slender-horned spineflower, federally- and State-listed as endangered – Section 6
- Riverside fairy shrimp, federally-listed as endangered – Section 5.3
- Vernal pool fairy shrimp, federally-listed as threatened – Section 5.3
- Least Bell's vireo, federally- and State-listed as endangered – Section 5.4
- Southwestern willow flycatcher, federally- and State-listed as endangered – Section 5.4
- Vail Lake ceanothus, federally-listed as threatened and State-listed as endangered – Section 7.1

The species discussed in Table O below are all federally and/or State listed as endangered, threatened or candidate species and have been reported within 3 miles of the project site according to CNNDB records, were identified on the informally generated species list by the USFWS IPaC, or were observed on the project site during surveys. Table O describes habitat requirements for each listed species, along with an assessment of habitat and the likelihood of the species occurring on the site.

Plant species identified in Table O include California Orcutt grass, Munz's onion, San Diego ambrosia, spreading navarretia, and thread-leaved brodiaea. These species are adequately conserved under the MSHCP but require focused surveys within suitable habitat located within various NEPSSA and/or CASSA survey areas. The project is not located within the survey areas for these species (it is within NEPSSA area 5 and CASSA area 5); however, focused rare plant surveys conducted would have allowed detection of these species. No additional surveys are required. These species are considered absent from the project as focused plant surveys did not result in observations of the species despite the presence of suitable habitat. No additional mitigation measures are required for these species.

Crotch bumble bee (*Bombus crotchii*), formerly a State candidate for listing as threatened or endangered, was detected on the project site. Impacts to native vegetation communities may affect this species due to habitat loss or direct mortality. Implementation of MSHCP Standard BMPs (see Section 10.0), the MSHCP Guidelines Pertaining to the Urban/Wildlands Interface (see Section 9.0), and the mitigation measures identified in this report would avoid and/or minimize impacts to the species and its habitat; no further mitigation is required.

[15] United States Fish and Wildlife Service (USFWS). Information for Planning and Consultation (IPaC). Riverside County. Website: https://ecos.fws.gov/ipac/location/BR36E4HFIJGCBLWJNS55Q5JRPM/resources (accessed May 18, 2021).

Table O: Threatened and Endangered Species

Species	Status	Habitat	Activity Period	Occurrence Probability
California Orcutt grass *Orcuttia californica*	US: FE CA: SE/1B MSHCP: S	Vernal pools from 15 to 660 meters (50 to 2,200 feet) elevation. In California, known from Los Angeles, Ventura, Riverside, and San Diego Counties. Also occurs in Mexico.	Blooms April through August (annual grass)	**Absent.** This species was not detected during focused plant surveys. This project is not located within any of the MSHCP NEPSSA survey areas for this species (Areas 2, 3, 3a, and 4).
Munz's onion *Allium munzii*	US: FE CA: ST/1B MSHCP: S	Seasonally moist sites on clay soils (generally) or within rocky outcrops (pyroxenite) on rocky-sandy loams (such as Cajalco, Las Posas, and Vallecitos) with clay subsoils, in openings within coastal sage scrub, pinyon juniper woodland, and grassland, at 300 to 1,070 meters (1,000 to 3,500 feet) elevation. Known only from western Riverside County in the greater Perris Basin (Temescal Canyon-Gavilan Hills/Plateau, Murrieta-Hot Springs areas) and within the Elsinore Peak (Santa Ana Mountains) and Domenigoni Hills regions.	Blooms April through May (perennial bulbiferous herb	**Absent.** This species was not detected during focused plant surveys. This project is not located within any of the MSHCP NEPSSA survey areas for this species (Areas 1, 2, and 4).
San Diego ambrosia *Ambrosia pumila*	US: FE CA: 1B MSHCP: S	Open, seasonally wet, generally low areas in floodplains or at edges of vernal pools or playas, usually in sandy loam or on clay (including upland clay slopes), at 20 to 487 meters (70 to 1,600 feet) elevation. Known from western Riverside and western San Diego Counties. Also occurs in Mexico.	Generally non-flowering (perennial herb)	**Absent.** This species was not detected during focused plant surveys. This project is not located within any of the MSHCP NEPSSA survey areas for this species (Areas 1 and 2).
Spreading navarretia *Navarretia fossalis*	US: FT CA: 1B MSHCP: S	In vernal pools, playas, shallow freshwater marshes, and similar sites at 15 to 820 meters (50 to 2,700 feet) elevation. In California, known only from Los Angeles, San Luis Obispo, Riverside, and San Diego Counties. Also occurs in Mexico.	Blooms April through June (annual herb)	**Absent.** This species was not detected during focused plant surveys. This project is not located within any of the MSHCP NEPSSA survey areas for this species (Areas 3 and 3a).

Table O: Threatened and Endangered Species

Species	Status	Habitat	Activity Period	Occurrence Probability
Thread-leaved brodiaea *Brodiaea filifolia*	US: FT CA: SE/1B MSHCP: S	Usually on clay or associated with vernal pools or alkaline flats; occasionally in vernally moist sites in fine soils (clay loam, silt loam, fine sandy loam, loam, loamy fine sand). Typically associated with needlegrass or alkali grassland or vernal pools. Occurs from 25 to 1,120 meters (80 to 3,700 feet) elevation. Known only from Los Angeles, Orange, Riverside, San Bernardino, San Diego, and San Luis Obispo Counties, California.	Blooms March through June (perennial herb)	**Absent.** This species was not detected during focused plant surveys. This project is not located within the MSHCP CASSA survey area for this species (Area 3).
Quino checkerspot butterfly *Euphydryas editha quino*	US: FE CA: SA MSHCP: C	Meadows or openings within coastal sage scrub or chaparral below about 5,000 feet where food plants (*Plantago erecta* and/or *Orthocarpus purpurascens*) are present. Historically known from Santa Monica Mountains to northwest Baja California; currently known only from southwestern Riverside County, southern San Diego County, and northern Baja California.	January through late April	**High.** Openings within Riversidian sage scrub occur throughout the site and one of the species' food plants, *Plantago erecta*, was observed within the project site. In addition, critical habitat for the species occurs within and north of the north-central portion of the project along an existing dirt access road, and the project site is within documented CNDDB occurrences.
Crotch bumble bee *Bombus crotchii*	US: – CA: Former SC MSHCP: NC	Inhabits open scrub and grassland from coastal California to crest of Sierra-Cascade and in desert edge areas, south into Mexico. Primarily nests underground. Suitable bumble bee habitat requires the continuous availability of flowers on which to forage throughout the duration of the colony (spring through fall), colony nest sites, and overwintering sites for the queens.	Spring and summer	**Present.** Suitable habitat exists on the project site. This species was observed during surveys.

Table O: Threatened and Endangered Species

Species	Status	Habitat	Activity Period	Occurrence Probability
Coastal California gnatcatcher *Polioptila californica californica*	US: FT CA: SSC MSHCP: C	Inhabits coastal sage scrub in low-lying foothills and valleys up to about 500 meters (1,640 feet) elevation in cismontane southwestern California and Baja California.	Year-round	**Present.** Riversidian sage scrub suitable for foraging and nesting occurs throughout the site. The species was observed on the project site during biological resources surveys.
Bald eagle *Haliaeetus leucocephalus* (nesting & wintering)	US: FD CA: SE/CFP MSHCP: C	Winters locally at deep lakes and reservoirs feeding on fish and waterfowl. Locally rare throughout North America.	November through February	**Present.** Vail Lake provides suitable foraging habitat. This species was observed foraging within the biological study area but not within the project site.
Tricolored blackbird (nesting colony) *Agelaius tricolor*	US: – CA: ST/SSC (breeding) MSHCP: C	Open country. Forages in grassland and cropland habitats. Nests in large groups near fresh water, preferably in emergent wetland with tall, dense cattails or tules, but also in thickets of willow, blackberry, wild rose, or tall herbs. Seeks cover for roosting in emergent wetland vegetation, especially cattails and tules, and also in trees and shrubs. Occurs in western Oregon, California, and northwestern Baja California.	Year-round	**Present.** Suitable nesting habitat occurs along the margins of Vail Lake. This species was observed within the biological study area during biological resources surveys.

Source: LSA (2021).

US: Federal Classifications

FE Listed as endangered.
FT Listed as threatened.
FDR Federally delisted (recovered).

CA: State Classifications

SE State-listed as endangered.
ST State-listed as threatened.
SC Candidate for listing as threatened or endangered.
CFP California Fully Protected. Refers to animals protected under Fish and Game Code sections 3511, 4700, 5050, and 5515.
SSC Species of Special Concern. Refers to animals with vulnerable or seriously declining populations.
SA Special Animal. Refers to any other animal monitored by the CNDDB, regardless of its legal or rarity status.

MSHCP: Western Riverside County MSHCP Status

C Species is covered and adequately conserved under the MSHCP.
S Species is covered and adequately conserved under the MSHCP, but surveys are required within indicated habitats and/or survey areas.
NC Species is not covered under the MSHCP.

Tricolored blackbird and coastal California gnatcatcher were observed on the project site. Impacts to these species would include temporary loss of habitat and indirect impacts from noise, dust, and increased human activities. The project site contains suitable habitat for Quino checkerspot butterfly Impacts to Quino checkerspot butterfly would include temporary and permanent loss of

larval habitat (Riversidian sage scrub with suitable food plants) as well as potential direct mortality of individuals during vegetation clearing and construction. All three of these species are fully covered and adequately conserved under the MSHCP. Mitigation Measures BIO-1, BIO-2, and BIO-3 (Section 4.3) address compliance with the MSHCP and the restoration of habitat following construction, and Mitigation Measures BIO-4 and BIO-5 (Section 5.4.3) address avoidance and minimization of impacts to nesting birds in general and coastal California gnatcatcher specifically. No further mitigation is required for impacts to these species.

13.3 OTHER SPECIAL-STATUS SPECIES

Other special-status species may occur on the proposed project site. The CDFW, USFWS, local agencies, and special interest groups, such as the California Native Plant Society (CNPS), maintain lists of species that they consider to be in need of monitoring. Legal protection for special-status species varies widely. Special-status species that were observed or that were determined to have a moderate or high likelihood of occurrence on the project site and that are fully covered and adequately conserved under the MSHCP include:

- Long-spined spineflower (*Chorizanthe polygonoides* var. *longispina*)
- Smooth tarplant (*Centromadia pungens* ssp. *laevis*)
- Arroyo chub (*Gila orcuttii*)
- Western spadefoot (*Spea hammondii*)
- Orange-throated whiptail (*Aspidoscelis hyperythra*)
- Coastal western whiptail (*Aspidoscelis tigris stejnegeri*)
- Red-diamond rattlesnake (*Crotalus ruber*)
- Western pond turtle (*Emys marmorata*)
- Coast horned lizard (*Phrynosoma blainvillii* (*coronatum*))
- Cooper's hawk (*Accipiter cooperii*)
- Sharp-shinned hawk (*Accipiter striatus*)
- Southern California rufous-crowned sparrow (*Aimophila ruficeps canescens*)
- Golden eagle (*Aquila chrysaetos*)
- Great blue heron (*Ardea herodias*)
- Bell's sage sparrow (*Artemisiospiza* (*Amphispiza*) *belli belli*)
- Burrowing owl (see discussion in Section 7.3)
- Ferruginous hawk (*Buteo regalis*)
- Coastal cactus wren (*Campylorhynchus brunneicapillus sandiegensis*)
- White-tailed kite (*Elanus leucurus*)
- California horned lark (*Eremophila alpestris actia*)
- American peregrine falcon (*Falco peregrinus anatum*)
- Yellow-breasted chat (*Icteria virens*)
- Loggerhead shrike (*Lanius ludovicianus*)
- Black-crowned night-heron (*Nycticorax nycticorax*)
- Double-crested cormorant (*Phalacrocorax auritus*)
- Purple martin (*Progne subis*)
- Yellow warbler (*Setophagia petechia*)

- San Diego black-tailed jackrabbit (*Lepus californicus bennettii*)
- Brush rabbit (*Sylvilagus bachmani*)
- Northwestern San Diego pocket mouse (*Chaetodipus fallax fallax*)
- Aguanga kangaroo rat (see discussion in Section 7.4)
- San Diego woodrat (*Neotoma lepida intermedia*)
- Los Angeles pocket mouse (see discussion in Section 7.4)

Of the covered species that may occur, only burrowing owl has specific mitigation requirements identified in the MSHCP. Mitigation Measures BIO-1, BIO-2, and BIO-3 (Section 4.3) address compliance with the MSHCP and the restoration of habitat following construction, and Mitigation Measures BIO-4 and BIO-5 (Section 5.4.3) address avoidance and minimization of impacts to nesting birds. No further mitigation is required for impacts to these species. Mitigation Measure BIO-7 addresses compliance with MSHCP requirements pertaining to burrowing owl.

The special-status species listed in Table P have a moderate or higher potential to occur in the general project vicinity or were observed on the project site[16] but are not covered under the MSHCP.

Both chaparral sand-verbena and white rabbit tobacco were detected on the project site. Approximately 100 chaparral sand-verbena and approximately 1,500 white rabbit tobacco individuals are anticipated to be impacted during project activities. Since white rabbit tobacco is a perennial herb, individuals may also be translocated to areas outside the impact area. Mitigation Measure BIO-3 (Section 4.3) requires the preparation and implementation of a habitat restoration plan, which would include locally-collected seeds or cuttings of sensitive plant species that would be cleared as a result of the project.

Special status reptile species not covered by the MSHCP may be present on the project site; two-striped garter snake was detected during surveys. Impacts to reptile species include temporary loss of habitat and indirect impacts from noise, dust, and increased human activities, as well as direct mortality during vegetation clearing and construction.

Special-status birds not covered by the MSHCP may be present on the site; lark sparrow, snowy egret, Lawrence's goldfinch, and black-chinned sparrow were observed during surveys. Impacts to bird species include temporary loss of habitat and indirect impacts from noise, dust, and increased human activities. Direct loss is not anticipated as these species are highly mobile and capable of dispersing.

[16] Acoustic sampling for bat species was conducted opportunistically during arroyo toad surveys. Equipment used during the acoustic sampling included Anabat Walkabout and Anabat Swift full-spectrum ultrasound detectors, and Anabat Express zero-crossing acoustic detectors. Echolocation call sequences were manually analyzed using SonoBat DataViewer 4.5 and Anabat Insight software for full-spectrum files, and AnalookW for zero-crossing files.

Table P: Special-Status Species Potentially Occurring in the Project Vicinity (Not Covered by MSHCP)

Species	Status	Habitat and Distribution	Growth Form and Blooming Period/Activity Period	Occurrence Probability
Chaparral sand-verbena *Abronia villosa var. aurita*	US: – CA: 1B MSHCP: NC	Sandy areas (generally flats and benches along washes) in chaparral and coastal sage scrub, and improbably in desert dunes or other sandy areas, below 1,600 meters (5,300 feet) elevation. In California, reported from Riverside, San Diego, Imperial, Los Angeles, and Ventura Counties. Believed extirpated from Orange County. Also reported from Arizona and Mexico (Baja California). Plants reported from desert communities are likely misidentified.	Blooms mostly March through August (annual or perennial herb)	**Present.** Suitable Riversidian sage scrub occurs throughout the project site. A total of 94 individuals were observed on site and 53 individuals were observed within the 100-foot survey buffer.
White rabbit-tobacco *Pseudognaphalium leucocephalum*	US: – CA: 2B MSHCP: NC	Sand and gravel at the edges of washes or mouths of steep canyons at 0 to 2,100 meters (0 to 7,000 feet) elevation. In California, known from Los Angeles, Orange, Riverside, Santa Barbara, San Diego, San Luis Obispo, and Ventura Counties. Also occurs in Arizona, New Mexico, Texas, and Mexico.	Blooms usually August through November (perennial herb)	**Present.** A total of 1,524 individuals were observed on site and 603 individuals were observed within the 100-foot survey buffer. Suitable streambed and steep canyons occur throughout the project site.
Southern California legless lizard *Anniella stebbinsi*	US: – CA: SSC MSHCP: NC	Inhabits sandy or loose loamy soils with high moisture content under sparse vegetation in Southern California.	Nearly year round, at least in southern areas	**Moderate.** There are nine known records of occurrence in the area and one record is within 0.5 mile of the project site. Potentially suitable habitat and soils are present within the project site.
Coast patch-nosed snake *Salvadora hexalepis virgultea*	US: – CA: SSC MSHCP: NC	Coastal chaparral, washes, sandy flats and rocky areas. Widely distributed throughout lowlands, up to 2,130 meters (7,000 feet) elevation, of Southern California from coast to the eastern border.	Active diurnally throughout most of the year	**Moderate.** There are two known records of occurrence (CNDDB 1999) within 9 miles of the project site. Potentially suitable habitat (small mammal burrows and coastal sage scrub) is present within the project site.

Table P: Special-Status Species Potentially Occurring in the Project Vicinity (Not Covered by MSHCP)

Species	Status	Habitat and Distribution	Growth Form and Blooming Period/Activity Period	Occurrence Probability
Two-striped garter snake *Thamnophis hammondii*	US: – CA: SSC MSHCP: NC	Highly aquatic. Only in or near permanent sources of water. Streams with rocky beds supporting willows or other riparian vegetation. From Monterey County to northwest Baja California.	Diurnal year-round	**Present.** Species was observed during 2020 surveys. Vail Lake provides suitable foraging and breeding habitat.
California glossy snake *Arizona elegans occidentalis*	US: – CA: SSC MSHCP: NC	Scrub and grassland habitats, often with loose or sandy soils. Patchily distributed from the eastern portion of San Francisco Bay to southern San Joaquin Valley and in non-desert areas of southern California. Also occurs in Baja California, Mexico.	Most active March through June (nocturnal)	**Moderate.** There are 16 known records of occurrence in the area and multiple records within 2 miles of the project site. Potentially suitable habitat and soils are present within the project site.
Lark sparrow *Chondestes grammacus* (nesting)	US: – CA: SA MSHCP: NC	Inhabits open areas with scattered bushes or trees. Nests on the ground or in shrubs or small trees. Breeds throughout most of California west of the deserts.	Year-round	**Present.** Species was observed during 2020 surveys.
Great egret *Ardea alba* (nesting)	US: – CA: SA MSHCP: NC	Wetlands, margins of lakes and streams, irrigated croplands, pastures, irrigation ditches, tidal estuaries, fresh- and brackish-water margins. Common in Southern California all year except for high mountains and deserts. Nests in large trees, usually near water.	Year-round	**Present.** Species was observed during 2020 surveys.
Snowy egret *Egretta thula* (nesting colony)	US: – CA: SA MSHCP: NC	Marshes, lakes, ponds, shallow coastal habitats, wetland habitats; inland found along railroads, agriculture fields.	Year-round diurnal activity	**Present.** Species was observed during 2020 surveys.
Least bittern *Ixobrychus exilis* (nesting)	US: – CA: SSC MSHCP: NC	Nests and forages in dense emergent marsh vegetation. Southern California populations are non-migratory. Found in Mystic Lake, San Jacinto Wildlife Area, and Santa Ana River.	Year-round	**Present.** Species was observed during 2020 surveys.

Table P: Special-Status Species Potentially Occurring in the Project Vicinity (Not Covered by MSHCP)

Species	Status	Habitat and Distribution	Growth Form and Blooming Period/Activity Period	Occurrence Probability
Allen's hummingbird *Selasphorus sasin* (nesting)	US: – CA: SA MSHCP: NC	Nests in residential areas, chaparral, open oak woodland, and riparian woodland in coastal areas the length of California. Generally restricted to exotic vegetation in urban areas in winter.	Year round in coastal Southern California; February through July elsewhere	**High.** Suitable habitat is present within the project site. This species may have been detected during 2020 surveys (was not possible to distinguish from rufous hummingbird *S. rufus*).
Lawrence's goldfinch *Spinus lawrencei* (=*Carduelis l.*) (nesting)	US: – CA: SA MSHCP: NC	Usually inhabits oak woodlands, but also uses chaparral, riparian woodlands, coastal scrub, forests, pinyon-juniper woodlands, plantings of cypress, cedars, or junipers, tall weedy and adjacent rural residential areas. A water source such as a stream, small lake, or farm pond within 0.5 km is probably required. Nests throughout much of the non-desert portion of California and Baja California.	Fairly common April through August; otherwise uncommon	**Present.** Species was observed during 2020 surveys.
Nuttall's woodpecker *Picoides nuttallii* (nesting)	US: – CA: SA MSHCP: NC	Resident in oak and riparian woodland throughout most of California west of the deserts.	Year-round	**Present.** Species was observed during 2020 surveys.
Summer tanager *Piranga rubra* (nesting)	US: – CA: SSC MSHCP: NC	Uncommon and local in Southern California. Breeds in riparian woodland along the Colorado River and at widely scattered locations, in desert regions, from Inyo County and northeast Kern County southward.	Year-round	**Present.** Species was observed during 2020 surveys.
Black-chinned sparrow *Spizella atrogularis* (nesting)	US: – CA: SA MSHCP: NC	Nests in chaparral, sagebrush, and arid scrub in foothills of the southern three-quarters of California.	April through July	**Present.** Species was observed during 2020 surveys.
Western mastiff bat *Eumops perotis californicus*	US: – CA: SSC MSHCP: NC	Occurs in many open, semi-arid to arid habitats, including conifer and deciduous woodlands, coastal scrub, grasslands, chaparral, etc.; roosts in crevices in vertical cliff	Year-round; nocturnal	**Present.** Species was observed during 2020 surveys.

Table P: Special-Status Species Potentially Occurring in the Project Vicinity (Not Covered by MSHCP)

Species	Status	Habitat and Distribution	Growth Form and Blooming Period/Activity Period	Occurrence Probability
		faces, high buildings, and tunnels, and travels widely when foraging.		
Western red bat *Lasiurus blossevillii*	US: CA: SSC MSHCP: NC	Roosts in the foliage of trees and shrubs, commonly in edge habitats along streams or open fields, and sometimes in orchards or urban areas. Often associated with riparian habitats, particularly those containing sycamores and cottonwoods.	Year-round; nocturnal	**Present.** Species was observed during 2020 surveys.
Hoary bat *Lasiurus cinereus*	US: CA: SA MSHCP: NC	Forages over a wide range of habitats, but prefers open habitats with access to trees for roosting, and water. Ranges throughout most of California.	Primarily the warmer months; leaves colder areas during winter	**Present.** Species was observed during 2020 surveys.
Yuma myotis *Myotis yumanensis*	US: – CA: SA MSHCP: NC	Optimal habitats are open forests and woodlands with sources of water over which to feed. Common and widespread in California. Uncommon in the Mojave and Colorado Desert regions, except for mountains. Ranging generally from sea level to 2,440 meters (8,000 feet). Roosts in buildings, mines, caves, or crevices; occasionally in swallow nests and under bridges.	Primarily the warmer months	**Present.** Species was observed during 2020 surveys.
Pocketed free-tailed bat *Nyctinomops femorosaccus*	US: – CA: SSC MSHCP: NC	Usually associated with cliffs, rock outcrops, or slopes. May roost in buildings (including roof tiles) or caves. Rare in California, where it is found in Riverside, San Diego, Imperial and possibly Los Angeles Counties. More common in Mexico.	Year-round; nocturnal	**Present.** Species was observed during 2020 surveys.
Dulzura pocket mouse *Chaetodipus californicus femoralis*	US: – CA: SSC MSHCP: NC	Found in a variety of habitats including coastal sage scrub, chaparral, and grassland in northern Baja California, San Diego and extreme southwestern and western Riverside Counties. Limit of range to northwest (at interface with *C. c. dispar*) unclear.	Year-round	**Moderate.** Suitable habitat is present within the project site, but species was not detected during small mammal surveys. No CNDDB records within the project site.

Table P: Special-Status Species Potentially Occurring in the Project Vicinity (Not Covered by MSHCP)

Species	Status	Habitat and Distribution	Growth Form and Blooming Period/Activity Period	Occurrence Probability
Jacumba pocket mouse *Perognathus longimembris internationalis*	US: – CA: SSC MSHCP: NC	Occurs in desert riparian, desert scrub, desert wash, arid coastal scrub, and sagebrush communities at moderate altitudes. Rarely found in rocky sites. Known from desert areas from east central San Diego County (San Felipe Valley and La Puerta Valley) south to Baja California. A report of this species from Temecula Creek (P. Brylski September 21, 1993 collection) in Riverside County was based on misidentification of Los Angeles pocket mouse (*Perognathus longimembris brevinasus*; Museum of Vertebrate Zoology No. 182967).	Nocturnal	**Low.** Species is not known from Riverside County.

Source: LSA (2021).
US: Federal Classifications
FD Federally delisted.
CA: State Classifications
1B California Rare Plant Rank 1B – rare, threatened or endangered in California and elsewhere.
2B California Rare Plant Rank 2B – rare, threatened or endangered in California, but more common elsewhere.
SSC Species of Special Concern. Refers to animals with vulnerable or seriously declining populations.
SA Special Animal. Refers to any other animal monitored by the CNDDB, regardless of its legal or rarity status.
MSHCP: Western Riverside County MSHCP Status
NC Species is not covered under the MSHCP.

Special-status mammals not covered by the MSHCP that were observed during surveys include several bat species and Dulzura pocket mouse. Impacts to these species would include temporary loss of habitat and indirect impacts from noise, dust, and increased human activities, as well as potential direct mortality during vegetation clearing and construction as individuals might be below ground or roosting. Dulzura pocket mouse has a moderate probability of occurrence and was not detected during mammal surveys. It is unknown whether this species occurs within the project impact area. Impacts to a relatively small area of potentially suitable habitat adjacent to existing disturbed areas would not be significant as it would not substantially affect the overall availability of suitable habitat in the vicinity of the project. Several species of bats were detected within the project area, and it is likely that roosts are present. California Fish and Game Code Section 4150 prohibits "take" of bat species. Impacts to maternal roosts during the breeding season or of roosting sites during the day could result in direct "take;" however, the mitigation measure below has been identified below to address this.

Although these species are not covered under the MSHCP, implementation of MSHCP Standard BMPs (see Section 10.0), the MSHCP Guidelines Pertaining to the Urban/Wildlands Interface (see Section 9.0), and the mitigation measures identified in this report would avoid and/or minimize impacts to these species and their habitats. In addition to these measures, the following mitigation measure would minimize impacts to bat species that may be affected by the project.

BIO-11 RCWD shall retain a CDFW-approved bat biologist to conduct a focused habitat assessment at buildings, rock outcrops, and mature trees and snags that will be subject to project-related impacts. The focused habitat assessment shall be conducted prior to or during the maternity season (April 1 through August 31). At locations where suitable roosting habitat is identified, the CDFW-approved bat biologist retained by RCWD shall conduct follow-up nighttime surveys for roosting bats. The nighttime surveys shall include a combination of acoustic and exit count methods, and shall take place during the bat maternity season to enable detection of maternity-roosting bats. If maternity roosts are identified within the project area, the following measures shall be implemented:

RCWD shall retain a CDFW-approved bat biologist to confirm the absence of roosting bats prior to removal of buildings or rock outcrops with potential to house roosting bats. If bats are found or if the absence of bats cannot be confirmed, the bat biologist shall install or directly supervise installation of humane eviction devices and exclusionary material or other method(s) to prevent bats from roosting in these areas. Implementation of the humane eviction/exclusions is typically performed in the fall (September or October) preceding construction activity at a given location to avoid impacts to hibernating bats during the winter months or during the maternity season (April 1 through August 31), when nonvolant (flightless) young are present. Any humane eviction/exclusion methods shall be implemented at least 10 days prior to the demolition of a structure or rock outcrop housing bats to allow sufficient time for the bats to vacate the roost feature(s).

Removal of mature trees and snags shall occur during the fall months (September or October) to the greatest extent feasible, to avoid the bat maternity season (April 1 through August 31) and avoid the potential for "take" of nonvolant (flightless) young. Trees and snags that have been identified as confirmed or potential roost sites require a two-step removal process and the involvement of a CDFW-approved bat biologist, retained by RCWD, to minimize the potential for roosting bat mortality during this activity. This two-step removal shall occur over two consecutive days as follows: on Day 1, branches and limbs not containing cavities, as identified by the CDFW-approved bat biologist, shall be removed. On Day 2, the remainder of the tree shall be removed without supervision by a bat biologist. The disturbance caused by limb removal, followed by an interval of one evening, will allow bats to safely abandon the roost.

To account for potential minor changes in impact area associated with final design, including utility relocation planning, contractor staging and work location needs, and construction methodology, the

following measure has been included to ensure that actual impacts to special-status species and associated habitat are adequately mitigated.

BIO-12 RCWD's biologist shall review the final anticipated temporary and permanent impact areas as part of the plan preparation based on final construction plans, including any changes in anticipated contractor staging configuration, utility work, disposal areas, access requirements, or revisions to construction methodology that could affect impact limits. In the event that impacts are reduced, RCWD may coordinate with applicable resource agencies to determine whether compensatory mitigation requirements should be reduced. In the event that work is proposed beyond the identified limits of impact, RCWD shall retain a qualified biologist to determine the potential for special-status resources to occur, including riparian/riverine areas, special-status species, identified Critical Habitat, jurisdictional waters or wetlands, or CDFW jurisdictional riparian or streambed areas. Additional surveys for special-status species shall be conducted if required prior to initiation of construction activities in the area beyond the limits of impact. If additional special-status resources would be affected, compensatory mitigation shall be adjusted in coordination with appropriate resource agencies, including the RCA. Upon completion of construction and prior to habitat restoration, RCWD's biologist shall conduct a review of the final impact areas to determine whether total impacts differ from those identified in this report. If appropriate, compensatory mitigation totals shall be adjusted in consultation with appropriate resource agencies.

No further mitigation is required.

13.4 WILDLIFE MOVEMENT CORRIDORS AND NURSERY SITES

Wildlife movement includes seasonal migration along corridors, as well as daily movements for foraging. Migration corridors may include areas of unobstructed movement of deer, riparian corridors providing cover for migrating birds, routes between breeding waters and upland habitat for amphibians, and between roosting and feeding areas for birds.

The project site occurs at the existing Vail Lake Dam and the area downstream, within portions of Temecula Creek and along existing roads and residential and agricultural areas. Current wildlife movement is mostly unrestricted with the exception of the western portion of the project site where residential and agricultural land uses reduce or eliminate the ability for wildlife to move freely. The area provides suitable nursery sites for a wide variety of animal species.

The project site does not occur within an existing or proposed linkage as identified in the MSHCP, but it is within Proposed Core 7 (see Section 3). Core areas provide nesting habitat/nursery sites for a variety of species. Proposed Linkage 24 occurs to the west of the project site along Temecula Creek and Linkages 17 and 18 occur to the south of the project site along Kolb Creek and Arroyo Seco Creek, respectively. The project site contains portions of Temecula Creek which provides riparian habitat and connects to Proposed Linkage 24 outside of the project site. Temecula Creek within the project area provides a natural movement corridor for wildlife. Construction activities

would not preclude overall wildlife movement throughout the area or use of the area as a nursery site, as ample vacant lands occur on either side of the impact area; however, project activities may temporarily disrupt movement through the area particularly for terrestrial invertebrates, reptiles, and amphibians, and would limit the use of areas within and immediately adjacent to the project footprint as breeding/nesting habitat. Impacts to structures, rocky areas, and vegetation could affect the use of these areas as maternal roost sites by bats. Compliance with MSHCP Standard BMPs (see Section 10.0), MSHCP Guidelines for the Urban/Wildlands Interface (see Section 9.0), and mitigation measures identified in this report will avoid and minimize impacts to wildlife movement and nursery sites. Upon project completion, no new barriers to wildlife movement would be introduced (the proposed dam would replace the existing dam, which is an existing barrier to aquatic wildlife movement along Temecula Creek). No further mitigation would be required.

13.5 NATURAL COMMUNITIES OF INTEREST

Riparian habitats, oak woodlands, and vernal pools are among the natural communities of interest to the CDFW. Riparian habitats including alluvial fan sage scrub, riparian scrub and riparian forest occur within the survey area. However, only alluvial fan sage scrub and riparian scrub are anticipated to be impacted as part of project activities. These two natural communities of interest are also considered riparian/riverine under the MSHCP. The preparation of a DBESP will be required for impacts to MSHCP riparian/riverine, which will analyze impacts and provide appropriate mitigation to be approved by the resource agencies. See Section 5.1 for additional details regarding MSHCP riparian/riverine, and Section 11.3 for impacts to CDFW-jurisdictional resources.

13.6 WETLANDS

Wetlands and riparian/riverine resources are present on the project site, as discussed in Sections 5.1 and 11.0 of this report. No further discussion is required for this topic under CEQA.

13.7 LOCAL POLICIES AND ORDINANCES PROTECTING BIOLOGICAL RESOURCES

Riverside County Ordinance No. 559 addresses trees above 5,000 feet in elevation and is not applicable to the project. Riverside County Ordinance No. 663 addresses payment of fees for the SKR HCP. RCWD will comply with this ordinance and pay the required fees.

No mitigation is required.

13.8 INDIRECT EFFECTS

Indirect impacts to surrounding areas as a result of the project may include, but are not limited to, increased dust, noise, lighting, traffic, and storm water runoff. Because of the scale of the project and its location within a landscape that is primarily undeveloped, indirect impacts to sensitive biological resources may occur. Implementation of MSHCP Standard BMPs (see Section 10.0), MSHCP Guidelines Pertaining to the Urban/Wildlands Interface (see Section 9.0), and mitigation measures identified in this report will avoid and minimize indirect effects to sensitive biological resources within and surrounding the project site. Upon project completion, no substantial change in indirect effects is anticipated, as there would not be an increase in human activity associated with

operations and maintenance compared to existing conditions. The following measure has been included to specifically require delineation and avoidance of off-site environmentally sensitive areas.

BIO-13 Prior to the start of construction activities, orange Environmentally Sensitive Area fencing or similar highly-visible material that delineates sensitive biological resources that occur within 5 feet of project impact areas shall be placed by the construction contractor under the supervision of a qualified biologist retained by RCWD. Such areas will be treated as "off-limits" during construction, in accordance with the MSHCP Standard BMPs.

No further mitigation is required.

13.9 CUMULATIVE EFFECTS

Impacts from the project are primarily associated with construction. Operations and maintenance activities are expected to be substantially similar following construction of the proposed dam; the project is not anticipated to introduce new edge effects or habitat fragmentation. Construction impacts would include temporary and permanent loss of native vegetation communities (riparian scrub, alluvial fan sage scrub, Riversidian sage scrub), including some jurisdictional waters and wetlands. These impacts would be highly localized and would be mitigated through compliance with the MSHCP, on-site restoration of temporary impact areas, and compensatory mitigation as appropriate. Impacts to threatened and endangered species would occur, including direct loss of Nevin's barberry individuals and potentially direct mortality of Quino checkerspot butterfly larvae, loss of habitat for least Bell's vireo, coastal California gnatcatcher, and southwestern willow flycatcher, as well as other non-listed species. These impacts would be avoided and minimized to the extent practicable, and are not anticipated to jeopardize the continued presence of these species within the area.

The MSHCP provides a comprehensive approach to the regional conservation of these habitats and, as a regional plan, serves to provide mitigation for cumulative impacts to covered species. Project compliance and consistency with the MSHCP ensures that any cumulative impacts to covered species are effectively mitigated. Special-status species that are not covered by the MSHCP also benefit from the surveys, conservation, and other measures of the MSHCP because they occupy many of the same habitats. Implementation of MSHCP Standard BMPs (see Section 10.0), MSHCP Guidelines Pertaining to the Urban/Wildlands Interface (see Section 9.0), and mitigation measures identified in this report will avoid and minimize impacts to sensitive biological resources. The proposed project would not preclude attainment of conservation goals within Proposed Core 7, nor would it adversely affect Public/Quasi-Public Lands consisting of Vail Lake. No further mitigation is required for cumulative impacts.

14.0 REFERENCES

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15.0 CERTIFICATION STATEMENT

I hereby certify that the statements furnished in this report present the data and information required for this biological evaluation and the facts, statements, and information presented are true and correct to the best of my knowledge and belief.

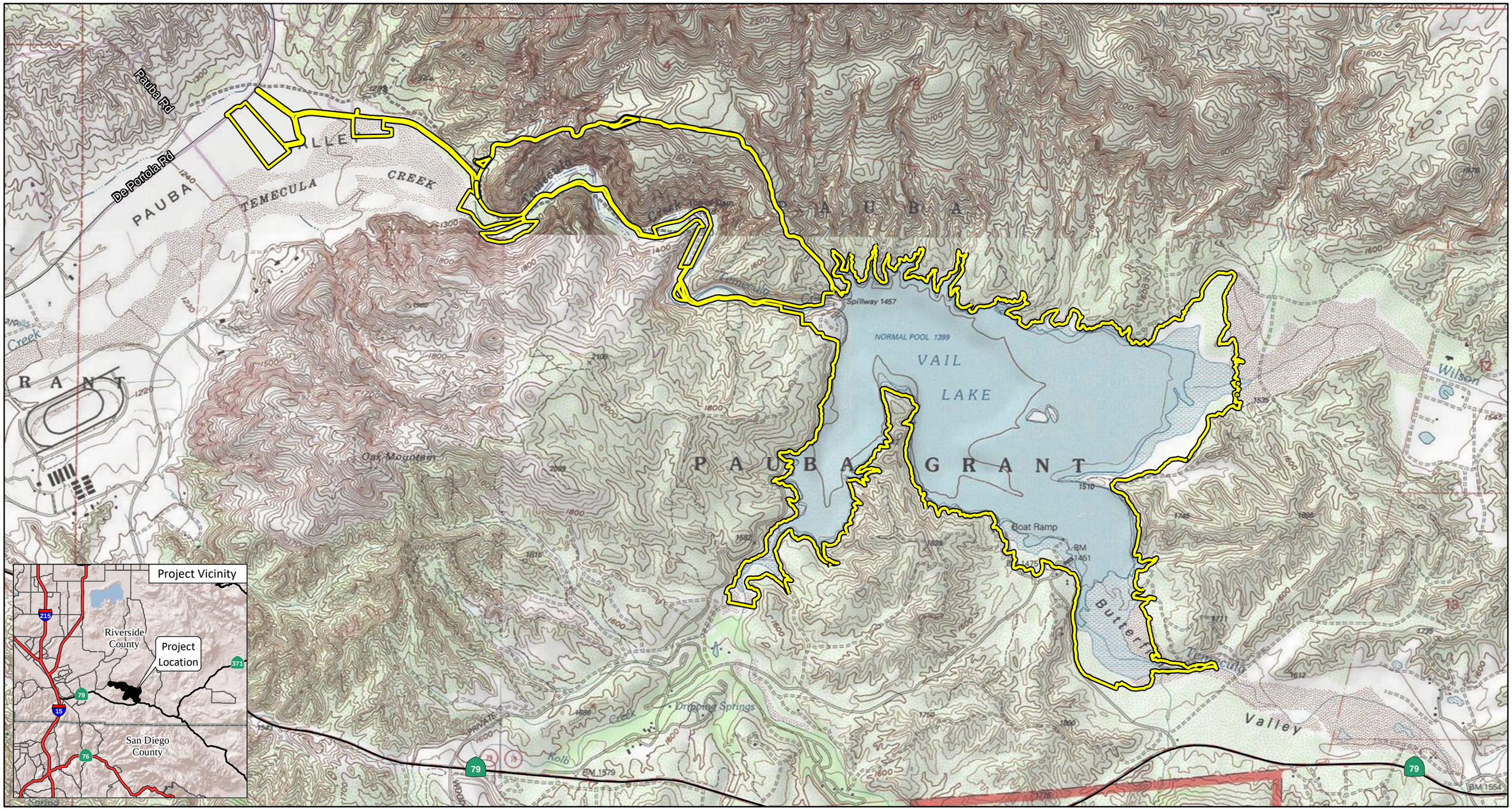
Date: November 23, 2022 Signature: A. Beazley

Adrianne Beazley
Associate/Environmental Planning/Biology

APPENDIX A

FIGURES

1. Project Location and Vicinity
2. Project Plans
3. Reserve Assembly
4. Soils
5. Proposed Impacts to Vegetation/Land Cover
6. Site Photographs
7. Proposed Impacts to Jurisdictional Waters
8. Threatened and Endangered Species Observations and Critical Habitat
9. MSHCP Survey Areas
10. Mitigation Opportunities



LSA

LEGEND

Biological Study Area

FIGURE 1

0 1000 2000

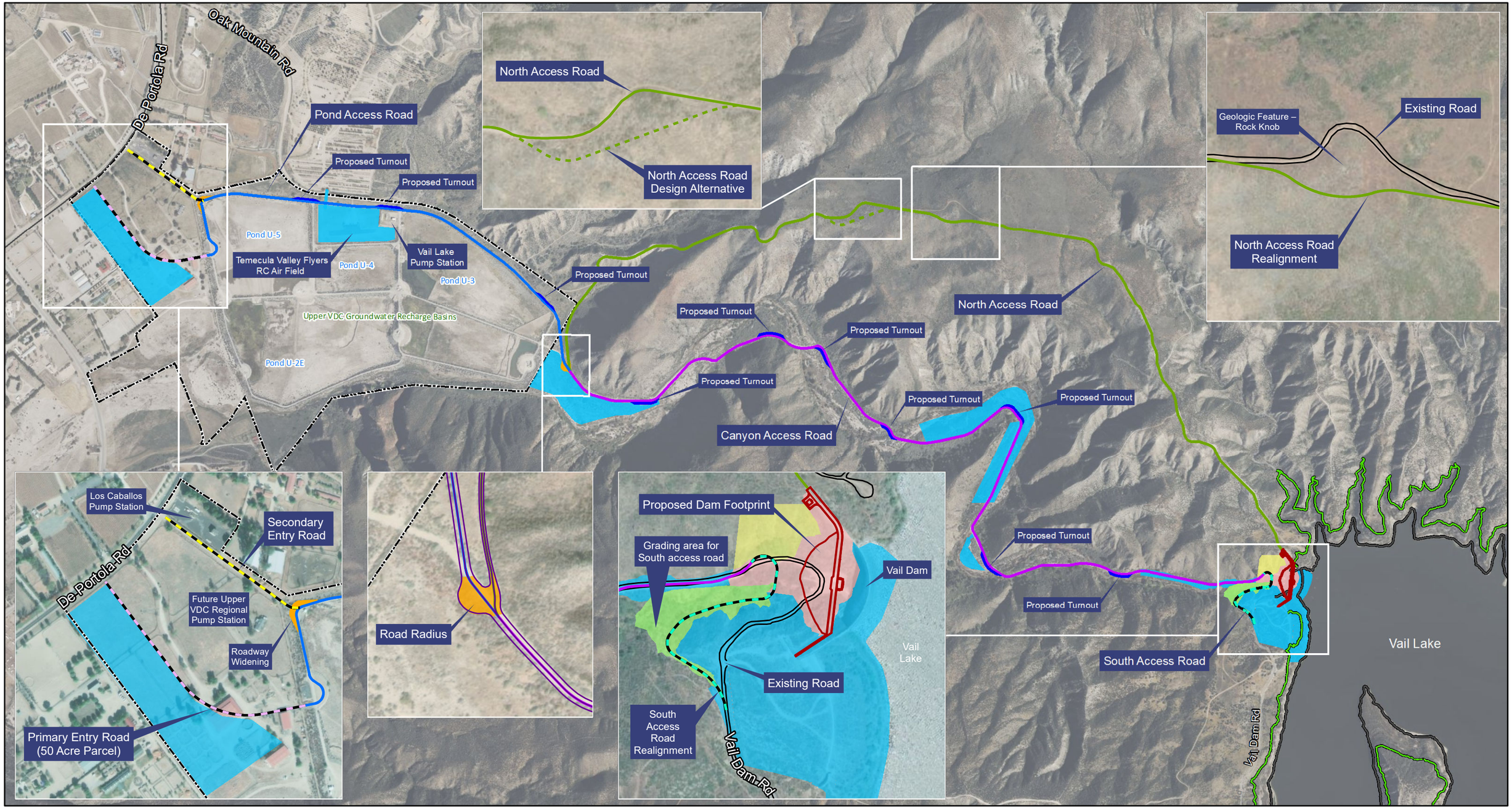
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SOURCE: USGS 7.5' Quad - *Bachelor Mtn, CA* (1978), *Pechanga, CA* (1988), *Sage, CA* (1954), and *Vail Lake, CA* (1988)

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Vail Dam Seismic and Hydrologic Remediation Project

Project Location and Vicinity



LSA

LEGEND

- Canyon Access Road
- North Access Road
- North Access Road Design Alternative
- Primary Entry Road (50 Acre Parcel)
- Secondary Entry Road
- Pond Access Road
- Realigned South Access Road
- Proposed Truck Turnout
- Roadway Radius
- Proposed Dam Footprint
- Property Boundary
- Dam Construction Area
- South Access Road Construction Area
- Staging and Laydown Area
- Temporary Construction Area
- Spillway Crest Elevation (1472.6' NAVD88)
- Current Water Level (1428.2' NAVD88)

0 500 1000
FEET

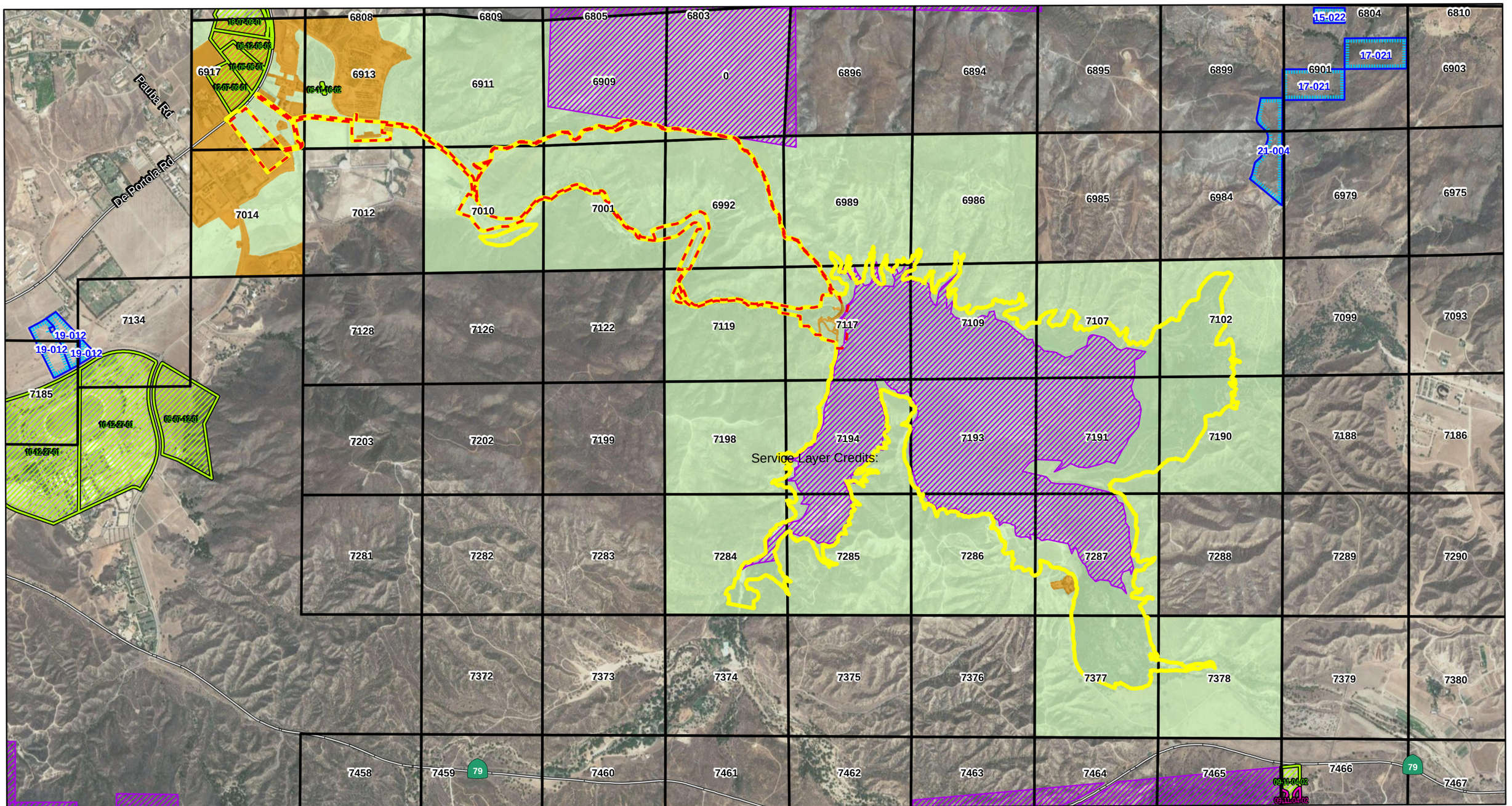
SOURCE: Bing Maps (2020); AECOM (6/2022)

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FIGURE 2

Vail Dam Seismic and Hydrologic Remediation Project

Project Plans



LSA

LEGEND

- Biological Study Area
- Project Site

Riverside County MSHCP

- Criteria Cells
- PQP Conserved Lands
- RCA Conserved Lands

- Developed Land
- Undeveloped Land

JPR Sites

- Proposed Development
- Proposed MSHCP Conservation

0 1000 2000
FEET

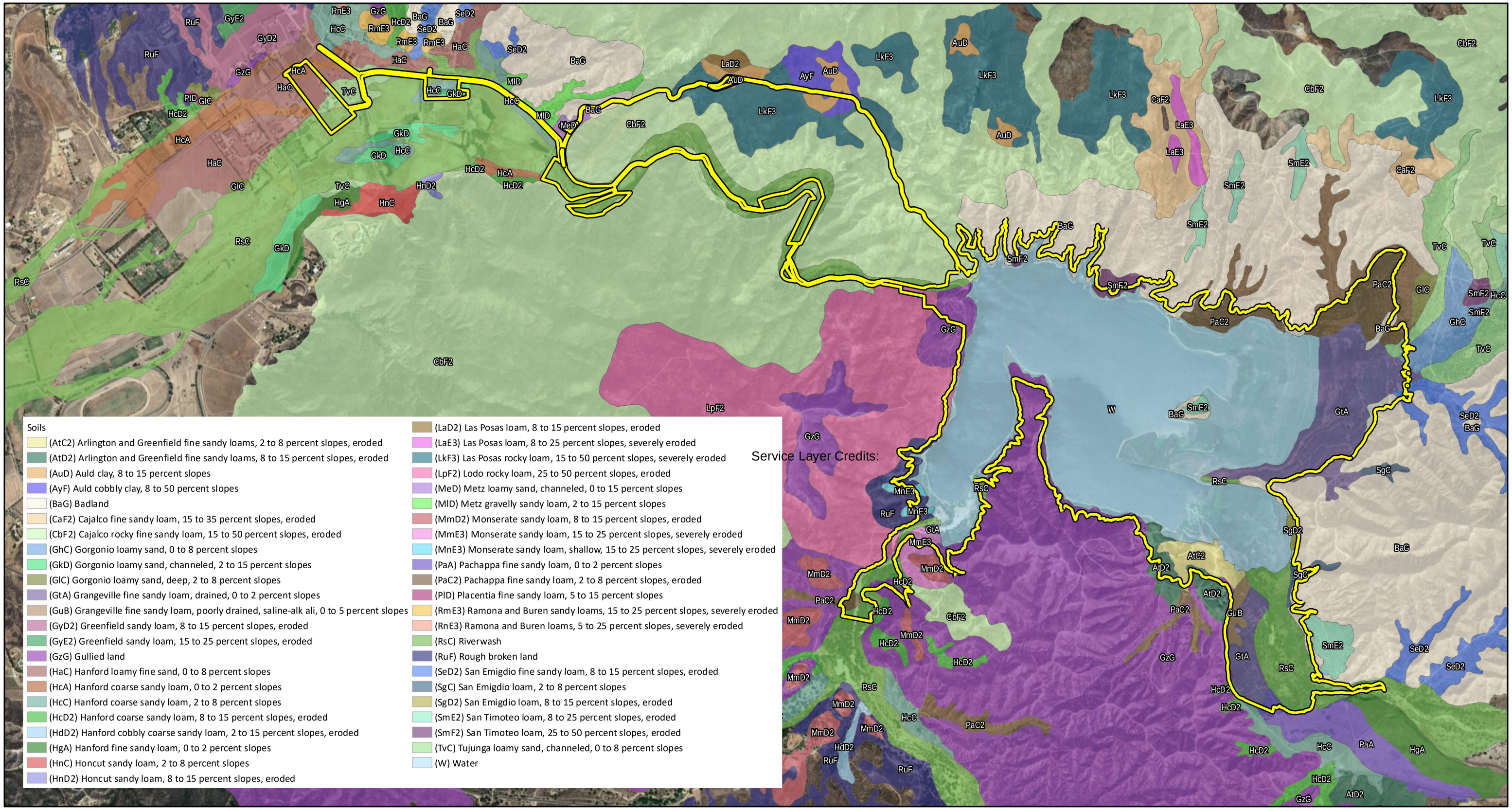
FIGURE 3

Vail Dam Seismic and Hydrologic Remediation Project

Reserve Assembly

SOURCE: Google Earth (2020); County of Riverside, Regional Conservation Authority (2021)

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LSA

LEGEND

Biological Study Area

FIGURE 4

0 900 1800

FEET

SOURCE: Google Maps (2022); Esri SSURGO Soils (2022)

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Vail Dam Seismic and Hydrologic Remediation Project

Soils



LSA

LEGEND

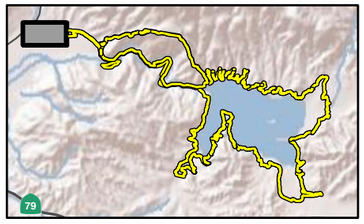
- Biological Study Area
- Photo Location and Direction
- Permanent Impact Area
- Temporary Impact Area

Vegetation

- Agriculture (AG)
- Alluvial Fan Sage Scrub (AFSS)
- Bare Ground (BG)
- Chaparral (CHAP)
- Developed (DEV)
- Disturbed (DIST)
- Lakeshore (LAKE)
- Non-native Grassland (NNG)
- Open Water (OW)
- Riparian Forest (RF)
- Riparian Scrub (RS)
- Riversidian Sage Scrub (RSS)
- Streambed (STR)
- Seasonal Pond

N

0 100 200
FEET



SOURCE: Google Maps (2020); LSA UAV Imagery (2/2020 and 3/2020)

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FIGURE 5

Sheet 1 of 11

Vail Dam Seismic and Hydrologic Remediation Project

Proposed Impacts to Vegetation/Land Cover



LSA

LEGEND

- Biological Study Area
- Photo Location and Direction
- Permanent Impact Area
- Temporary Impact Area

Vegetation

- Agriculture (AG)
- Alluvial Fan Sage Scrub (AFSS)
- Bare Ground (BG)
- Chaparral (CHAP)
- Developed (DEV)
- Disturbed (DIST)
- Lakeshore (LAKE)
- Non-native Grassland (NNG)
- Open Water (OW)
- Riparian Forest (RF)
- Riparian Scrub (RS)
- Riversidian Sage Scrub (RSS)
- Streambed (STR)
- Seasonal Pond

N

0 100 200
FEET

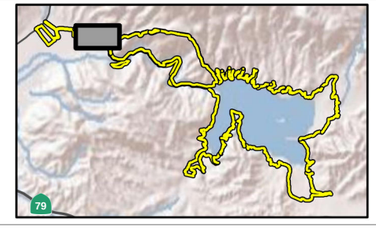


FIGURE 5
Sheet 2 of 11

Vail Dam Seismic and Hydrologic Remediation Project

Proposed Impacts to Vegetation/Land Cover

SOURCE: Google Maps (2020); LSA UAV Imagery (2/2020 and 3/2020)

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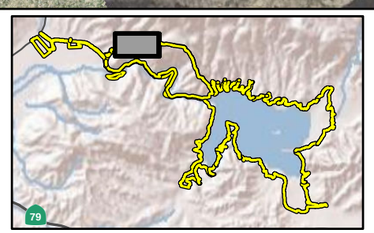
- Biological Study Area
- Photo Location and Direction
- Permanent Impact Area
- Temporary Impact Area

Vegetation

- Agriculture (AG)
- Alluvial Fan Sage Scrub (AFSS)
- Bare Ground (BG)
- Chaparral (CHAP)
- Developed (DEV)
- Disturbed (DIST)
- Lakeshore (LAKE)
- Non-native Grassland (NNG)
- Open Water (OW)
- Riparian Forest (RF)
- Riparian Scrub (RS)
- Riversidian Sage Scrub (RSS)
- Streambed (STR)
- Seasonal Pond

N

0 100 200
FEET



SOURCE: Google Maps (2020); LSA UAV Imagery (2/2020 and 3/2020)

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FIGURE 5
Sheet 3 of 11

Vail Dam Seismic and Hydrologic Remediation Project

Proposed Impacts to Vegetation/Land Cover



LSA

LEGEND

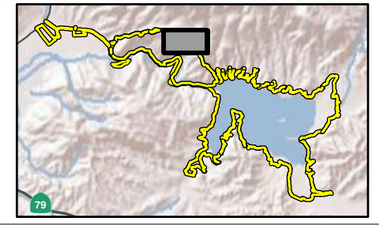
- Biological Study Area
- Photo Location and Direction
- Permanent Impact Area
- Temporary Impact Area

Vegetation

- Agriculture (AG)
- Alluvial Fan Sage Scrub (AFSS)
- Bare Ground (BG)
- Chaparral (CHAP)
- Developed (DEV)
- Disturbed (DIST)
- Lakeshore (LAKE)
- Non-native Grassland (NNG)
- Open Water (OW)
- Riparian Forest (RF)
- Riparian Scrub (RS)
- Riversidian Sage Scrub (RSS)
- Streambed (STR)
- Seasonal Pond

N

0 100 200
FEET



SOURCE: Google Maps (2020); LSA UAV Imagery (2/2020 and 3/2020)

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FIGURE 5

Sheet 4 of 11

Vail Dam Seismic and Hydrologic Remediation Project

Proposed Impacts to Vegetation/Land Cover



LSA

LEGEND

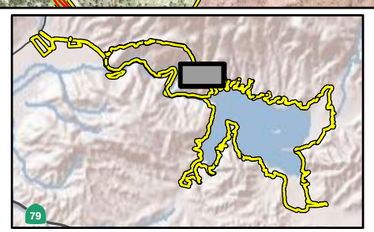
- Biological Study Area
- Photo Location and Direction
- Permanent Impact Area
- Temporary Impact Area

Vegetation

- Agriculture (AG)
- Alluvial Fan Sage Scrub (AFSS)
- Bare Ground (BG)
- Chaparral (CHAP)
- Developed (DEV)
- Disturbed (DIST)
- Lakeshore (LAKE)
- Non-native Grassland (NNG)
- Open Water (OW)
- Riparian Forest (RF)
- Riparian Scrub (RS)
- Riversidian Sage Scrub (RSS)
- Streambed (STR)
- Seasonal Pond

N

0 100 200
FEET



SOURCE: Google Maps (2020); LSA UAV Imagery (2/2020 and 3/2020)

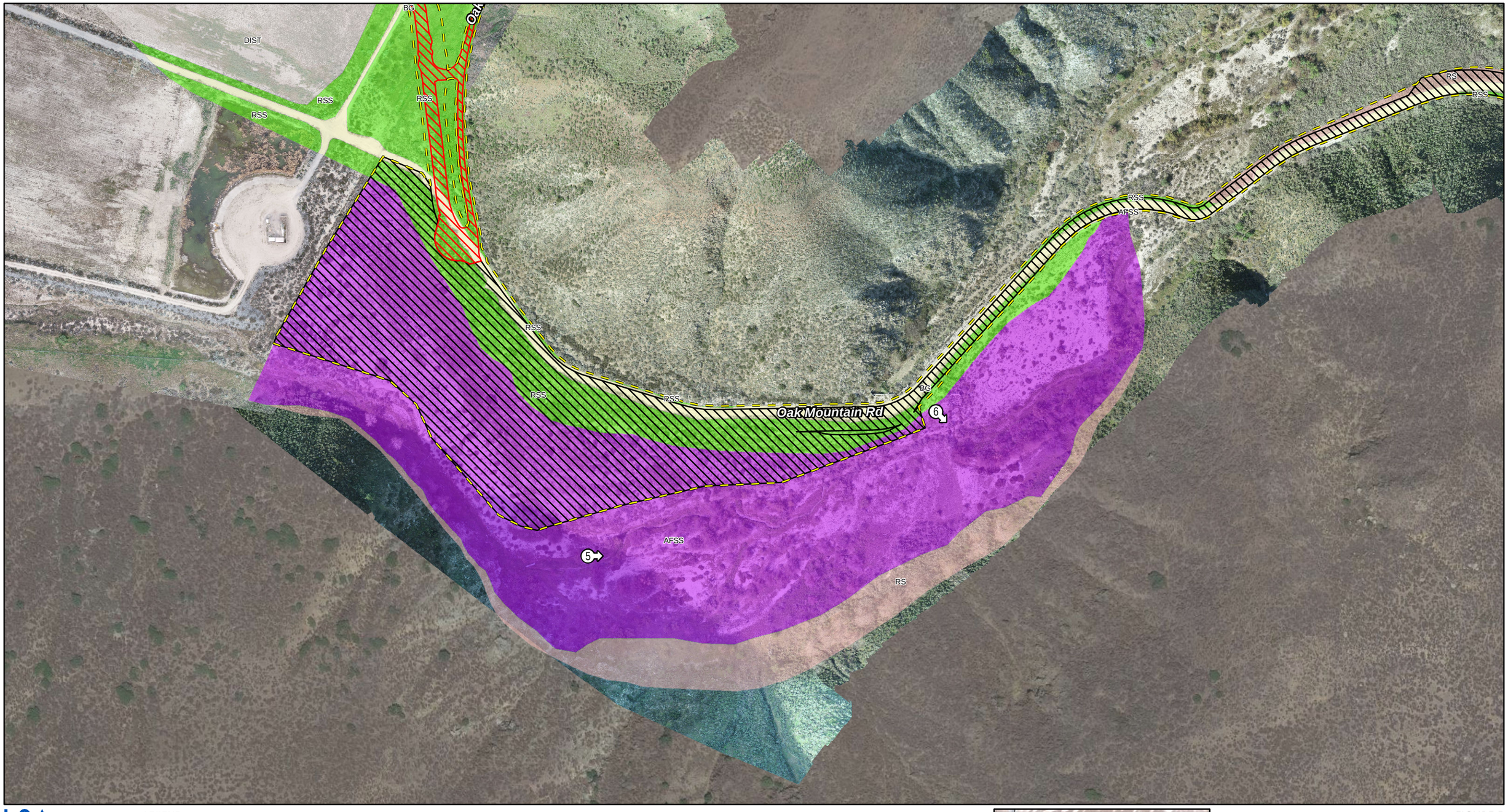
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FIGURE 5

Sheet 5 of 11

Vail Dam Seismic and Hydrologic Remediation Project

Proposed Impacts to Vegetation/Land Cover



LSA

LEGEND

- Biological Study Area
- Photo Location and Direction
- Permanent Impact Area
- Temporary Impact Area

Vegetation

- Agriculture (AG)
- Alluvial Fan Sage Scrub (AFSS)
- Bare Ground (BG)
- Needs to be Defined
- Chaparral (CHAP)
- Developed (DEV)
- Disturbed (DIST)
- Lakeshore (LAKE)
- Non-native Grassland (NNG)
- Open Water (OW)
- Riparian Forest (RF)
- Riparian Scrub (RS)
- Riversidian Sage Scrub (RSS)
- Streambed (STR)
- Seasonal Pond

N

0 100 200
FEET

SOURCE: Google Maps (2020); LSA UAV Imagery (2/2020 and 3/2020)

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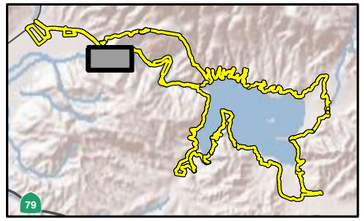


FIGURE 5
Sheet 6 of 11

Vail Dam Seismic and Hydrologic Remediation Project

Proposed Impacts to Vegetation/Land Cover



LSA

LEGEND

- Biological Study Area
- Photo Location and Direction
- Permanent Impact Area
- Temporary Impact Area

Vegetation

- Agriculture (AG)
- Alluvial Fan Sage Scrub (AFSS)
- Bare Ground (BG)
- Chaparral (CHAP)
- Developed (DEV)
- Disturbed (DIST)
- Lakeshore (LAKE)
- Non-native Grassland (NNG)
- Open Water (OW)
- Riparian Forest (RF)
- Riparian Scrub (RS)
- Riversidian Sage Scrub (RSS)
- Streambed (STR)
- Seasonal Pond

0 100 200
FEET

SOURCE: Google Maps (2020); LSA UAV Imagery (2/2020 and 3/2020)

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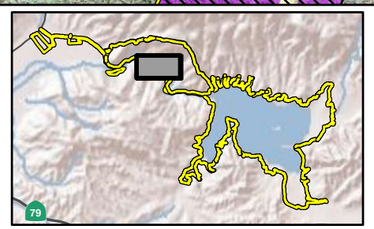


FIGURE 5
Sheet 7 of 11

Vail Dam Seismic and Hydrologic Remediation Project

Proposed Impacts to Vegetation/Land Cover



LSA

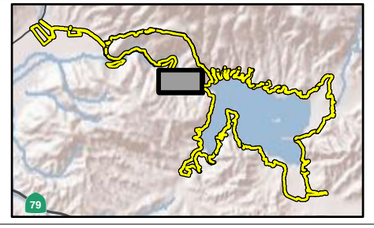
LEGEND

- Biological Study Area
- Photo Location and Direction
- Permanent Impact Area
- Temporary Impact Area

Vegetation

- Agriculture (AG)
- Alluvial Fan Sage Scrub (AFSS)
- Bare Ground (BG)
- Chaparral (CHAP)
- Developed (DEV)
- Disturbed (DIST)
- Lakeshore (LAKE)
- Non-native Grassland (NNG)
- Open Water (OW)
- Riparian Forest (RF)
- Riparian Scrub (RS)
- Riversidian Sage Scrub (RSS)
- Streambed (STR)
- Seasonal Pond

0 100 200
FEET



SOURCE: Google Maps (2020); LSA UAV Imagery (2/2020 and 3/2020)

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FIGURE 5
Sheet 8 of 11

Vail Dam Seismic and Hydrologic Remediation Project

Proposed Impacts to Vegetation/Land Cover



LSA

LEGEND

- Biological Study Area
- Photo Location and Direction
- Permanent Impact Area
- Temporary Impact Area

Vegetation

- Agriculture (AG)
- Alluvial Fan Sage Scrub (AFSS)
- Bare Ground (BG)
- Chaparral (CHAP)
- Developed (DEV)
- Disturbed (DIST)
- Lakeshore (LAKE)
- Non-native Grassland (NNG)
- Open Water (OW)
- Riparian Forest (RF)
- Riparian Scrub (RS)
- Riversidian Sage Scrub (RSS)
- Streambed (STR)
- Seasonal Pond

0 100 200
FEET

SOURCE: Google Maps (2020); LSA UAV Imagery (2/2020 and 3/2020)

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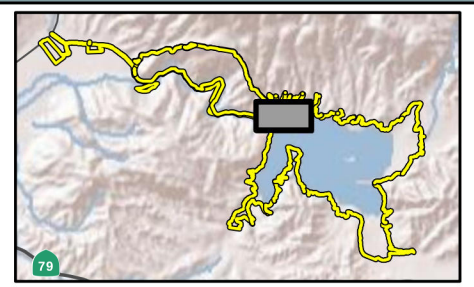


FIGURE 5

Sheet 9 of 11

Vail Dam Seismic and Hydrologic Remediation Project

Proposed Impacts to Vegetation/Land Cover

LSA

LEGEND

- Biological Study Area
- Photo Location and Direction
- Permanent Impact Area
- Temporary Impact Area

Vegetation

- Agriculture (AG)
- Alluvial Fan Sage Scrub (AFSS)
- Bare Ground (BG)
- Chaparral (CHAP)
- Developed (DEV)
- Disturbed (DIST)
- Lakeshore (LAKE)
- Non-native Grassland (NNG)
- Open Water (OW)
- Riparian Forest (RF)
- Riparian Scrub (RS)
- Riversidian Sage Scrub (RSS)
- Streambed (STR)
- Seasonal Pond

0 325 650
FEET

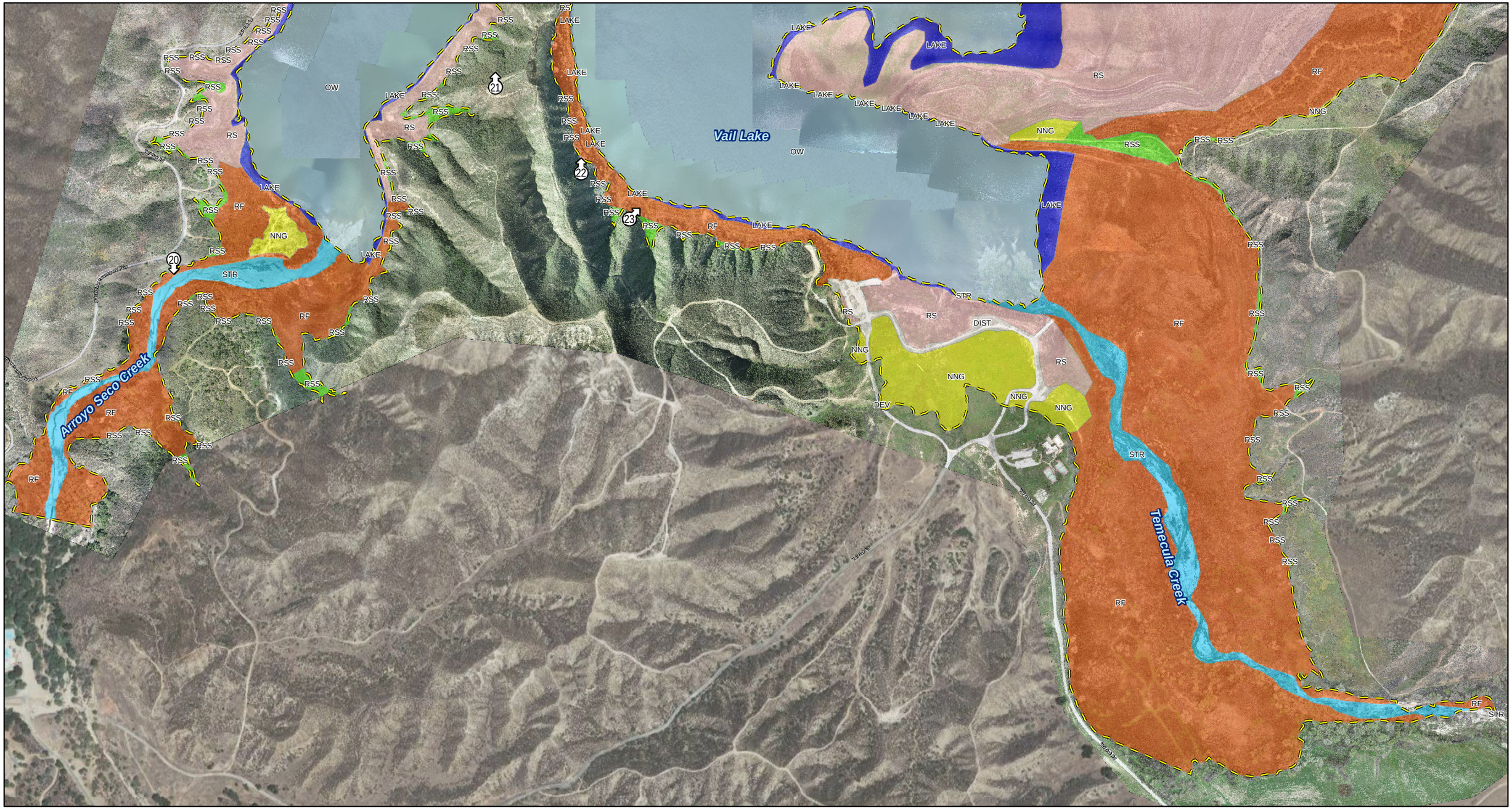
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FIGURE 5
Sheet 10 of 11

Vail Dam Seismic and Hydrologic Remediation Project

Proposed Impacts to Vegetation/Land Cover



LSA

LEGEND

- Biological Study Area
- Photo Location and Direction
- Permanent Impact Area
- Temporary Impact Area

Vegetation

- Agriculture (AG)
- Alluvial Fan Sage Scrub (AFSS)
- Bare Ground (BG)
- Chaparral (CHAP)
- Developed (DEV)
- Disturbed (DIST)
- Lakeshore (LAKE)
- Non-native Grassland (NNG)
- Open Water (OW)
- Riparian Forest (RF)
- Riparian Scrub (RS)
- Riversidian Sage Scrub (RSS)
- Streambed (STR)
- Seasonal Pond

0 325 650
FEET

SOURCE: Google Maps (2020); LSA UAV Imagery (2/2020 and 3/2020)

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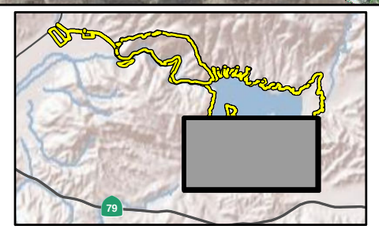


FIGURE 5
Sheet 11 of 11

Vail Dam Seismic and Hydrologic Remediation Project

Proposed Impacts to Vegetation/Land Cover



View of disturbed areas on 50-acre parcel between proposed Primary Entry Road and Secondary Entry Road, facing north. Photo date: 5/12/2020.



View of Pond U-5, facing west (Pond Access Road, not shown, is to the right). Photo date: 5/12/2020.



View from north of Temecula Flyer's Field, facing west; Pond Access Road, turnouts, and disposal area would be located in the left part of the photo. Photo date: 5/12/2020.



View from Pond Access Road at northeast corner of Pond U-3, facing northeast; North Access Road partially visible on left side of photo. Photo date: 5/12/2020.



UAV oblique overview of Canyon Access Road and proposed Staging and Laydown Area, facing east. Photo date: 2/19/2020.



View from Canyon Access Road of Temecula Creek near proposed Staging and Laydown Area, facing southeast. Photo date: 7/15/2020.

LSA

FIGURE 6
Sheet 1 of 5

Vail Dam Seismic and Hydrologic Remediation Project
Site Photographs



View of Canyon Access Road crossing of Temecula Creek (second crossing from west to east), facing south. Photo date: 7/15/2020.



View of Canyon Access Road crossing of Temecula Creek (second crossing from west to east), facing west. Photo date: 7/15/2020.



View of Canyon Access Road crossing of Temecula Creek (third crossing from west to east), facing southeast. Photo date: 7/15/2020.



UAV oblique overview of Canyon Access Road and proposed Staging and Laydown Area, facing north. Photo date: 2/19/2020.



UAV oblique overview of Canyon Access Road and proposed Staging and Laydown Area, facing west. Photo date: 2/19/2020.



UAV oblique overview of Canyon Access Road and proposed Staging and Laydown Area, facing north. Photo date: 2/19/2020.

LSA

FIGURE 6
Sheet 2 of 5

Vail Dam Seismic and Hydrologic Remediation Project
Site Photographs



View of Canyon Access Road crossing of Temecula Creek (fourth crossing from west to east), facing northwest. Photo date: 1/3/2021.



UAV oblique overview of Canyon Access Road and proposed Staging and Laydown Area, facing northwest. Photo date: 2/19/2020.



View of Canyon Access Road crossing of Temecula Creek (sixth crossing from west to east), facing east. Photo date: 1/3/2021.



View of North Access Road and seasonal pool, facing west. Photo date: 5/12/2020.



View of Vail Lake from proposed Staging and Laydown Area south of the existing dam and spillway weir, facing north towards dam and spillway. Photo date: 7/15/2020.



View of Vail Lake from proposed Staging and Laydown Area south of the existing dam and spillway weir, facing northeast towards Wilson Creek. Photo date: 7/15/2020.

LSA

FIGURE 6
Sheet 3 of 5

Vail Dam Seismic and Hydrologic Remediation Project
Site Photographs



View of Vail Lake from proposed Staging and Laydown Area south of the existing dam and spillway weir, facing southeast, showing Gooseneck Bay. Photo date: 7/15/2020.



View of Vail Lake from proposed Staging and Laydown Area south of the existing dam and spillway weir, facing south towards Arroyo Seco Creek. Photo date: 7/15/2020.



View from North Access Road of Vail Lake, facing southeast. Photo date: 5/12/2020.



View from North Access Road of Vail Lake and Vail Dam, facing southeast. Photo date: 5/12/2020.



View of Arroyo Seco Creek drainage from south of Gooseneck Bay, facing south. Photo date: 4/27/2020.



View of elevated knoll area on south side of Vail Lake (Gooseneck Bay is to the left), facing north. Photo date: 7/24/2020.

LSA

FIGURE 6
Sheet 4 of 5

Vail Dam Seismic and Hydrologic Remediation Project
Site Photographs



View of Vail Lake from the south side east of the elevated knoll, facing north. Photo date: 7/16/2020.



View of Vail Lake from south side east of elevated knoll, facing north, showing Temecula Creek and Wilson Creek drainages in the distance. Photo date: 7/16/2020.

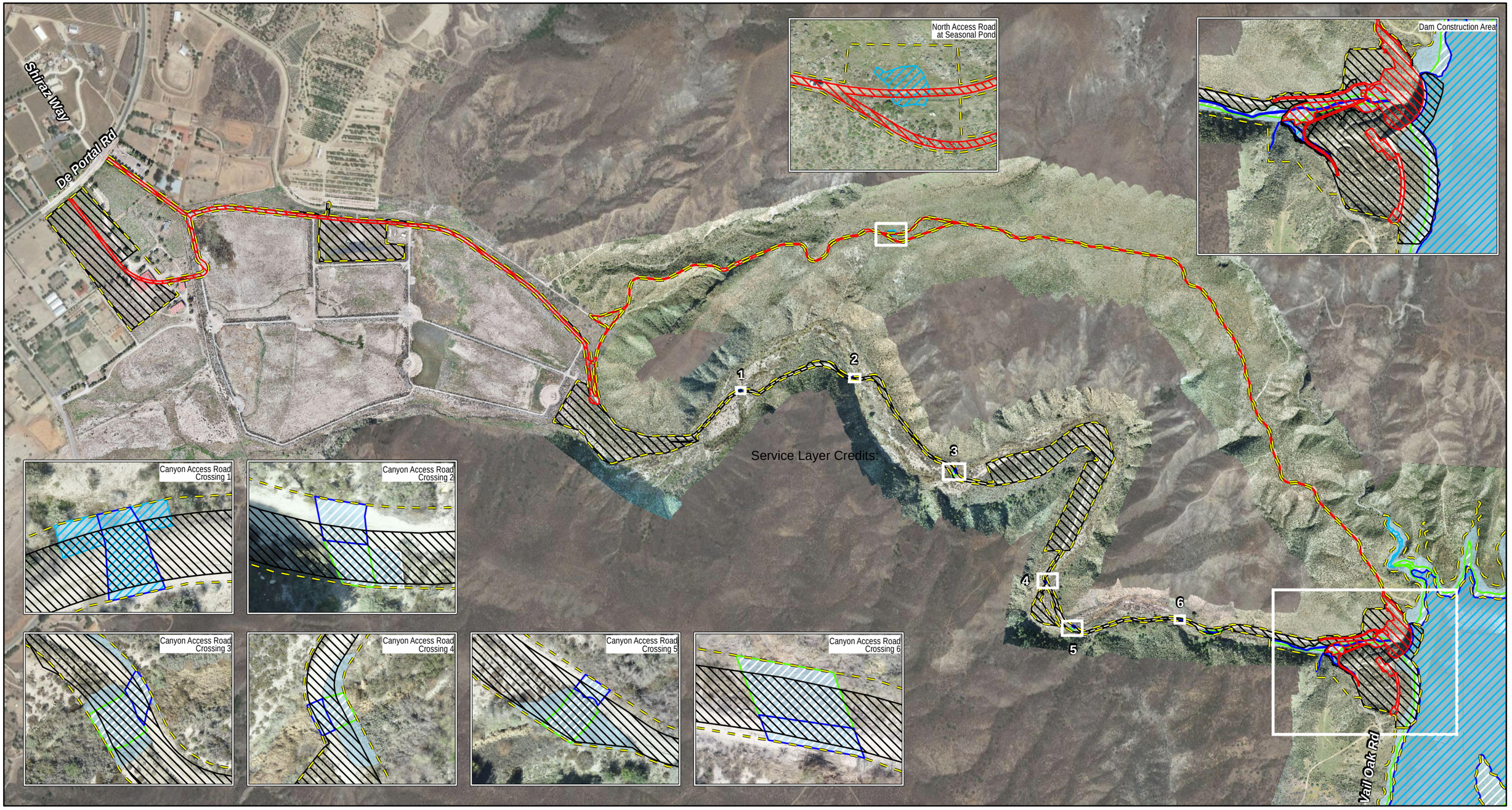


View of Wilson Creek drainage area, facing southwest. Photo date: 4/29/2020.

LSA

FIGURE 6
Sheet 5 of 5

Vail Dam Seismic and Hydrologic Remediation Project
Site Photographs



LSA

LEGEND

- Biological Study Area
- Permanent Impacts to Potential Jurisdictional Resources
- Temporary Impacts to Potential Jurisdictional Resources
- Nonwetland Waters of the U.S
- Wetland Waters of the U.S
- Nonwetland Waters of the State
- Wetland Waters of the State
- CDFW/Riparian

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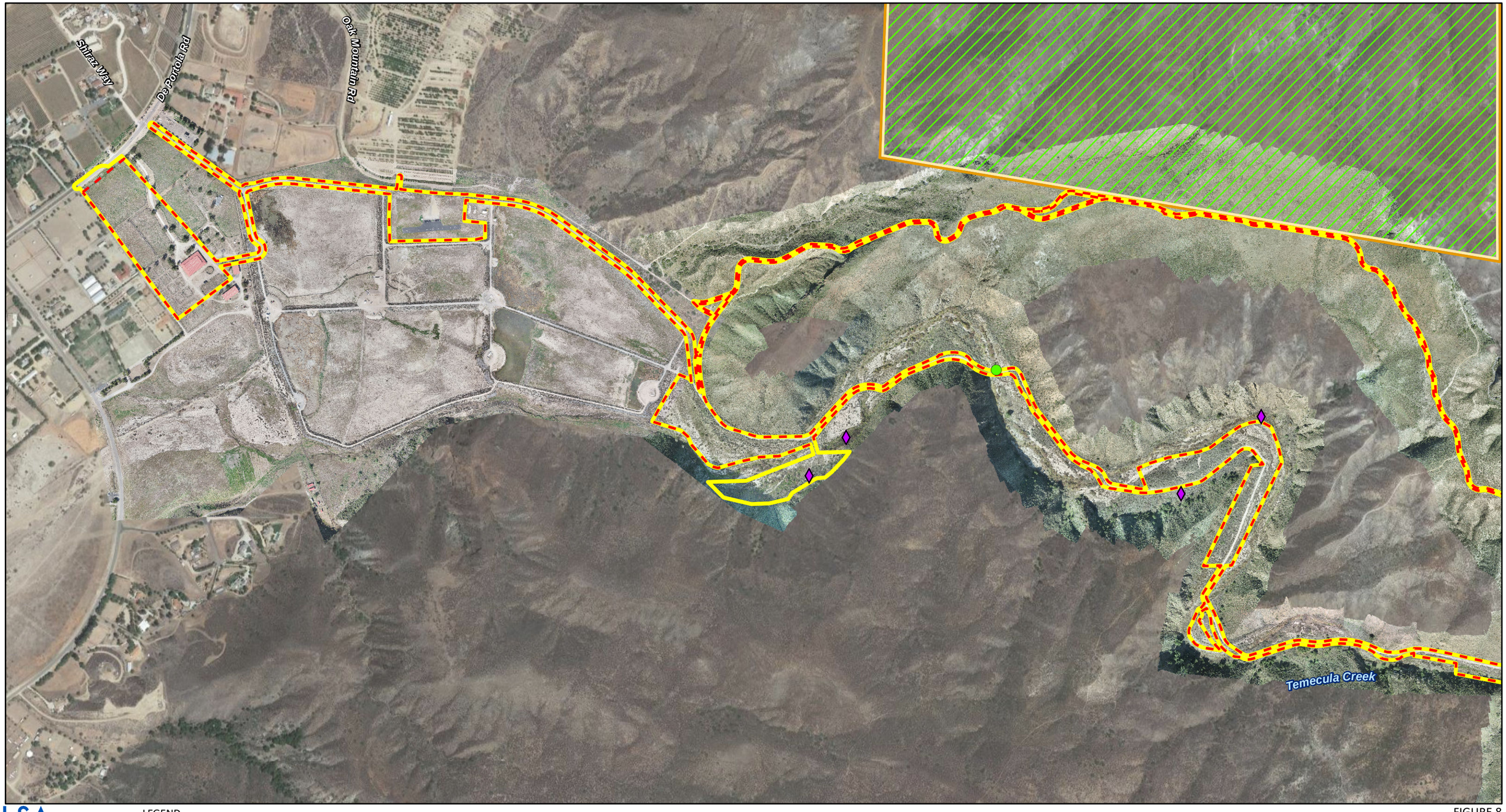
SOURCE: Google Maps (2020); LSA UAV Imagery (2/2020 and 3/2020)

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FIGURE 7

Vail Dam Seismic and Hydrologic Remediation Project

Proposed Impacts to Jurisdictional Waters



LSA

LEGEND

Biological Study Area
Project Site

Plant Survey Results
Nevin's Barberry

Arroyo Toad Survey Results
Arroyo Toad

Riparian Bird Survey Results
Coastal California Gnatcatcher
Least Bell's Vireo
Southwestern willow flycatcher
Tricolored blackbird

Crititcal Habitat
Arroyo Toad
Coastal California Gnatcatcher
Quino Checkerspot Butterfly

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SOURCE: Google Maps (2019); LSA UAV Imagery (2/2020 and 3/2020)

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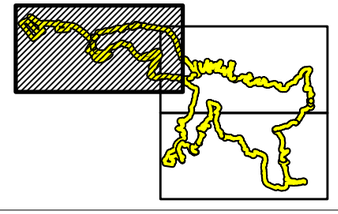


FIGURE 8
Sheet 1 of 3

Vail Dam Seismic and Hydrologic Remediation Project

Threatened and Endangered Species Observations and Critical Habitat

Temecula Creek

Vail Lake

Wilson Creek

LSA

LEGEND

Biological Study Area

Project Site

Plant Survey Results

Nevin's Barberry

Arroyo Toad Survey Results

Arroyo Toad

Riparian Bird Survey Results

Coastal California Gnatcatcher

Least Bell's Vireo

Southwestern willow flycatcher

Tricolored blackbird

Crititcal Habitat

Arroyo Toad

Coastal California Gnatcatcher

Quino Checkerspot Butterfly

N

0 400 800

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SOURCE: Google Maps (2019); LSA UAV Imagery (2/2020 and 3/2020)

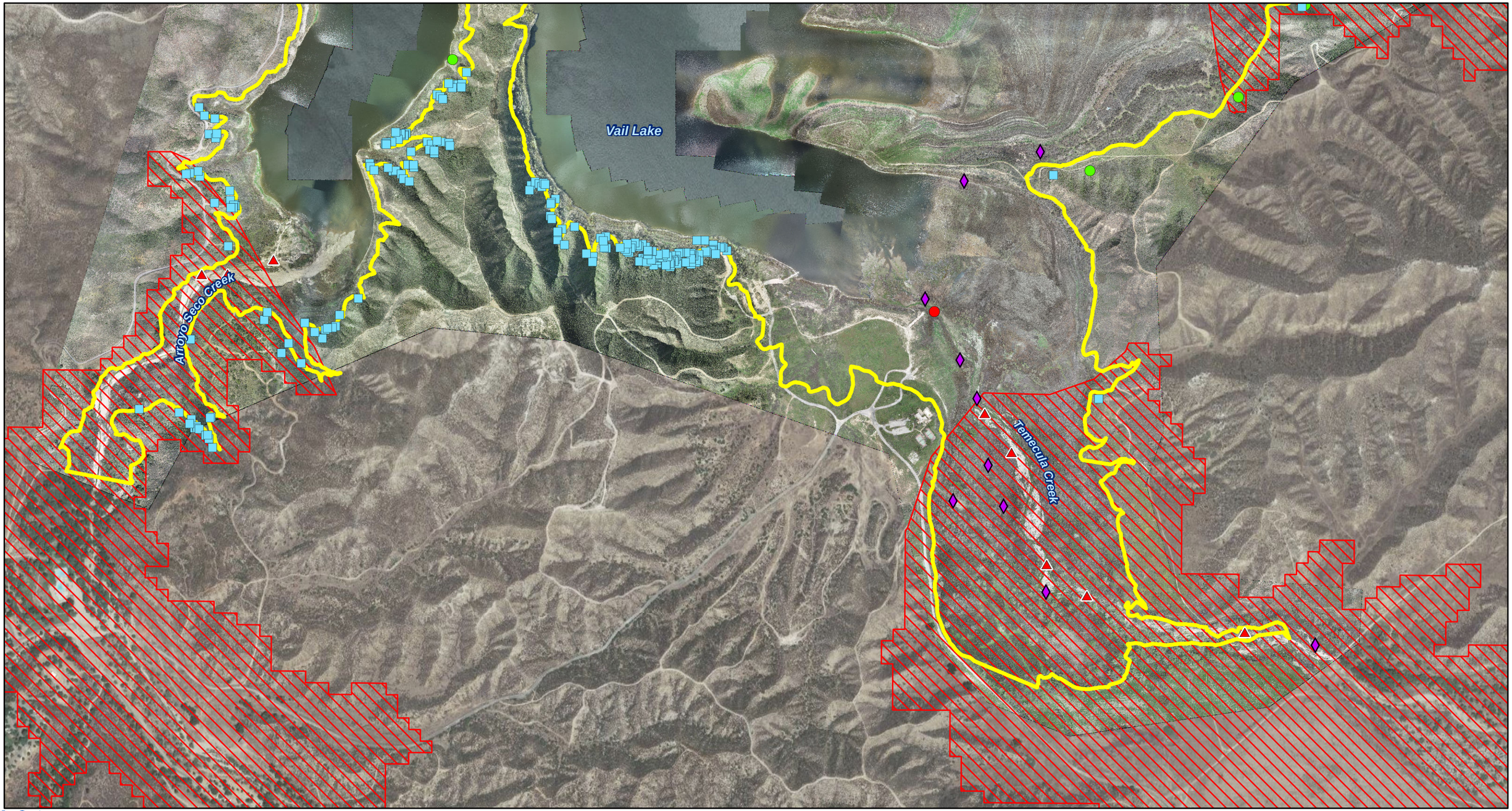
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FIGURE 8

Sheet 2 of 3

Vail Dam Seismic and Hydrologic Remediation Project

Threatened and Endangered Species Observations and Critical Habitat



LSA

LEGEND

Biological Study Area
Project Site

Plant Survey Results
Nevin's Barberry

Arroyo Toad Survey Results
Arroyo Toad

Riparian Bird Survey Results
Coastal California Gnatcatcher
Least Bell's Vireo
Southwestern willow flycatcher
Tricolored blackbird

Crititcal Habitat
Arroyo Toad
Coastal California Gnatcatcher
Quino Checkerspot Butterfly

N

0 400 800
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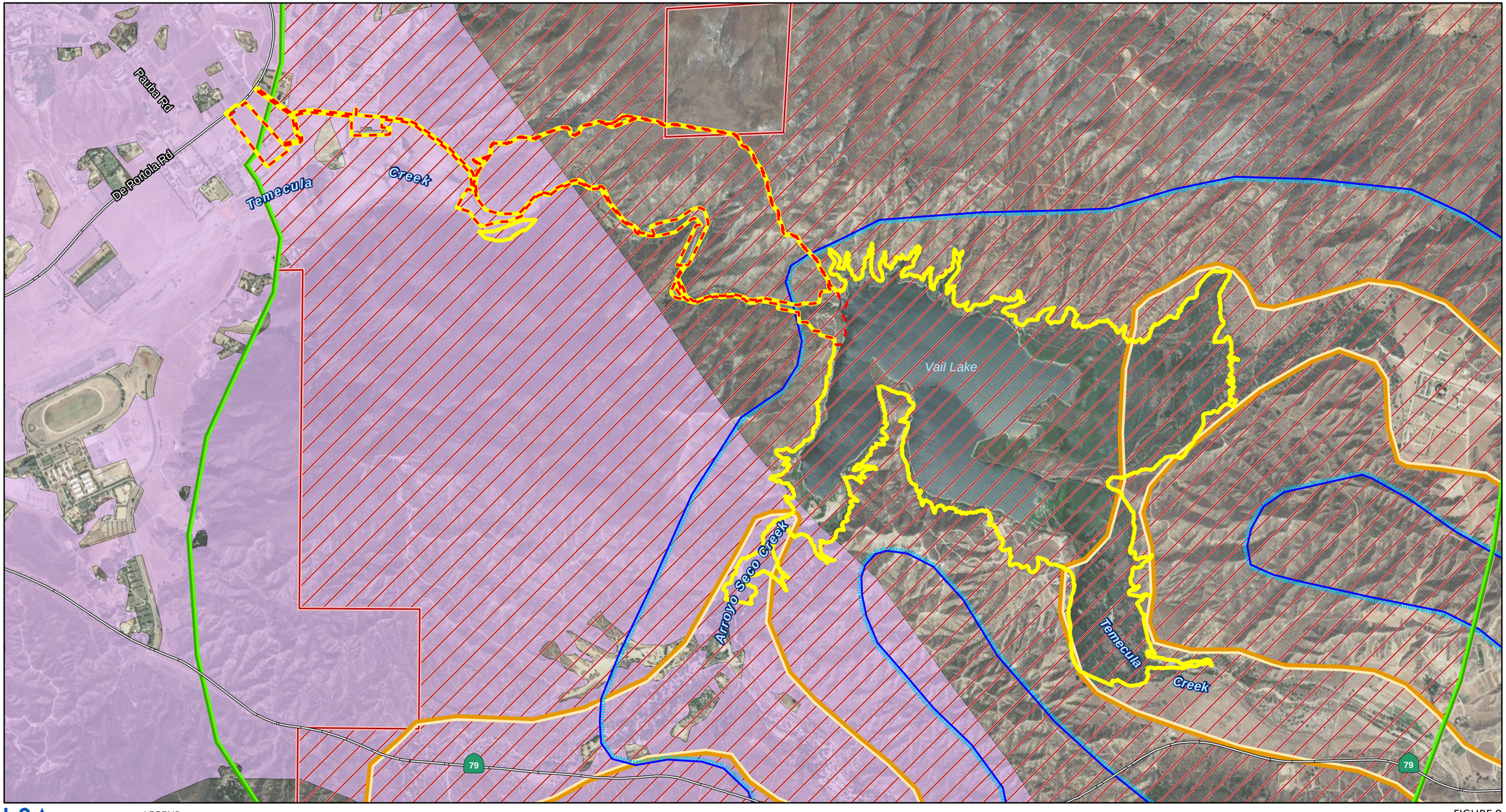
SOURCE: Google Maps (2019); LSA UAV Imagery (2/2020 and 3/2020)

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FIGURE 8
Sheet 3 of 3

Vail Dam Seismic and Hydrologic Remediation Project

Threatened and Endangered Species Observations and Critical Habitat



LSA

LEGEND

- Biological Study Area
- Project Site

Western Riverside County MSHCP

- Amphibian Survey Area
- Burrowing Owl Survey Area
- Mammal Survey Area
- Narrow Endemic Plant Species Survey Area (NEPSSA)
- Criteria Area Species Survey Area (CASSA)

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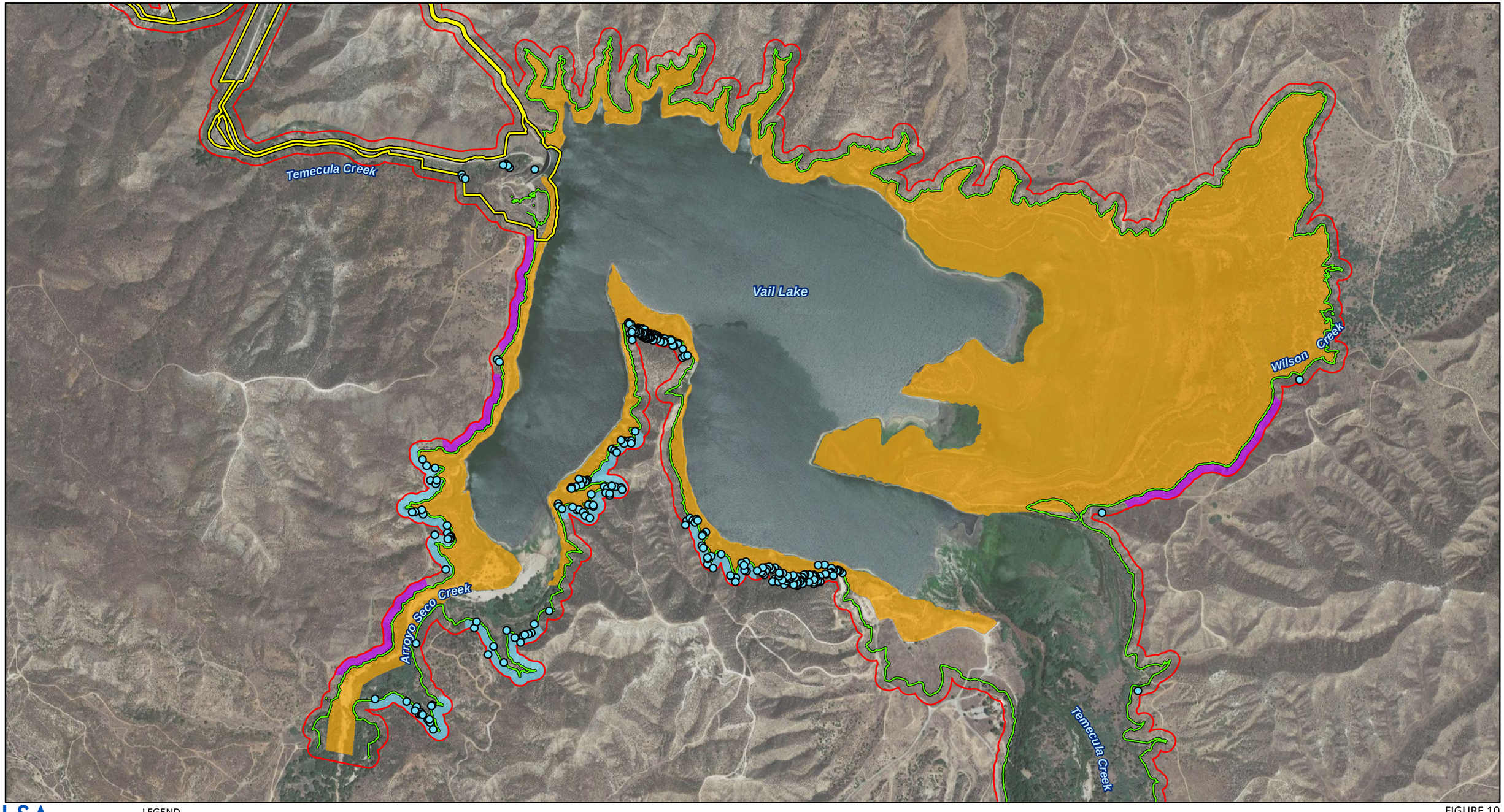
SOURCE: Google Maps (2020); County of Riverside, Regional Conservation Authority (2021)

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FIGURE 9

Vail Dam Seismic and Hydrologic Remediation Project

MSHCP Survey Areas



LSA

LEGEND

- Project Location
- Plant Survey Area
- Spillway Crest (1472.6' NAVD88)
- Opportunities for Tamarisk Removal

Potential Nevin's Barberry Planting Locations

- Expanded Area
- Current Extent

Plant Survey Results

- Nevin's Barberry

0 500 1000
FEET

SOURCE: Google Imagery (2022)

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FIGURE 10

Vail Dam Seismic and Hydrologic Remediation Project

Mitigation Opportunities

APPENDIX B

PLANT AND ANIMAL SPECIES OBSERVED

Plant and Animal Species Observed

Scientific Name	Common Name
FERNS AND ALLIES	
Selaginellaceae	**Spike moss family**
Selaginella bigelovii	Bushy spike moss
Pteridaceae	**Lip Fern Family**
Pellaea andromedifolia	Coffee fern
Pentagramma triangularis	Goldenback fern
CONIFERS	
Cupressaceae	**Cypress Family**
Juniperus californica	California juniper
EUDICOT FLOWERING PLANTS	
Adoxaceae	**Muskroot family**
Sambucus nigra ssp. *caerulea*	Blue elderberry
Amaranthaceae	**Amaranth Family**
*Amaranthus albus**	Tumble pigweed
Anacardiaceae	**Sumac Family**
Malosma laurina	Laurel Sumac
Rhus aromatica	Skunk bush
Rhus ovata	Sugar bush
Toxicodendron diversilobum	Pacific Poison oak
Apiaceae	**Carrot Family**
*Apium graveolens**	Common celery
Bowlesia incana	Hoary bowlesia
Daucus pusillus	American wild carrot
Apocynaceae	**Dogbane Family**
Funastrum cynanchoides	Fringed twinevine
Asteraceae	**Sunflower Family**
Acourtia microcephala	Sacapellote
Ambrosia acanthicarpa	Annual bur-sage
Ambrosia confertiflora	Weak-leaved burweed
Ambrosia psilostachya	Western ragweed
Artemisia californica	California sagebrush
Artemisia douglasiana	Mugwort
Artemisia dracunculus	Tarragon
Artemisia tridentata	Big sagebrush
Baccharis salicifolia	Mule fat
Baccharis salicina	Willow baccharis
Bahiopsis laciniata	San Diego County viguiera
Bebbia juncea	Sweetbush

Plant and Animal Species Observed

Scientific Name	Common Name
Brickellia californica	California brickellbush
*Carduus pycnocephalus**	Italian thistle
*Centaurea benedicta**	Blessed thistle
*Centaurea melitensis **	Maltese star-thistle
Chaenactis artemisifolia	Artemisia-leaved chaenactis
Chaenactis glabriuscula	Yellow pincushion
Cirsium vulgare	Bull thistle
Corethrogyne filaginifolia	California aster
*Cynara cardunculus**	Artichoke thistle
Deinandra fasciculata	Fasciculated tarweed
Deinandra kelloggii	Kellogg's tarweed
Deinandra paniculata	Paniculate tarplant
Encelia actoni	Acton's encelia
Encelia farinosa	Brittlebush
Ericameria brachylepis	Boundary goldenbush
Erigeron canadensis	Canadian horseweed
Erigeron foliosus	Leafy daisy
Eriophyllum confertiflorum	Golden yarrow
*Gazania linearis**	Treasureflower
Gutierrezia sarothrae	Broom snakeweed
*Hedypnois cretica**	Crete weed
Heterotheca grandiflora	Telegraph weed
*Hypochaeris glabra**	Smooth cat's ear
Isocoma menziesii var. *vernonioides*	Menzies' Goldenbush
Iva axillaris	Poverty weed
*Lactuca serriola**	Prickly lettuce
Laennecia coulteri	Coulter's horseweed
Lasthenia coronaria	Goldfields
Lasthenia gracilis	Needle goldfields
Layia platyglossa	Coastal tidy-tips
Lepidospartum squamatum	Scalebroom
Logfia filaginoides	California filago
Logfia gallica	Filago
Malacothrix coulteri	Snake's head
Malacothrix saxatilis	Cliff malacothrix
*Matricaria discoidea**	Disc mayweed
Oncosiphon pilulifer	Stinknet
Pluchea sericea	Arrowweed

Plant and Animal Species Observed

Scientific Name	Common Name
Porophyllum gracile	Slender poreleaf
Pseudognaphalium bioletti	Two-color rabbit-tobacco
Pseudognaphalium californicum	California cudweed
Pseudognaphalium leucocephalum	White rabbit-tobacco
*Pseudognaphalium luteoalbum**	Jersey cudweed
Pseudognaphalium stramineum	Cottonbatting plant
Psilocarphus brevissimus	Short woollyheads
Rafinesquia californica	California chicory
Senecia flaccidus	Shrubby butterweed
*Senecio vulgaris**	Common groundsel
*Sonchus asper**	Prickly sow-thistle
*Sonchus oleraceus**	Common sow-thistle
Stylocline gnaphaloides	Everlasting neststraw
Tetradymia comosa	Cotton thorn
Uropappus lindleyi	Silver puffs
Xanthium strumarium	Rough cocklebur
Berberidaceae	**Barberry Family**
Berberis nevinii	Nevin's barberry
Boraginaceae	**Borage Family**
Amsinckia intermedia	Common fiddleneck
Cryptantha intermedia	Common cryptantha
Cryptantha muricata	Pointed cryptantha
Eriodictyon crassifolium	Yerba santa
Eucrypta chrysanthemifolia	Common eucrypta
Harpagonella palmeri	Palmer's grapplinghook
Heliotropium curassavicum	Alkali heliotrope
Nemophila menziesii	Baby blue-eyes
Pectocarya linearis	Narrow-toothed pectocarya
Phacelia distans	Distant phacelia
Phacelia minor	Wild Canterbury bells
Phacelia ramosissima	Branching phacelia
Pholistoma auritum	Blue fiesta flower
Plagiobothrys canescens	Valley popcornflower
Brassicaceae	**Mustard Family**
*Brassica nigra**	Black mustard
*Brassica tournefortii**	Sahara mustard
*Capsella bursa-pastoris**	Shepherd's purse
Caulanthus lasiophyllus	California mustard

Plant and Animal Species Observed

Scientific Name	Common Name
*Descurainia sophia**	Flixweed
*Hirschfeldia incana**	Shortpod mustard
*Lepidium virginicum**	Virginia pepperweed
*Sisymbrium irio**	London rocket
*Sisymbrium orientale**	Indian hedgemustard
Cactaceae	**Cactus Family**
Cylindropuntia californica var. *parkeri*	Valley cholla
Opuntia basilaris var. *basilaris*	Beavertail prickleypear
Opuntia littoralis	Coastal prickleypear
Caprifoliaceae	**Honeysuckle Family**
Lonicera subspicata	Honeysuckle
Caryophyllaceae	**Pink Family**
*Herniaria hirsuta**	Hairy rupturewort
Loeflingia squarrosa	Spreading pygmyleaf
*Polycarpon tetraphyllum**	Fourleaf manyseed
Stellaria media	Common chickweed
Chenopodiaceae	**Saltbush Family**
Atriplex canescens	Fourwing saltbush
Atriplex lentiformis	Big saltbush
*Atriplex semibaccata**	Australian saltbush
Chenopodium berlandieri	Pitseed goosefoot
Chenopodium californicum	California goosefoot
*Salsola tragus**	Russian thistle
Convolvulaceae	**Morning-glory Family**
Calystegia macrostegia	Morning-glory
Cuscuta sp.	Dodder
Crassulaceae	**Stonecrop Family**
Crassula aquatica	Water pygmyweed
Crassula connata	Sand pygmyweed
Dudleya lanceolata	Lanceleaf dudleya
Dudleya pulverulenta	Chalky live-forever
Cucurbitaceae	**Gourd Family**
Cucurbita foetidissima	Calabazilla
Marah macrocarpus	Cucamonga manroot
Ericaceae	**Blueberry Family**
Arctostaphylos glauca	Bigberry manzanita
Euphorbiaceae	**Spurge Family**
Croton californicus	California croton

Plant and Animal Species Observed

Scientific Name	Common Name
Croton setigerus	Dove weed
Stillingia linearifolia	Queen's-root
Fabaceae	**Pea Family**
Acmispon glaber	Deerweed
Acmispon heermannii	Lotus
Acmispon maritimus	Coastal lotus
Acmispon micranthus	Fishhook lotus
Acmispon strigosus	Strigose lotus
Amorpha fruticosa	False indigo
Astragalus didymocarpus	Dwarf white milkvetch
Astragalus pomonensis	Pomona locoweed
Medicago polymorpha	Bur-clover
Melilotus albus	White sweetclover
Melilotus indicus	Yellow sweetclover
Prosopis glandulosa var. *torreyana*	Honey mesquite
Lupinus bicolor	Miniature lupine
Lupinus microcarpus	Chick lupine
Lupinus sparsiflorus	Coulter's lupine
Lupinus succulentus	Arroyo lupine
Lupinus truncatus	Collar lupine
Lupinus excubitus var. *hallii*	Guard lupine
Fagaceae	**Beech Family**
Quercus agrifolia	Coast live oak
Quercus berberidifolia	Scrub oak
Geraniaceae	**Geranium Family**
*Erodium botrys**	Longbeak stork's-bill
*Erodium cicutarium**	Redstem stork's-bill
Erodium texanum	Texas stork's-bill
Lamiaceae	**Mint Family**
*Lamium amplexicaule**	Henbit deadnettle
*Marrubium vulgare**	Horehound
Salvia apiana	White sage
Salvia carduacea	Thistle sage
Salvia columbariae	Chia
Salvia mellifera	Black sage
Malvaceae	**Mallow Family**
Malacothamnus fasciculatus	Chaparral mallow

Plant and Animal Species Observed

Scientific Name	Common Name
Montiaceae	**Miner's lettuce Family**
Claytonia parviflora	Streambank springbeauty
Myrsinaceae	**Myrsine Family**
Lysmachia arvensis	Scarlet pimpernel
Nyctaginaceae	**Four-o'-clock Family**
Abronia villosa var. *aurita*	Chaparral sand-verbena
Mirabilis laevis	Wishbone bush
Oleaceae	**Olive Family**
Forestiera pubescens	Desert olive
Onagraceae	**Evening primrose Family**
Camissonia strigulosa	Strigulose evening primrose
Camissoniopsis bistorta	Southern suncup
Clarkia epilobioides	Canyon clarkia
Clarkia purpurea ssp. *quadrivulnera*	Four-spot clarkia
Epilobium ciliatum	Smooth spike-primrose
Eulobus californicus	Mustard-like evening primrose
Oenothera californica ssp. *californica*	California evening-primrose
Oenothera elata ssp. *hookeri*	Hooker's evening primrose
Orobanchaceae	**Broom-rape Family**
Castilleja exserta	Exserted Indian paintbrush
Castilleja foliolosa	Felt paintbrush
Papaveraceae	**Poppy Family**
Argemone munita	Flatbud prickly poppy
Eschscholzia californica	California poppy
Papaver heterophyllum	Windpoppy
Phrymaceae	**Monkey-flower Family**
Mimulus brevipes	Slope semaphore
Mimulus guttatus	Yellow monkey-flower
Mimulus pilosus	Downy monkey-flower
Plantaginaceae	**Plantain Family**
Antirrhinum coulterianum	White snapdragon
Antirrhinum nuttallianum	Nuttall's snapdragon
Keckiella antirrhinoides	Yellow bush penstemon
*Nuttallianus texanus**	Texas toadflax
Penstemon spectabilis	Royal penstemon
Plantago erecta	Dotseed plantain
Plantago ovata	Desert Indianwheat
Veronica anagallis-aquatica	Great water speedwell

Plant and Animal Species Observed

Scientific Name	Common Name
Veronica peregrina	Purslane speedwell
Platanaceae	**Sycamore Family**
Platanus racemosa	California sycamore
Polemoniaceae	**Phlox Family**
Eriastrum sapphirinum	Sapphire woollystar
Gilia angelensis	Los Angeles gilia
Polygonaceae	**Buckwheat Family**
Chorizanthe polygonoides var. *longispina*	Long-spined spineflower
Eriogonum elongatum	Longstem buckwheat
Eriogonum fasciculatum	California buckwheat
Eriogonum gracile	Slender buckwheat
Lastarriaea coriacea	Woodland pterostegia
Rumex hymenosepalus	Desert rhubarb
Rumex salicifolius	Willow dock
Portulacaeae	**Purslane Family**
*Portulaca oleracea**	Common purslane
Ranunculaceae	**Buttercup Family**
Clematis pauciflora	Ropevine clematis
Delphinium parryi ssp. *parryi*	San Bernardino larkspur
Rhamnaceae	**Buckthorn Family**
Rhamnus crocea	Redberry buckthorn
Rosaceae	**Rose Family**
Adenostoma fasciculatum	Chamise
Prunus fasciculata	Desert almond
Prunus ilicifolia	Hollyleaf cherry
Rosa californica	California rose
Rubiaceae	**Madder Family**
Galium angustifolium ssp. *angustifolium*	Narrow-leaved bedstraw
Galium aparine	Goose grass
Salicaceae	**Willow Family**
Populus fremontii	Fremont cottonwood
Salix exigua	Narrowleaf willow
Salix gooddingii	Gooding's willow
Salix laevigata	Red willow
Salix lasiolepis	Arroyo willow
Scrophulariaceae	**Figwort Family**
Scrophularia californica	Coast figwort

Plant and Animal Species Observed

Scientific Name	Common Name
Simmondsiaceae	**Jojoba Family**
Simmondsia chinensis	Jojoba
Solanaceae	**Nightshade Family**
Datura wrightii	Sacred thorn-apple
*Nicotiana glauca**	Tree tobacco
Nicotiana quadrivalvis	Indian tobacco
Solanum americanum	American black nightshade
Solanum douglasii	Greenspot nightshade
Solanum parishii	Parish's nightshade
Tamaricaceae	**Tamarisk Family**
*Tamarix ramoissima**	Mediterranean tamarisk
Urticaceae	**Nettle Family**
Hesperocnide tenella	Western nettle
Urtica dioica ssp. *holosericea*	Hoary nettle
*Urtica urens**	Dwarf nettle
Zygophyllaceae	**Caltrop Family**
*Tribulus terrestris**	Puncture vine
MONOCOT FLOWERING PLANTS	
Agavaceae	**Century Plant Family**
Hesperoyucca whipplei	Chaparral yucca
Yucca schidigera	Mojave yucca
Araceae	**Arum Family**
Lemna sp.	Duckweed
Cyperaceae	**Sedge Family**
Cyperus eragrostis	Tall flatsedge
Eleocharis parishii	Spikerush
Schoenoplectus californicus	California bulrush
Juncaceae	**Rush Family**
Juncus mexicanus	Mexicanus rush
Juncus xiphioides	Iris-leaved rush
Liliaceae	**Lily Family**
Calochortus splendens	Splendid mariposa lily
Poaceae	**Grass Family**
*Avena barbata**	Slender wild oat
*Avena fatua**	Wild oat
*Bromus diandrus**	Ripgut brome
Bromus madritensis	Foxtail chess
*Bromus tectorum**	Cheatgrass

Plant and Animal Species Observed

Scientific Name	Common Name
Cortaderia sp.*	Pampas grass
*Cynodon dactylon**	Bermuda grass
Deschampsia danthonioides	Annual hairgrass
Distichlis spicata	Saltgrass
Elymus condensatus	Giant wildrye
Elymus triticoides	Beardless wildrye
*Festuca myuros**	Annual fescue
*Hordeum murinum**	Mouse barley
Lamarckia aurea	Goldentop
Melica imperfecta	Coast range melic
Muhlenbergia microsperma	Littleseed muhly
Poa secunda	Sandberg bluegrass
*Polypogon monspeliensis**	Annual rabbitsfoot grass
*Schismus barbatus**	Common Mediterranean grass
Sporobolus airoides	Alkali sacaton
Stipa pulchra	Purple needlegrass
Themidaceae	**Brodiaea Family**
Brodiaea terrestris	Dwarf brodiaea
Dichelostemma capitatum	Blue dicks
Muilla maritima	Common muilla
Typhaceae	**Cattail Family**
Typha domingensis	Southern cattail
ARTHROPODS	
Branchinecta lindahli	Versatile fairy shrimp
DAMSELFLIES	
Coenagrionidae	**Pond damsels**
Enallagma sp.	Bluet sp.
Ischnura sp.	Forktail sp.
TYPICAL DRAGONFLIES	
Aeshnidae	**Darners**
Rhionaeschna multicolor	Blue-eyed darner
Libellulidae	**Skimmers**
Perithemis intensa	Mexican amberwing
Sympetrum corruptum	Variegated meadowhawk
Tramea lacerata	Black saddlebags
Pantala flavescens	Wandering glider

Plant and Animal Species Observed

Scientific Name	Common Name
BUTTERFLIES	
Pieridae	**Whites and Sulphurs**
Pontia protodice	Checkered white
*Pieris rapae**	Cabbage white
Colias eurytheme	Orange sulphur
Lycaenidae	**Gossamer-Wing Butterflies**
Brephidium exile	Western pygmy-blue
Leptotes marina	Marine blue
Hemiargus ceraunus	Ceraunus blue
Everes amyntula	Western tailed-blue
Plebejus acmon	Acmon blue
Riodinidae	**Metalmarks**
Apodemia mormo	Mormon metalmark
Nymphalidae	**Brush-Footed Butterflies**
Nymphalis californica	California tortoiseshell
Vanessa atalanta	Red admiral
Junonia coenia	Common buckeye
Limenitis lorquini	Lorquin's admiral
Hesperiidae	**Skippers**
Erynnis funeralis	Funereal duskywing
ANTS, BEES, AND WASPS	
Apidae	**Carpenter, Cuckoo, Digger, Bumble, and Honey Bees**
Bombus californicus	California bumble bee
Bombus crotchii	Crotch bumble bee
BONY FISHES	
Poeciliidae	**Livebearers**
Gambusia affinis	Western mosquitofish
AMPHIBIANS	
Plethodontidae	**Lungless Salamanders**
Batrachoseps major	Southern California slender salamander
Bufonidae	**True Toads**
Anaxyrus boreas	Western toad
Anaxyrus californicus	Arroyo toad
Hylidae	**Chorus Frogs**
Pseudacris cadaverina	California treefrog
Pseudacris hypochondriaca	Baja California treefrog
Ranidae	**True Frogs**
Lithobates catesbianus	American bullfrog

Plant and Animal Species Observed

Scientific Name	Common Name
REPTILES	
Phrynosomatidae	**Phrynosomatid Lizards**
Sceloporus occidentalis	Western fence lizard
Sceloporus orcutti	Granite spiny lizard
Uta stansburiana	Common Side-blotched lizard
Colubridae	**Colubrid Snakes**
Coluber flagellum	Coachwhip
Thamnophis hammondii	Two-striped gartersnake
Viperidae	**Vipers**
Crotalus ruber	Red-diamond rattlesnake
Emydidae	**Pond Turtles**
Trachemys scripta	Pond slider
BIRDS	
Anatidae	**Swans, Geese, and Ducks**
Mareca strepera	Gadwall
Anas platyrhynchos	Mallard
Bucephala albeola	Bufflehead
Oxyura jamaicensis	Ruddy duck
Odontophoridae	**New World Quail**
Callipepla californica	California quail
Phasianidae	**Pheasants**
*Meleagris gallopavo**	Wild turkey
Podicipedidae	**Grebes**
Podilymbus podiceps	Pied-billed grebe
Podiceps nigricollis	Eared grebe
Aechmophorus occidentalis	Western grebe
Aechmophorus clarkii	Clark's grebe
Columbidae	**Pigeons and Doves**
*Streptopelia decaocto**	Eurasian collared dove
*Zenaida asiatica**	White-winged dove
Zenaida macroura	Mourning dove
Cuculidae	**Cuckoos and Roadrunners**
Geococcyx californianus	Greater roadrunner
Caprimulgidae	**Goatsuckers**
Chordeiles acutipennis	Lesser nighthawk
Phalaenoptilus nuttallii	Common poorwill
Apodidae	**Swifts**
Aeronautes saxatilis	White-throated swift

Plant and Animal Species Observed

Scientific Name	Common Name
Trochilidae	**Hummingbirds**
Archilochus alexandri	Black-chinned hummingbird
Calypte anna	Anna's hummingbird
Calypte costae	Costa's hummingbird
Selasphorus rufus/sasin	Rufous/Allen's hummingbird
Rallidae	**Rails and Gallinules**
Gallinula galeata	Common gallinule
Fulica americana	American coot
Porzana carolina	Sora
Charadriidae	**Plovers and Lapwings**
Charadrius vociferus	Killdeer
Scolopacidae	**Sandpipers**
Actitis macularius	Spotted sandpiper
Tringa melanoleuca	Greater yellowlegs
Gallinago delicata	Wilson's snipe
Laridae	**Skuas, Gulls, Terns, and Skimmers**
Hydroprogne caspia	Caspian tern
Sterna forsteri	Forster's tern
Phalacrocoracidae	**Cormorant**
Phalacrocorax auritus	Double-crested cormorant
Pelecanidae	**Pelicans**
Pelecanus erythrorhynchos	American white pelican
Ardeidae	**Herons, Egrets, and Bitterns**
Ixobrychus exilis	Least bittern
Ardea herodias	Great blue heron
Ardea alba	Great egret
Egretta thula	Snowy egret
Butorides virescens	Green heron
Nycticorax nycticorax	Black-crowned night heron
Threskiornithidae	**Ibises and Spoonbills**
Plegadis chihi	White-faced ibis
Cathartidae	**American Vultures**
Cathartes aura	Turkey vulture
Accipitridae	**Kites, Hawks, and Eagles**
Elanus leucurus	White-tailed kite
Haliaeetus leucocephalus	Bald eagle
Accipiter cooperii	Cooper's hawk
Accipiter striatus	Sharp-shinned hawk

Plant and Animal Species Observed

Scientific Name	Common Name
Buteo lineatus	Red-shouldered hawk
Buteo jamaicensis	Red-tailed hawk
Aquila chrysaetos	Golden eagle
Tytonidae	**Barn Owls**
Tyto alba	Barn owl
Strigidae	**Typical Owls**
Bubo virginianus	Great horned owl
Alcedinidae	**Kingfishers**
Megaceryle alcyon	Belted kingfisher
Picidae	**Woodpeckers**
Melanerpes formicivorus	Acorn woodpecker
Picoides nuttallii	Nuttall's woodpecker
Picoides pubescens	Downy woodpecker
Colaptes auratus	Northern flicker
Falconidae	**Falcons**
Falco sparverius	American kestrel
Falco peregrinus	Peregrine falcon
Tyrannidae	**Tyrant Flycatchers**
Empidonax traillii brewsteri	Little willow flycatcher
Empidonax traillii extimus	Southwestern willow flycatcher
Sayornis nigricans	Black phoebe
Myiarchus cinerascens	Ash-throated flycatcher
Tyrannus vociferus	Cassin's kingbird
Tyrannus verticalis	Western kingbird
Laniidae	**Shrikes**
Lanius ludovicianus	Loggerhead shrike
Vireonidae	**Vireos**
Vireo bellii pusillus	Least Bell's vireo
Vireo gilvus	Warbling vireo
Corvidae	**Crows and Ravens**
Aphelocoma californica	California scrub-jay
Corvus brachyrhynchos	American crow
Corvus corax	Common raven
Alaudidae	**Larks**
Eremophila alpestris	Horned lark
Hirundinidae	**Swallows**
Tachycineta bicolor	Tree swallow
Stelgidopteryx serripennis	Northern rough-winged swallow

Plant and Animal Species Observed

Scientific Name	Common Name
Progne subis	Purple martin
Petrochelidon pyrrhonota	Cliff swallow
Paridae	**Titmice**
Baeolophus inornatus	Oak titmouse
Aegithalidae	**Bushtits**
Psaltriparus minimus	Bushtit
Sittidae	**Nuthatches**
Sitta carolinensis	White-breasted nuthatch
Troglodytidae	**Wrens**
Salpinctes obsoletus	Rock wren
Catherpes mexicanus	Canyon wren
Thryomanes bewickii	Bewick's wren
Troglodytes aedon	House wren
Campylorhynchus brunneicapillus	Cactus wren
Polioptilidae	**Gnatcatchers and Gnatwrens**
Polioptila caerulea	Blue-gray gnatcatcher
Polioptila californica californica	Coastal California gnatcatcher
Sylviidae	**Sylviid Warblers**
Chamaea fasciata	Wrentit
Turdidae	**Thrushes**
Sialia mexicana	Western bluebird
Turdus migratorius	American robin
Mimidae	**Mockingbirds and Thrashers**
Mimus polyglottos	Northern Mockingbird
Toxostoma redivivum	California thrasher
Sturnidae	**Starlings**
*Sturnus vulgaris**	European starling
Ptilogonatidae	**Silky Flycatchers**
Phainopepla nitens	Phainopepla
Fringillidae	**Finches**
Haemorhous mexicanus	House finch
Spinus psaltria	Lesser goldfinch
Spinus lawrencei	Lawrence's goldfinch
Spinus tristis	American goldfinch
Passerellidae	**New World Sparrows**
Pipilo maculatus	Spotted towhee
Aimophila ruficeps	Southern California Rufous-crowned sparrow
Melozone crissalis	California towhee

Plant and Animal Species Observed

Scientific Name	Common Name
Spizella atrogularis	Black-chinned sparrow
Chondestes grammacus	Lark sparrow
Junco hyemalis	Dark-eyed junco
Artemisiospiza belli	Bell's sparrow
Melospiza melodia	Song sparrow
Zonotrichia atricapilla	White-crowned sparrow
Icteriidae	**Yellow-breasted Chats**
Icteria virens	Yellow-breasted chat
Icteridae	**Blackbirds, Orioles, and Allies**
Icterus cucullatus	Hooded oriole
Icterus bullockii	Bullock's oriole
Agelaius phoeniceus	Red-winged blackbird
Agelaius tricolor	Tricolored blackbird
Molothrus ater	Brown-headed cowbird
Euphagus cyanocephalus	Brewer's blackbird
Quiscalus mexicanus	Great-tailed grackle
Parulidae	**Wood Warblers**
Oreothlypis celata	Orange-crowned warbler
Geothlypis trichas	Common yellowthroat
Setophaga ruticilla	American redstart
Setophaga petechia	Yellow warbler
Cardellina pusilla	Wilson's warbler
Cardinalidae	**Cardinals, Grosbeaks, and Allies**
Piranga rubra	Summer tanager
Piranga ludoviciana	Western tanager
Pheucticus melanocephalus	Black-headed grosbeak
Passerina caerulea	Blue grosbeak
Passerina amoena	Lazuli bunting
MAMMALS	
Leporidae	**Rabbits and Hares**
Lepus californicus	Black-tailed jackrabbit
Sylvilagus audubonii	Desert cottontail
Sylvilagus bachmani	Brush rabbit
Molossidae	**Free-tailed Bats**
Eumops perotis californicus	Western mastiff bat
Nyctinomops femorosaccus	Pocketed free-tailed bat
Tadarida brasiliensis	Brazilian free-tailed bat

Plant and Animal Species Observed

Scientific Name	Common Name
Vespertilionidae	**Evening Bats**
Eptesicus fuscus	Big brown bat
Lasiurus blossevillii	Western red bat
Lasiurus cinereus	Hoary bat
Myotis californicus	California myotis
Myotis yumanensis	Yuma myotis
Parastrellus hesperus	Canyon bat
Canidae	**Foxes, Wolves, and Dogs**
Canis latrans	Coyote
Mephitidae	**Skunks**
Mephitis mephitis	Striped skunk
Cervidae	**Deer, Elk, and Allies**
Odocoileus hemionus	Mule deer
Cricetidae	**Hamsters, Voles, Lemmings, and New World Rats and Mice**
Microtus californicus	California vole
Neotoma lepida intermedia	San Diego desert woodrat
Neotoma macrotis	Big-eared woodrat
Peromyscus maniculatus	North American deermouse
Peromyscus fraterculus	Northern Baja deermouse
Peromyscus boylii	Brush deermouse
Peromyscus californicus	California deermouse
Reithrodontomys megalotis	Western harvest mouse
Geomyidae	**Pocket Gophers**
Thomomys bottae	Botta's pocket gopher
Heteromyidae	**Pocket Mice and Kangaroo Rats**
Chaetodipus fallax fallax	Northwestern San Diego pocket mouse
Dipodomys simulans/agilis	Dulzura/agile kangaroo rat
Muridae	**Old World Mice, Rats, and Relatives**
Mus musculus	House mouse
Sciuridae	**Squirrels, Chipmunks, and Marmots**
Otospermophilus beecheyi	California ground squirrel

Non-native species are indicated by an asterisk (*).

APPENDIX C

JURISDICTIONAL DELINEATION REPORT

JURISDICTIONAL DELINEATION REPORT

VAIL DAM SEISMIC AND HYDROLOGIC REMEDIATION PROJECT

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LSA

November 2022

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INTRODUCTION

This report presents the results of a jurisdictional delineation conducted by LSA for the Vail Dam Seismic and Hydrologic Remediation Project (Proposed Project). It summarizes the results of fieldwork conducted to identify the extent of State and federal jurisdiction within the study area potentially subject to regulation by the United States Army Corps of Engineers (Corps) pursuant to Section 404 of the Federal Clean Water Act (CWA), the Regional Water Quality Control Board (RWQCB) pursuant to Section 401 of the CWA and/or the Porter-Cologne Water Quality Control Act, and the California Department of Fish and Wildlife (CDFW) pursuant to Section 1600 et seq. of the California Fish and Game Code. LSA surveyed an approximately 1,090-acre Jurisdictional Study Area (JSA) in unincorporated southwestern Riverside County, east of the City of Temecula. Due to Project design changes after completion of this report, the JSA includes areas that may not be disturbed by the Proposed Project. This report has been prepared for the purpose of identifying aquatic resource limits for submittal to the Corps, the RWQCB, and the CDFW as part of their review of applications for permit authorization.

This routine wetland and jurisdictional delineation was conducted under contract with the Rancho California Water District (RCWD). The findings and conclusions presented in this report, including the locations and extent of aquatic resources subject to regulatory jurisdiction, represent the professional opinion of LSA and should be considered preliminary until verified by representatives from the Corps, the RWQCB, and the CDFW.

PROPOSED PROJECT

Vail Lake and Vail Dam are located in unincorporated southwestern Riverside County, east of Temecula, in Southern California. Refer to Figure 1, Project Location and Vicinity, for a regional location map (all figures provided in Appendix A). Vail Lake was created through the construction of the existing Vail Dam by the Vail Company in 1948 and 1949 to store local runoff for irrigation and water supply. The lake and dam were acquired by the Rancho California Water District (RCWD) in 1978 and have been used since that time for water supply and replenishment of RCWD's groundwater basins. In addition, Vail Dam has provided passive downstream flood protection for the City of Temecula and the United States Marine Corps Base Camp Pendleton under more frequently recurring storms. Vail Lake is also utilized for recreation. Vail Dam spans Temecula Creek, a northwesterly draining tributary of the Santa Margarita River that drains the north side of Palomar Mountain.

RCWD proposes to remediate seismic and hydrologic hazards associated with the existing Vail Dam, a concrete arch dam, by constructing a new straight-axis gravity concrete dam immediately downstream of the existing dam. Hydrologic and seismic evaluations of the existing dam, conducted by the California Department of Water Resources Division of Safety of Dams, indicate that the existing dam's spillway is insufficient to pass the probable maximum flood without overtopping the dam and that the existing dam would not resist the stresses induced by the maximum credible earthquake.

The Proposed Project has multiple benefits, including enhanced regional water supply reliability, groundwater recharge, passive flood protection, and improved water supply reliability. The

Proposed Project is needed to protect residents, structures, transportation infrastructure, and other downstream resources from potential dam failure. Dam failure would result in downstream flooding and the loss of Vail Lake, which would adversely affect water supply throughout RCWD's service area.

The Proposed Project includes improvements to the Vail Lake and Vail Dam access roads (via De Portola Road and State Route 79 [SR-79]), provision for on-site construction staging and material disposal areas, partial demolition of the existing arch dam, and a new gravity dam. See Figure 2, Project Plans, for a depiction of the construction areas, as well as Project access. Oak Mountain Road, an existing private dirt road accessed off De Portola Road, would not be used for construction access. The Proposed Project is anticipated to be initiated in the fall of 2023 and completed in late 2025. The total duration of Project construction is estimated to be 31 months. Once the Project is complete, Vail Lake and Vail Dam would not require any part-time construction workers or full-time, dedicated RCWD staff on site.

Access Roads

Existing on-site roadways that provide access from De Portola Road to the dam include the Secondary Entry Road (the existing, unpaved access road from De Portola Road to the Pond Access Road), the Pond Access Road, the Canyon Access Road, and the North Access Road. The South Access Road connects to Vail Dam Road, providing access to Vail Lake Road (which connects to SR-79) via the campground area. Construction access from SR-79 is limited to delivery of modular barges to Vail Lake; improvements to the South Access Road would consist of realigning the existing road, and no improvements are proposed to Vail Dam Road or Vail Lake Road. Oak Mountain Road, an existing private dirt road accessed off De Portola Road, would not be used for construction access. Improvements would be required to existing access roads to accommodate construction traffic; however, no improvements to public roadways are required. Refer to Figure 2, Project Plans, for a depiction of the construction areas, as well as Project access.

One new road segment would be constructed. The Primary Entry Road (50 Acre Parcel) is a proposed alternate access point from De Portola Road that would connect to the Pond Access Road at the edge of the Upper Valle De Los Caballos (VDC) Recharge Basins. Once the Primary Entry Road (50 Acre Parcel) has been completed, all construction access for the Project area would be provided along that route. The existing Secondary Entry Road at De Portola Road would provide a secondary access point for RCWD light-duty service vehicles. RCWD intends to maintain both the Primary Entry Road (50 Acre Parcel) and the Secondary Entry Road after completion of the Proposed Project. Improvements are described in more detail below.

- **Primary Entry Road (50 Acre Parcel).** The Primary Entry Road (50 Acre Parcel) is a short segment across the RCWD's 50 Acre Parcel that would connect the Pond Access Road to De Portola Road (an existing, paved roadway) and would be constructed within property owned by RCWD, south of the future Upper VDC Regional Pump Station and Chlorine Contact Tank Project (RCWD Project No. D1903) to avoid conflict with that project. The first order of work will be to construct this access road for construction access to the dam. The Primary Entry Road (50 Acre Parcel) would provide two travel lanes (25 feet [ft] total width) and include gravel surfacing, and it

would also provide access to one of the construction staging areas. RCWD would demolish one unused building, formerly a horse stable, to allow construction of the Primary Entry Road.

- **Secondary Entry Road.** An existing unpaved access road from De Portola Road located adjacent to RCWD's Los Caballos Pump Station will continue to provide access for RCWD vehicles only from De Portola Road to the Pond Access Road. This unpaved roadway is 20 ft wide in the existing condition; improvements would be limited to scraping the surface and placing a 4-inch gravel wear surface within the existing road limits. This road would be used during daytime hours and would not provide routine construction access. Construction-related activities would be limited to installation of a noise barrier and potential occasional delivery of oversized equipment; daily construction traffic would be routed along the Primary Entry Road (50 Acre Parcel). Upon completion of the Primary Entry Road, the Secondary Entry Road would no longer be used for routine construction access.

- **North Access Road.** An existing unimproved North Access Road traverses approximately 2 miles from the northeast corner of the Upper VDC percolation ponds to the right abutment of the existing dam. The existing connection between the North Access Road and the Pond Access Road would be improved to facilitate the turning radius of a truck with a 40 ft wheelbase. The details of the proposed improvement to this area are shown on Figure 2. The existing North Access Road would be improved to provide vehicular access to the crest of the proposed dam. The North Access Road would be the primary vehicular access route to the crest of the proposed dam after Project completion. Vehicular access is not feasible from the left abutment due to the height of the existing left gravity abutment. Project improvements would include gravel surfacing and improvement of drainage. The road would remain a single-lane road. As shown on Figure 2, realignment would be needed where the road is outside of the property boundary and where excavation through a rock knob would be required.

- **Canyon Access Road.** The existing unpaved access road through the canyon below the dam (Pauba Canyon) is approximately 2 miles long and is currently a single-lane road bound on both sides by vegetation with limited sight lines (Figure 2)**.** This access road would need to be widened to two lanes (25 ft total width) for construction traffic, with several turnouts to allow vehicles to pass. Widening would be accomplished through removal of the existing vegetation on both sides of the current roadway. This widening would be only for the purpose of construction, and the expanded sides of the access road would be revegetated after the completion of construction. The roadway would be restored to its existing single-lane configuration after construction of the dam is complete. Other improvements to the Canyon Access Road would include gravel surfacing, which would remain within the single-lane road following construction. The existing five earthen Arizona type crossings of the creek would remain. However, temporary culverts or placement of clean rock within the channel may be required during construction at the five Arizona crossings to provide adequate support for construction vehicle crossings. Any temporary culverts or fill would be removed following completion of construction, and the creek would be restored to approximate pre-Project contours and habitat conditions or better. Within approximately 550 ft of the new dam, the elevation of the Canyon Access Road would be raised by up to 7 ft to avoid overtopping during

high-volume lake water release. Vegetated riprap would be placed within the Temecula Creek channel along the southern side of the raised road portion to reduce potential erosion.

- **Pond Access Road.** The Pond Access Road is an existing unpaved road providing access to the Upper VDC Recharge Basins and connecting to the North Access Road and Canyon Access Road. It is 20 to 25 ft wide in the existing condition. The roadway surface would be scraped or lightly graded to smooth the roadway surface, and vegetation that has encroached onto the roadway from the slopes of the road would be removed as part of the Proposed Project. Vegetated slopes on the sides of the roadway would not be scraped or graded. The Pond Access Road would not be widened as part of the Proposed Project with the exception of three turnouts to allow trucks to pass and a small area near the northeast corner of the ponds where there is insufficient turning radius for the larger trucks turning onto the North Access Road. At the maximum curve, this area would be widened from approximately 25 ft (including shoulders) to 50 ft as part of the Proposed Project; the location of the widening is shown on Figure 2. The Pond Access Road would provide two travel lanes for light utility vehicles and one travel lane for the heavy hauling trucks. During construction, on-site construction flag persons may be required to facilitate heavy hauling truck use of the Pond Access Road.

- **South Access Road.** The existing South Access Road connects to Vail Dam Road, which is a gravel one-lane roadway used by RCWD service vehicles that connects to Vail Lake Road via the campground (this route would not be used for construction purposes except as a possible delivery route for the modular barge system). The South Access Road would need to be relocated as it is within the footprint of the foundation excavation of the new dam. A new roadway embankment would be constructed along the north-facing slope of the canyon, approximately 150 ft downstream of the existing access road. The proposed realignment of the new South Access Road is shown on Figure 2. This location was selected to provide access from the spillway area and to provide a construction staging area immediately downstream of the new dam. After relocation, the South Access Road would maintain a connection to Vail Dam Road for use by RCWD service vehicles. Following construction, the graded slopes on the side of the South Access Road would be revegetated with appropriate native vegetation. Vegetated riprap would be placed at the foot of the embankment that would support the realigned road to reduce potential erosion associated with the release of water from the dam from Vail Lake into Temecula Creek. It is anticipated that the South Access Road embankment would be constructed using materials excavated from the new dam foundation. This road would also have gravel surfacing and drainage improvements. The South Access Road would be inundated in the event the reservoir spills; therefore, during operation, major erosion would need to be repaired on this road in the event of spill events. Implementation of the Project would give RCWD greater control over the lake water level in the event of an emergency release and would substantially decrease the likelihood of a spill event. Therefore, damage to the South Access Road during a major weather event is considered to be a low risk.

Construction Staging and On-Site Disposal

The site development would include staging areas to support construction and demolition activities. Material disposal areas are also planned for placement of excess foundation excavation spoils. It is currently estimated that dam construction would require approximately 81,600 cubic yards (cy) of

Roller Compacted Concrete (RCC), which would utilize approximately 147,000 tons of aggregate that would need to be imported and stored on site prior to use. However, this volume would increase if additional foundation excavation is required to enhance the seismic response of the dam. Potential quarries for aggregate include a quarry located in the community of Fallbrook east of Interstate 15 (I-15) along State Route 76 (SR-76), approximately 25 miles from the Project site, as well as a quarry located in the City of Corona. Concrete and cement would also be imported from the City of Victorville. Fly ash, a byproduct of coal power generation, would be imported from out of state.

Staging Areas

Limited area is available adjacent to the proposed dam and downstream due to the narrow width of this portion of the canyon. Therefore, staging areas have been identified in various locations, including the relatively level area downstream of the spillway, wider portions of the canyon downstream of the dam, within a vacant portion of RCWD's property adjacent to De Portola Road, and within the Temecula Valley Flyers RC Air Field ("Flyers Field") north of Basin U-4 in the Upper VDC Recharge Basins, which is currently leased to the Temecula Flyers for remote-controlled aircraft use. The proposed staging areas are shown on Figure 2. Staging areas include aggregate stockpile areas, laydown areas, and access and staging areas. It is anticipated that the Project contractor would determine the optimal locations within the staging areas for each activity. Staging areas would be required to provide the following:

- **RCC Mix Plant Area:** This area would contain a portable concrete mix plant (RCC batch plant) with silos of cement and fly ash and stockpiles of aggregate in 3 to 4 sizes. This mix plant area is anticipated to be located at the Flyers Field (see Figure 2) in the Upper VDC Recharge Basins. The RCC would be hauled from the mix plant to the dam site with off-road trucks.

- **Foundation Grout Mix Plant:** This area would contain a small mix plant for the grout used in the foundation grouting. This grout mix plant would be located adjacent to the dam site.

- **Crushing Plant:** This area would contain a portable rock crushing plant for crushing materials excavated from the dam foundation. Because of the limited space available adjacent to the dam, it is likely that the crushing plant would be located in a mid-canyon area.

- **Contractor Trailers:** Both the contractor's and engineer's field offices would be located within staging areas.

- **Laydown Areas:** These areas would provide material laydown/storage areas and space for activities such as fabricating rebar and assembling concrete forms, etc.

- **Crane Access Areas:** Portions of the staging and laydown area near the dam spillway may be graded to provide flat areas for crane access during the partial demolition of the existing arch dam. Cranes may be used to lift modular barge components from flatbed trucks into the lake and to move demolition debris from barges onto trucks for disposal.

- **Topsoil Stockpile Areas:** Topsoil from areas within the impact limits that support native vegetation will be salvaged and stockpiled during construction. Following construction, the salvaged topsoil will be spread onto areas to be restored to native habitat.

Disposal Areas

As discussed previously, approximately 64,900 cy of materials (including the previous foundation spoils, alluvium, fill, and moderately weathered rock) would be generated from excavation for the dam foundation. Most of this material would be used to construct the new alignment of the South Access Road and as fill to construct flat areas near Vail Dam to support crane access for demolition activities. The balance of the excavation materials would require removal from the dam area and subsequent disposal. RCWD currently plans to keep the excess materials on its property for possible future re-use. The disposal areas are anticipated to be located within the staging and laydown area near De Portola Road on RCWD's 50 Acre Parcel as shown on Figure 2. Off-site disposal, if needed, would be at a nearby licensed landfill.

Electrical, Mechanical, and Instrumentation for the Dam

The existing dam facilities have overhead electrical service provided by Southern California Edison (SCE). The existing overhead service would need to be rerouted to accommodate the footprint of the new dam and outlet works facilities. New power poles would be provided to route the existing service up the downstream side of the right abutment to the new Dam Control Building. All new electrical utility facilities would be designed per SCE standards. Power is used for lighting, security cameras, gate actuators, trash rack hoists, and monitoring and control systems.

Existing Dam Demolition

The three central monoliths of the existing arch dam would be partially removed after the new dam and outlet works are functional to allow for hydraulic connection of the reservoir with the new outlet tower. The remainder of the existing arch dam would remain in place. The demolition would likely include saw cutting the arch monoliths into manageable sizes that can be removed with a barge-supported crane. Auxiliary barges would transport the demolition debris to the shoreline, likely to the spillway staging area. All the demolition debris will be removed from the site for off-site disposal via the Canyon Access Road. It is anticipated that the demolition will occur over a period of 3 to 4 months.

It is anticipated that the contractor would support the demolition equipment on a modular pontoon system that would be trucked to the site and then assembled to form a larger barge. Multiple barges may be required to transport equipment and demolition debris to/from the shoreline and the dam. The barges could be launched from the existing launch ramp (in the southeast part of the reservoir) or lofted into the reservoir with a crane located in the staging area planned in the spillway area. Use of the existing launch ramp will not be feasible if the water level in the reservoir is too low. No improvements are planned to the existing launch ramp, Vail Lake Road (the access road to the ramp), or Vail Dam Road. Any grading performed in the vicinity of the staging area to prepare a flat area for crane access will use on-site materials (e.g., dam foundation excavation materials) and will be restored with native vegetation at the end of the demolition.

It is estimated the barge mobilization and demobilization would require about 10 flatbed truck trips to/from the site. Removing the estimated 1,250 cy of demolition debris would require about 105 trips with dump trucks and would occur via the Canyon Access Road.

Demolition of the existing gravity abutments would occur where the new dam contacts the abutments. This would consist of hydroblasting and removing 2–3 inches of concrete on the sloping downstream faces of the abutments and removing the upper 6 inches of the crests of both the right and left gravity abutments.

Spillway Modifications

The existing spillway would be used as the spillway for the new gravity dam. Concrete aprons would be installed to armor the area below the ogee and overpour weirs.

REGULATORY BACKGROUND

United States Army Corps of Engineers

The Corps regulates discharges of dredged or fill material into waters of the United States (WOTUS). These waters include wetland and nonwetland bodies of water that meet specific criteria. Corps regulatory jurisdiction pursuant to Section 404 of the CWA is founded on a connection, or nexus, between the water body in question and interstate commerce. This connection may be direct (through a tributary system linking a stream channel with traditional navigable waters used in interstate or foreign commerce) or may be indirect (through a nexus identified in Corps regulations).

For several decades, the operable definition of waters of the U.S. was provided at 33 Code of Federal Regulations (CFR) 328.3, but implementation of this definition has been shaped by the courts and subsequent guidance over the years, most substantially by the 2001 Supreme Court decision in *Solid Waste Agency of Northern Cook County v. United States Army Corps of Engineers*, No. 99-1178 (*SWANCC*) and the 2006 Supreme Court decision in the consolidated cases *Rapanos v. United States* and *Carabell v. United States* (126 S. Ct. 2208), collectively referred to as *Rapanos*. The Supreme Court concluded that wetlands are "waters of the United States" if they significantly affect the chemical, physical, and biological integrity of other covered waters more readily understood as navigable. However, the involved Supreme Court Justices were not able to agree on a single, underlying standard which would govern future jurisdictional disputes. Instead, a four-Justice plurality opinion, authored by Justice Scalia, and an opinion by Justice Kennedy, proposed two alternative tests for evaluating jurisdictional waters:

1. Relative permanence and continuous surface connection

2. Significant nexus: a nexus exists when the feature (whether an adjacent wetland or tributary) significantly affects the chemical, physical, and biological integrity of other covered waters

Following the *Rapanos* decision, the lower courts immediately struggled to determine which "test" should be used, which led to inconsistency in CWA implementation across the states. On June 5, 2007, the Corps issued guidance regarding the *Rapanos* decision. After consideration of public comments and agencies' experience, revised guidance was issued on December 2, 2008. This

guidance states that the Corps will assert jurisdiction over traditional navigable waters (TNWs), wetlands adjacent to TNWs, relatively permanent nonnavigable tributaries that have a continuous flow at least seasonally (typically 3 months), and wetlands that directly abut relatively permanent tributaries. Under the 2008 *Rapanos* Guidance, the Corps determined jurisdiction over waters that are nonnavigable tributaries that are not relatively permanent and wetlands adjacent to nonnavigable tributaries that are not relatively permanent only after making a significant nexus finding. The Corps generally did not assert jurisdiction over swales or erosional features, or ditches excavated wholly in and draining only uplands that do not carry a relatively permanent flow of water. However, the Corps reserved the right to regulate these waters on a case-by-case basis.

Several recent attempts have been made to clarify the scope of WOTUS. Based, in part, on the *Rapanos* decision and the opinions authored by Justice Kennedy and Justice Scalia, new rules defining WOTUS were promulgated under the Obama and Trump administrations. The 2015 "Clean Water Rule" and the 2020 "Navigable Waters Protection Rule" set forth different definitions for WOTUS (ranging from relatively broad federal jurisdiction under the 2015 rule to relatively limited federal jurisdiction under the 2020 rule). Each of these new rules prompted a series of legal challenges and court decisions. On August 30, 2021, the United States District Court for Arizona vacated the 2020 Navigable Waters Protection Rule, which reinstated federal wetland regulations and definitions originally adopted by the federal government in the 1980s. In light of this order, the United States Environmental Protection Agency (EPA) and Corps (collectively "agencies") have halted implementation of the 2020 Navigable Waters Protection Rule and are interpreting WOTUS consistent with the pre-2015 regulatory regime (and 2008 *Rapanos* Guidance) until further notice.

While litigation continues and the agencies, on June 9, 2021, announced plans for new WOTUS rulemaking, the current definition of WOTUS[1] is as follows:

1. All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;

2. All interstate waters including interstate wetlands;

3. All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce including any such waters:

    a. Which are or could be used by interstate or foreign travelers for recreational or other purposes; or

    b. From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or

[1] See: "Current Implementation of Waters of the United States." https://www.epa.gov/wotus/current-implementation-waters-united-states (accessed October 8, 2021).

c. Which are used or could be used for industrial purposes by industries in interstate commerce;

4. All impoundments of waters otherwise defined as waters of the United States under this definition;

5. Tributaries of waters identified in paragraphs (1) through (4) of this section;

6. The territorial sea;

7. Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (1) through (6) of this section; waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA (other than cooling ponds as defined in 40 CFR 423.11(m) which also meet the criteria of this definition) are not waters of the United States.

WOTUS do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the CWA, the final authority regarding CWA jurisdiction remains with EPA.

Given the substantial changes in operable definitions that have occurred and may continue to occur considering recent regulatory revisions and court actions, it is not possible to predict the regulations that will be in place at the time of a particular jurisdictional determination by the Corps. Therefore, this jurisdictional delineation focuses on identifying the boundaries of potentially jurisdictional water bodies, utilizing methods for determining the locations of the ordinary high water mark (OHWM) and wetland boundaries as described below. These methods for determining the boundaries of water bodies in general have not substantially changed over the years and are not likely to change with any revised regulations. This delineation can then be used in combination with a companion jurisdictional analysis to determine which of the identified water bodies are actually jurisdictional, based on the definition that is in effect at the time of a jurisdictional determination by the Corps.

The Corps typically considers any body of water displaying an OHWM for designation as WOTUS, subject to the applicable definition of WOTUS. Corps jurisdiction over nontidal waters of the U.S. extends laterally to the OHWM or beyond the OHWM to the limit of any contiguous wetlands, if present.

The OHWM is defined as "that line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding area" (33 CFR 328.3). Jurisdiction typically extends upstream to the point where the OHWM is no longer perceptible.

Waters found to be isolated and not subject to CWA regulation may still be regulated by the RWQCB under the State Porter-Cologne Water Quality Control Act (Porter-Cologne Act).

Wetlands

Wetland delineations for Section 404 purposes must be conducted according to the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (Version 2.0) (*Regional Supplement*) (Corps 2008) and the *Corps of Engineers 1987 Wetland Delineation Manual* (*1987 Manual*) (Environmental Laboratory 1987). Where there are differences between the two documents, the *Regional Supplement* takes precedence over the *1987 Manual*.

The Corps and the EPA define wetlands as follows:

> *Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted to life in saturated soil conditions.*

In order to be considered a jurisdictional wetland under Section 404, an area must possess three wetland characteristics: hydrophytic vegetation, hydric soils, and wetland hydrology. Each characteristic has a specific set of mandatory wetland criteria that must be satisfied for that particular wetland characteristic to be met. Several indicators may be analyzed to determine whether the criteria are satisfied.

Hydrophytic vegetation and hydric soils indicators provide evidence that episodes of inundation have lasted more than a few days or have occurred repeatedly over a period of years, but do not confirm that an episode has occurred recently. Conversely, wetland hydrology indicators provide evidence that an episode of inundation or soil saturation occurred recently, but do not provide evidence that episodes lasted more than a few days or occurred repeatedly over a period of years. Because of this, if an area lacks one of the three characteristics under normal circumstances, the area is considered nonwetland under most circumstances.

Determination of wetland limits may be obfuscated by a variety of natural environmental factors or human activities, collectively called difficult wetland situations, including cyclic periods of drought and flooding or highly ephemeral stream systems. During periods of drought, for example, bank return flows are reduced and water tables are lowered. This results in a corresponding lowering of ordinary high water and invasion of upland plant species into wetland areas. Conversely, extreme flooding may create physical evidence of high water well above what might be considered ordinary and may allow the temporary invasion of hydrophytic species into nonwetland areas. In highly ephemeral systems typical of Southern California, these problems are encountered frequently. In these situations, professional judgment based on years of practical experience and extensive knowledge of local ecological conditions comes into play in delineating wetlands. The *Regional Supplement* provides additional guidance for difficult wetland situations.

Hydrophytic Vegetation

Hydrophytic vegetation is plant life that grows and is typically adapted for life in permanently or periodically saturated soils. The hydrophytic vegetation criterion is met if more than 50 percent of the dominant plant species from all strata (tree, shrub, herb, and woody vine layers) are considered hydrophytic. Hydrophytic species are those included on the 2016 National Wetland Plant List

(Lichvar et al. 2016) published by the Corps. Each species on the list is rated according to a wetland indicator category, as shown in Table A.

Table A: Hydrophytic Vegetation

Category		Probability
Obligate Wetland	OBL	Almost always occur in wetlands (estimated probability > 99%)
Facultative Wetland	FACW	Usually occur in wetlands (estimated probability 67–99%)
Facultative	FAC	Equally likely to occur in wetlands and nonwetlands (estimated probability 34–66%)
Facultative Upland	FACU	Usually occur in nonwetlands (estimated probability 67–99%)
Obligate Upland	UPL	Almost always occur in nonwetlands (estimated probability > 99%)

To be considered hydrophytic, the species must have wetland indicator status (i.e., be rated Obligate Wetland [OBL], Facultative Wetland [FACW], or Facultative [FAC]).

The delineation of hydrophytic vegetation is typically based on the most dominant species from each vegetative stratum (strata are considered separately); when more than 50 percent of these dominant species are hydrophytic (i.e., FAC, FACW, or OBL), the vegetation is considered hydrophytic. In particular, the Corps recommends the use of the "50/20" rule (also known as the dominance test) from the *Regional Supplement* for determining dominant species. Under this method, dominant species are the most abundant species that immediately exceed 50 percent of the total dominance measure for the stratum, plus any additional species comprising 20 percent or more of the total dominance measure for the stratum. In cases where indicators of hydric soil and wetland hydrology are present but the vegetation initially fails the dominance test, the prevalence index must be used. The prevalence index is a weighted average of all plant species within a sampling point. The prevalence index is particularly useful when communities only have one or two dominants, where species are present at roughly equal coverage, or when strata differ greatly in total plant cover. In addition, Corps guidance provides that morphological adaptations may be considered when determining hydrophytic vegetation when indicators of hydric soil and wetland hydrology are present (Corps 2008). If the plant community passes either the dominance test or prevalence index after reconsidering the indicator status of any plant species that exhibit morphological adaptations for life in wetlands, then the vegetation is considered hydrophytic.

Hydric Soils

Hydric soils[2] are defined as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part.[3] Soils are considered likely to meet the definition of a hydric soil when one or more of the following criteria are met:

[2] The hydric soils definition and criteria included in the *1987 Manual* are obsolete. Users of the 1987 Manual are directed to the United States Department of Agriculture (USDA) NRCS website for the most current information on hydric soils.

[3] Current definition as of 1994 (*Federal Register,* July 13, 1994).

1. All Histels except Folistels and Histosols except Folists;

2. Soils that are frequently ponded for a long duration or very long duration[4] during the growing season; or

3. Soils that are frequently flooded for a long duration or very long duration during the growing season.

Hydric soils develop under conditions of saturation and inundation combined with microbial activity in the soil that causes a depletion of oxygen. While saturation may occur at any time of the year, microbial activity is limited to the growing season, when soil temperature is above biologic zero (the soil temperature at a depth of 50 centimeters, below which the growth and function of locally adapted plants are negligible). Biogeochemical processes that occur under anaerobic conditions during the growing season result in the distinctive morphologic characteristics of hydric soils. Based on these criteria and on information gathered from the National Soil Information System (NASIS) database, the United States Department of Agriculture's Natural Resources Conservation Service (NRCS) created a Soil Data Access (SDA) Hydric Soils List that is updated annually.

The *Regional Supplement* has a number of field indicators that may be used to identify hydric soils. The NRCS (2017) has also developed a number of field indicators that may demonstrate the presence of hydric soils. These indicators include hydrogen sulfide generation, accumulation of organic matter, and the reduction, translocation, and/or accumulation of iron and other reducible elements. These processes result in soil characteristics that persist during both wet and dry periods. Separate indicators have been developed for sandy soils and for loamy and clayey soils.

Wetland Hydrology

Under natural conditions, development of hydrophytic vegetation and hydric soils is dependent on a third characteristic: wetland hydrology. Areas with wetland hydrology are those where the presence of water has an overriding influence on vegetation and soil characteristics due to anaerobic and reducing conditions, respectively (Environmental Laboratory 1987). The wetland hydrology criterion is satisfied if the area is seasonally inundated or saturated to the surface for a minimum of 14 consecutive days during the growing season in most years (Corps 2008).

Hydrology is often the most difficult criterion to measure in the field due to seasonal and annual variations in water availability. Some of the indicators that are commonly used to identify wetland hydrology include visual observation of inundation or saturation, watermarks, recent sediment deposits, surface scour, and oxidized root channels (rhizospheres) resulting from prolonged anaerobic conditions.

California Department of Fish and Wildlife

The CDFW, through provisions of the California Fish and Game Code (Sec. 1600 et seq.), is empowered to issue agreements for any alteration of a river, stream, or lake where fish or wildlife

[4] "Long duration" is defined as a single event lasting from 7 to 30 days; "very long duration" is defined as a single event that lasts longer than 30 days.

resources may be adversely affected. Streams (and rivers) are defined by the presence of a channel bed and banks and at least an intermittent flow of water. The CDFW regulates wetland areas only to the extent that those wetlands are part of a river, stream, or lake as defined by the CDFW. Also, the CDFW typically does not regulate estuaries below the mouth of a tributary river or stream.

In obtaining CDFW agreements, the limits of wetlands are not typically determined. The reason for this is that the CDFW generally includes, within the jurisdictional limits of streams and lakes, any riparian habitat present. Riparian habitat includes willows, mule fat, and other vegetation typically associated with the banks of a stream or lake shorelines and may not be consistent with Corps definitions. In most situations, wetlands associated with a stream or lake would fall within the limits of riparian habitat. Thus, defining the limits of CDFW jurisdiction based on riparian habitat will automatically include any wetland areas and may include additional areas that do not meet Corps criteria for soils and/or hydrology (e.g., where riparian woodland canopy extends beyond the banks of a stream away from frequently saturated soils).

Regional Water Quality Control Board

The Porter-Cologne Water Quality Control Act of the California Water Code (§ 13000 et seq.) established nine RWQCBs to oversee water quality on a day-to-day basis at the local and/or regional level. Their duties include preparing and updating water quality control plans and associated requirements, and issuing water quality certifications under Section 401 of the CWA. This Act grants ultimate authority to the State Water Resources Control Board (SWRCB) over State water rights and water quality policy. Under the Porter-Cologne Water Quality Control Act, the RWQCBs (or SWRCB for projects that cross multiple RWQCB jurisdictions) are responsible for issuing National Pollutant Discharge Elimination System permits for point-source discharges and waste discharge requirements for nonpoint-source discharges into jurisdictional waters of the State.

The definition of waters under the jurisdiction of the State of California is broad and includes any surface water or groundwater, including saline waters within the boundaries of the State. Waters that meet the definition of waters of the United States are also considered waters of the State, but the jurisdictional limits of waters of the State may extend beyond the limits of waters of the United States. Isolated or ephemeral waters that may not be subject to regulations under federal law are considered to be waters of the State and regulated accordingly. The SWRCB recently adopted a definition of wetlands that utilizes Corps criteria and methods, but includes as wetlands those areas that meet hydrology and soils criteria even when vegetation is absent. While there is no formal statewide guidance for the delineation of nonwetland waters of the State, jurisdiction generally corresponds to the surface area of aquatic features that are at least seasonally inundated, and all areas within the banks of defined rivers, streams, washes, and channels, including associated riparian vegetation. Currently, each RWQCB reserves the right to establish criteria for the regulation of nonwetland waters of the State.

Wetland Waters of the State

On August 28, 2019, the California Office of Administrative Law approved the SWRCB-proposed *State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State* (Procedures). The Procedures, effective on May 28, 2020, apply to discharges of dredged or fill material to waters of the State. The Procedures consist of four major elements: (1) a wetland

definition; (2) a framework for determining whether a feature that meets the wetland definition is a water of the State; (3) wetland delineation procedures; and (4) procedures for the submittal, review, and approval of applications for Water Quality Certifications and Waste Discharge Requirements for dredge or fill activities.

The Water Boards define a wetland as:

> *An area is wetland if, under normal circumstances, (1) the area has continuous or recurrent saturation of the upper substrate caused by groundwater, or shallow surface water, or both; (2) the duration of such saturation is sufficient to cause anaerobic conditions in the upper substrate; and (3) the area's vegetation is dominated by hydrophytes or the area lacks vegetation.*

The Water Board will rely on the final aquatic resource report verified by the Corps for determining the extent of wetland waters of the U.S. However, if it is not delineated in a final aquatic report, the procedures will use the 1987 Manual and Regional Supplement to determine whether the area meets the State definition of a wetland. As described in the 1987 Manual and Regional Supplement, an area "lacks vegetation" if it has less than 5 percent areal coverage of plants at the peak of the growing season. The methods shall be modified only to allow for the fact that the lack of vegetation does not prevent the determination of such an area that meets the State definition of wetland.

Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP)

The MSHCP requires evaluation of the functions and values of any aquatic resources (i.e., riparian/ riverine areas and vernal pools) on site. The purpose of this evaluation is the protection of these areas for conservation of specific species associated with these resources. Section 6.1.2, Volume I of the MSHCP, states the following regarding evaluation of aquatic resources:

> *The documentation for the assessment shall include mapping and a description of the functions and values of the mapped areas with respect to the species listed above, under "Purpose." Factors to be considered include hydrologic regime, flood storage and flood flow modification, nutrient retention and transformation, sediment trapping and transport, toxicant trapping, public use, wildlife habitat, and aquatic habitat. The functions and values assessment will focus on those areas that should be considered for priority acquisition for the MSHCP conservation area, as well as those functions that may affect downstream values related to conservation of covered species within the MSHCP conservation area.*

The MSHCP also requires that if any aquatic resources are identified as suitable habitat for several specific species identified in the MSHCP, focused surveys for those species are required, and avoidance and minimization measures must be implemented in accordance with the species-specific objectives for each of those species.

Areas subject to regulation by the Corps, RWQCB, and CDFW will continue to be regulated by those agencies.

SITE DESCRIPTION AND SETTING

The JSA is in unincorporated southwestern Riverside County, east of the City of Temecula, in southern California. Specifically, the JSA is in Section 00, Township 8 South, and Range 1 West of the United States Geological Survey (USGS) *Bachelor Mountain, Sage, Pechanga,* and *Vail Lake, California* 7.5-minute topographic quadrangle maps.

Vail Dam spans Temecula Creek, a northwesterly draining tributary of the Santa Margarita River that drains the north side of Palomar Mountain. The JSA is within the Santa Margarita River Watershed, which is approximately 750 square miles in San Diego and Riverside Counties and drains to the Pacific Ocean just north of the City of Oceanside. It includes parts of the Cleveland National Forest, the Santa Rosa Plateau Ecological Preserve, and Agua Tibia Wilderness. It also includes portions of the Pechanga and Cahuilla Indian Reservations; the cities of Murrieta and Temecula; the community of Fallbrook; and portions of Marine Corps Base Camp Pendleton. Vail Lake is fed by Temecula Creek, Wilson Creek, Kolb Creek, and Arroyo Seco Creek.

The topography within the JSA varies from relatively flat within the canyon downstream of Vail Dam to steeply sloped within the canyons surrounding Vail Lake and has an elevation range of approximately 1,280 to 1,990 ft above mean sea level (amsl). The higher elevations are along the North Access Road, north of Pauba Canyon.

The approximately 1,090-acre JSA is divided into three areas: (1) the area east of De Portola Road and within Pauba Canyon along Pulgas Creek Road, downstream of Vail Dam; (2) the area along the North Access Road, along the ridgeline north of Pauba Canyon; and (3) the area within and around the perimeter of Vail Lake.

Area East of De Portola Road and Within Pauba Canyon

The section of the JSA east of De Portola Road is flat and dominated by disturbed habitat, nonnative grassland, and bare ground. This area contains development associated with an equestrian facility and RCWD structures and unpaved access roads. The section of the JSA within the canyon contains an unpaved access road that reaches the dam. This section of the JSA is relatively flat, as it does not include the adjacent hillsides that have substantial slopes. This section is almost entirely undeveloped. Vegetation communities within this section include Riversidean sage scrub, Riversidean alluvial fan sage scrub, nonnative grassland, riparian scrub, oak woodland, freshwater marsh, and disturbed habitat.

North Access Road

This section of the JSA consists of an approximately 2-mile existing unimproved access road from the northeast corner of the Upper VDC percolation ponds to the right abutment of the existing dam. Vegetation communities within and on either side of the road consist of disturbed habitat and Riversidean sage scrub.

Area Within and Around Vail Lake

This section of the JSA consists of the Vail Lake water body and riparian habitats along the shore, Temecula Creek upstream and downstream from Vail Lake, Arroyo Seco Creek upstream from Vail

Lake, Wilson Creek upstream from Vail Lake, and unnamed drainage features on the north side of Vail Lake. The predominant vegetation communities identified in these areas (not including open water) are riparian forest, riparian scrub, and alluvial fan sage scrub. Riparian forest predominates at the eastern end of the JSA and south of the lake along the southern shore and in Arroyo Seco and Temecula Creeks. Riparian scrub predominates along the western, northern, and eastern lake shores.

METHODOLOGY

LSA Senior Biologists Jaime Morales and Anthony Greco performed the jurisdictional delineation fieldwork on June 16 and 29, 2020. LSA Associate Biologist Dr. Stanley Spencer assisted with the fieldwork on June 16, 2020. Mr. Morales returned to the site on July 12, 2020, to capture data at additional sample points. LSA biologists surveyed the JSA on foot and evaluated all areas of potential jurisdiction according to Corps, RWQCB, and CDFW criteria. Data were recorded directly on a field map containing a 2020 drone aerial photograph base at a scale of 1 inch = 200 ft.

LSA evaluated areas supporting hydrology or species of plant life potentially indicative of wetlands according to routine wetland delineation procedures described in the Regional Supplement. Representative sample points were selected and examined in the field in those areas where wetland jurisdiction was in question or needed to be confirmed. At each sample point, the dominant and subdominant plant species were identified and their wetland indicator status (Lichvar et al. 2016) noted. When possible, a small sample pit (approximately 12 to 20 inches deep) was dug in order to examine soil characteristics and composition. Soil matrix colors were classified according to the Munsell Soil Color Charts (Munsell Color 2000). Hydrological conditions, including any surface inundation, saturated soils, groundwater levels, and/or other wetland hydrology indicators, were recorded. General site characteristics were also noted. Standard data forms were completed for each sample point; copies of these data forms are included in Appendix B of this report.

RESULTS AND CONCLUSIONS

Temecula Creek (upstream and downstream of Vail Lake), Arroyo Seco Creek, and Wilson Creek display defined streambeds and banks and convey flows intermittently into Vail Lake. Additionally, several unnamed drainage features on the northern side of Vail Lake contribute ephemeral flows into Vail Lake. Water from the lake is released periodically by RCWD into Temecula Creek downstream of the dam. Temecula Creek conveys flows into the Santa Margarita River, which conveys flows into the Pacific Ocean. The Pacific Ocean is a traditional navigable water of the U.S.

Functions and values for potentially jurisdictional riparian/riverine areas within the JSA were determined to have moderate to high significance in terms of resources. Appendix C describes and evaluates the functions and values of the features within the JSA. Figure 3, Potential Jurisdictional Waters, depicts the locations of potentially jurisdictional resources, and Figure 4, Site Photographs, shows site conditions during the jurisdictional delineation fieldwork. The wetland determination data forms (Appendix B) contain full descriptions of the results of each sample point.

Vegetation

The JSA contains the following vegetation communities and land uses: alluvial fan sage scrub, bare ground, developed land, disturbed habitat, lakeshore, nonnative grassland, open water, riparian forest, riparian scrub, Riversidean sage scrub, and unvegetated streambed.

The hydrophytic vegetation criterion for Corps wetland waters of the U.S. is satisfied when there is a prevalence of wetland vegetation. Areas identified in this report as wetland waters of the U.S. and State are typically dominated by wetland vegetation and subject to Corps, RWQCB, and CDFW jurisdiction. Drainage- and lake-associated vegetation occurring beyond the stream bank and lake water level is also subject to CDFW jurisdiction.

Wetland vegetation was present within Temecula Creek, Wilson Creek, and Arroyo Seco Creek and around the perimeter of Vail Lake in areas categorized as lakeshore, riparian forest, and riparian scrub. Dominant plant species included blue elderberry (*Sambucus nigra* ssp. *caerulea* FACU), western ragweed (*Ambrosia psilostachya* FACU), mule fat (*Baccharis salicifolia* FAC), arrowweed (*Pluchea sericea* FACW), rough cocklebur (*Xanthium strumarium* FAC), salt heliotrope (*Heliotropium curassavicum* FACU), California sycamore (*Platanus racemosa* FAC), willow dock (*Rumex salicifolius* FACW), Fremont cottonwood (*Populus fremontii* FAC), narrowleaf willow (*Salix exigua* FACW), Goodding's willow (*Salix gooddingii* FACW), red willow (*Salix laevigata* FACW), arroyo willow (*Salix lasiolepis* FACW), Mediterranean tamarisk (*Tamarix ramosissima* FAC), hoary nettle (*Urtica dioica* ssp. *holosericea* FAC), California bulrush (*Schoenoplectus californicus* OBL), tall flatsedge (*Cyperus eragrostis* FACW), annual rabbitsfoot grass (*Polypogon monspeliensis* FACW), and southern cattail (*Typha domingensis* OBL).

Wetland vegetation was absent from the area within and on either side of the North Access Road; however, this area was included in the JSA because it contains a seasonal pond.

Soils

The following soils are present within the JSA according to the United States Department of Agriculture (Figure 5, Soils, displays the soils mapped within and around the JSA):

- (AtC2) Arlington and Greenfield fine sandy loams, 2 to 8 percent slopes , eroded
- (AtD2) Arlington and Greenfield fine sandy loams, 8 to 15 percent slopes, eroded
- (AuD) Auld clay, 8 to 15 percent slopes
- (AyF) Auld cobbly clay, 8 to 50 percent slopes
- (BaG) Badland
- (CbF2) Cajalco rocky fine sandy loam, 15 to 50 percent slopes, eroded
- (GkD) Gorgonio loamy sand, channeled, 2 to 15 percent slopes
- (GtA) Grangeville fine sandy loam, drained, 0 to 2 percent slopes
- (GuB) Grangeville fine sandy loam, poorly drained, saline-alkali, 0 to 5 percent slopes
- (GzG) Gullied land
- (HcA) Hanford coarse sandy loam, 0 to 2 percent slopes
- (HcC) Hanford coarse sandy loam, 2 to 8 percent slopes
- (HcD2) Hanford coarse sandy loam, 8 to 15 percent slopes, eroded

- (LkF3) Las Posas rocky loam, 15 to 50 percent slopes, severely eroded
- (LpF2) Lodo rocky loam, 25 to 50 percent slopes, eroded
- (MeD) Metz loamy sand, channeled, 0 to 15 percent slopes
- (MlD) Metz gravelly sandy loam, 2 to 15 percent slopes
- (MmE3) Monserate sandy loam, 15 to 25 percent slopes, severely eroded
- (MnE3) Monserate sandy loam, shallow, 15 to 25 percent slopes, severely eroded
- (RsC) Riverwash
- (RuF) Rough broken land
- (SgC) San Emigdio loam, 2 to 8 percent slopes
- (SgD2) San Emigdio loam, 8 to 15 percent slopes, eroded
- (SmE2) San Timoteo loam, 8 to 25 percent slopes, eroded
- (SmF2) San Timoteo loam, 25 to 50 percent slopes, eroded
- (TvC) Tujunga loamy sand, channeled, 0 to 8 percent slopes

Sample points were taken within the JSA above and below the observed OHWM where wetland vegetation was present in order to identify the limits of potential jurisdictional areas. Previously referenced Figure 3 depicts the locations of the sample points. The wetland determination data forms contain full descriptions of the soils present at each sample point.

Sample Points 1 and 2 were taken within the seasonal pond identified along the North Access Road. Construction access is anticipated to occur along this access road. Sample Points 3 through 7 were taken within Pauba Canyon, at points where the Canyon Access Road intersects with Temecula Creek, or where construction-related activities or proposed structures are planned (closer to Vail Dam). Sample Points 8 through 16 were taken around the lakeshore surrounding Vail Lake or within the creeks conveying flows into the lake.

Generally, hydric soils were present within Temecula Creek downstream of Vail Lake, at the lakeshore surrounding Vail Lake, and within the creeks that convey flows to Vail Lake. Due to the intermittent nature of the creeks conveying flows to the lake and because the lake water level is considerably lower than historic levels (current water level is 1,424.5 ft above amsl according to the NAVD88; average historic water level between 1978 and 2019 is 1,445.2 ft amsl NAVD88), soils in these areas have ponded or flooded long enough during the growing season to develop anaerobic conditions. Evidence of these anaerobic conditions was characterized by dark soils meeting the Depleted Matrix (F3) and Redox Dark Surfaces (F6) hydric soils indicators, as outlined in the Regional Supplement, and the presence of redox features that were identified as 5YR 5/6 at the sample points containing hydric soils.

Hydrology

Wetland hydrology was evident within Temecula Creek downstream of Vail Lake, at the perimeter around Vail Lake up to a discernable shelf or bank created by an old and presumably long-duration water level (beyond this shelf wetland hydrology and hydric soils were generally absent and hydrophytic vegetation was less prevalent), and within the creeks that convey flows to Vail Lake. The following wetland hydrology indicators were observed: surface water (A1; primary indicator), saturation (A3; primary indicator), drift deposits (B3; primary indicator – nonriverine), surface soil

cracks (B6; primary indicator), inundation visible on aerial imagery (B7; primary indicator), water-stained leaves (B9; primary indicator), aquatic invertebrates (B13; primary indicator), oxidized rhizospheres along living roots (C3; primary indicator), water marks (B1; secondary indicator), drift deposits (B3; secondary indicator - riverine), and saturation visible on aerial imagery (C9; secondary indicator).

Potential Corps Jurisdiction

Wetland Waters of the United States

There are several areas within the JSA where potential Corps jurisdictional wetlands of the U.S. occur (i.e., areas that satisfy all three criteria for Corps jurisdictional wetlands). The majority of areas within the OHWMs and the associated floodplains of Temecula Creek, Wilson Creek, and Arroyo Seco Creek that contain a predominance of wetland vegetation are considered potential Corps wetland waters of the U.S. Additionally, much of the shoreline around Vail Lake meets the Corps criteria for jurisdictional wetland waters of the U.S. At two points where Temecula Creek intersects the Canyon Access Road and a proposed staging area near the western end of the canyon, wetland waters of the U.S. are absent due to the lack of a predominance of wetland vegetation.

The seasonal pond identified along the North Access Road (location of Sample Points 1 and 2) exhibited evidence of wetland hydrology and some vernal pool plant species, such as smooth boisduvalia (*Boisduvalia pygmaea* formerly *Epilobium pygmaea*) and wooly marbles (*Psilocarphus brevissimus*); however, it did not meet the Corps' hydrophytic plant and hydric soils criteria, so it is not a vernal pool.

Nonwetland Waters of the United States

Within the JSA, nonwetland waters of the U.S. are present at the following locations: the open waters associated with Vail Lake and areas within the OHWMs of intermittent creeks (Temecula, Wilson, and Arroyo Seco) that do not contain a predominance of wetland vegetation. Additional features are present along the southern slope of the canyon downstream of the existing dam.

Table B displays the acreages of waters of the U.S. within the JSA. Due to the nature and location of anticipated project impacts from the Canyon Access Road (refer to Figure 2 in Appendix A), jurisdictional resources associated with Temecula Creek downstream of Vail Dam at the location of anticipated creek crossings are quantified separately.

All areas that satisfy the Corps jurisdictional criteria for nonwetland waters of the U.S. are also subject to RWQCB jurisdiction as nonwetland waters of the State. However, there are instances where the jurisdictional limits of waters of the State may extend beyond the limits of waters of the U.S. Additionally, ephemeral drainage features that are not continuously saturated or present evidence of anaerobic conditions (including the seasonal pond identified along the North Access Road) are subject to RWQCB jurisdiction as nonwetland waters of the State.

Table C displays the acreages of waters of the State within the JSA.

Table B: Potential Waters of the United States Within the JSA

Feature[1]	Nonwetland Waters (acres)	Wetland Waters (acres)	Total Waters (acres)
Temecula Creek (Downstream of Dam)			
Staging Area Access Crossing[2]	0.01	-	**0.01**
Canyon Access Road Crossing 1	0.01	-	**0.01**
Canyon Access Road Crossing 2	0.01	0.01	**0.02**
Canyon Access Road Crossing 3	0.02	0.04	**0.06**
Canyon Access Road Crossing 4	0.01	0.01	**0.02**
Canyon Access Road Crossing 5	0.01	0.03	**0.04**
Canyon Access Road Crossing 6	0.01	0.02	**0.04**
Additional Area within JSA	0.20	1.18	**1.38**
Vail Lake Area - including Arroyo Seco Creek, Wilson Creek, and Temecula Creek (upstream of dam)	412.20	284.44	**696.64**
TOTAL JSA	**412.47**	**285.75**	**698.23**

Source: LSA 2022.
Note: Totals may not equal sum due to rounding.
[1] Crossings of Temecula Creek by the Canyon Access Road are numbered 1 to 6 from west to east.
[2] This crossing is no longer part of the project.
JSA = Jurisdictional Study Area

Table C: Potential Waters of the State Within the JSA

Feature[1]	Nonwetland Waters (acres)	Wetland Waters (acres)	Total Waters (acres)
Temecula Creek (Downstream of Dam)			
Staging Area Access Crossing[2]	0.01	-	**0.01**
Canyon Access Road Crossing 1	0.02	-	**0.02**
Canyon Access Road Crossing 2	-	0.03	**0.03**
Canyon Access Road Crossing 3	-	0.06	**0.06**
Canyon Access Road Crossing 4	-	0.02	**0.02**
Canyon Access Road Crossing 5	-	0.04	**0.04**
Canyon Access Road Crossing 6	-	0.04	**0.04**
Additional Area within JSA	0.20	1.38	**1.57**
Seasonal Pond along North Access Road	0.07	-	**0.07**
Vail Lake Area - including Arroyo Seco Creek, Wilson Creek, and Temecula Creek (upstream of dam)	412.47	284.49	**696.96**
TOTAL JSA	**412.76**	**286.05**	**698.82**

Source: LSA 2022.
Note: Totals may not equal sum due to rounding.
[1] Crossings of Temecula Creek by the Canyon Access Road are numbered 1 to 6 from west to east.
[2] This crossing is no longer part of the project.
JSA = Jurisdictional Study Area

Potential CDFW Jurisdiction

With the exception of the seasonal pond along the North Access Road, which is too small and ephemeral to support wildlife, all of the areas satisfying the RWQCB jurisdictional criteria for waters of the State are also potentially subject to CDFW jurisdiction, pursuant to Section 1602 of the California Fish and Game Code. Additionally, associated riparian vegetation extending beyond the stream banks is considered subject to CDFW jurisdiction. The area surrounding the lake contains an abundance of riparian vegetation that extends far beyond the edge of the lake and the associated waters of the U.S. and State. Table D displays the acreage of potential CDFW jurisdiction present within the JSA.

Table D: Potential CDFW Jurisdiction Within the JSA

Feature[1]	Streambed/Banks and Open Water (acres)	Riparian Vegetation (acres)	Total Streambed/Banks and Riparian Vegetation (acres)
Temecula Creek (Downstream of Dam)			
Staging Area Access Crossing[2]	0.01	0.03	**0.04**
Canyon Access Road Crossing 1	0.02	-	**0.02**
Canyon Access Road Crossing 2	-	0.03	**0.03**
Canyon Access Road Crossing 3	-	0.09	**0.09**
Canyon Access Road Crossing 4	-	0.06	**0.06**
Canyon Access Road Crossing 5	-	0.08	**0.08**
Canyon Access Road Crossing 6	-	0.04	**0.04**
Additional Area within JSA	0.18	2.68	**2.86**
Vail Lake Area - including Arroyo Seco Creek, Wilson Creek, and Temecula Creek (upstream of dam)	412.20	556.52	**968.72**
Total JSA	**412.43**	**559.51**	**971.94**

Source: LSA 2022.
Note: Totals may not equal sum due to rounding.
[1] Crossings of Temecula Creek by the Canyon Access Road are numbered 1 to 6 from west to east.
[2] This crossing is no longer part of the project.
CDFW = California Department of Fish and Wildlife
JSA = Jurisdictional Study Area

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APPENDIX A

FIGURES 1–5

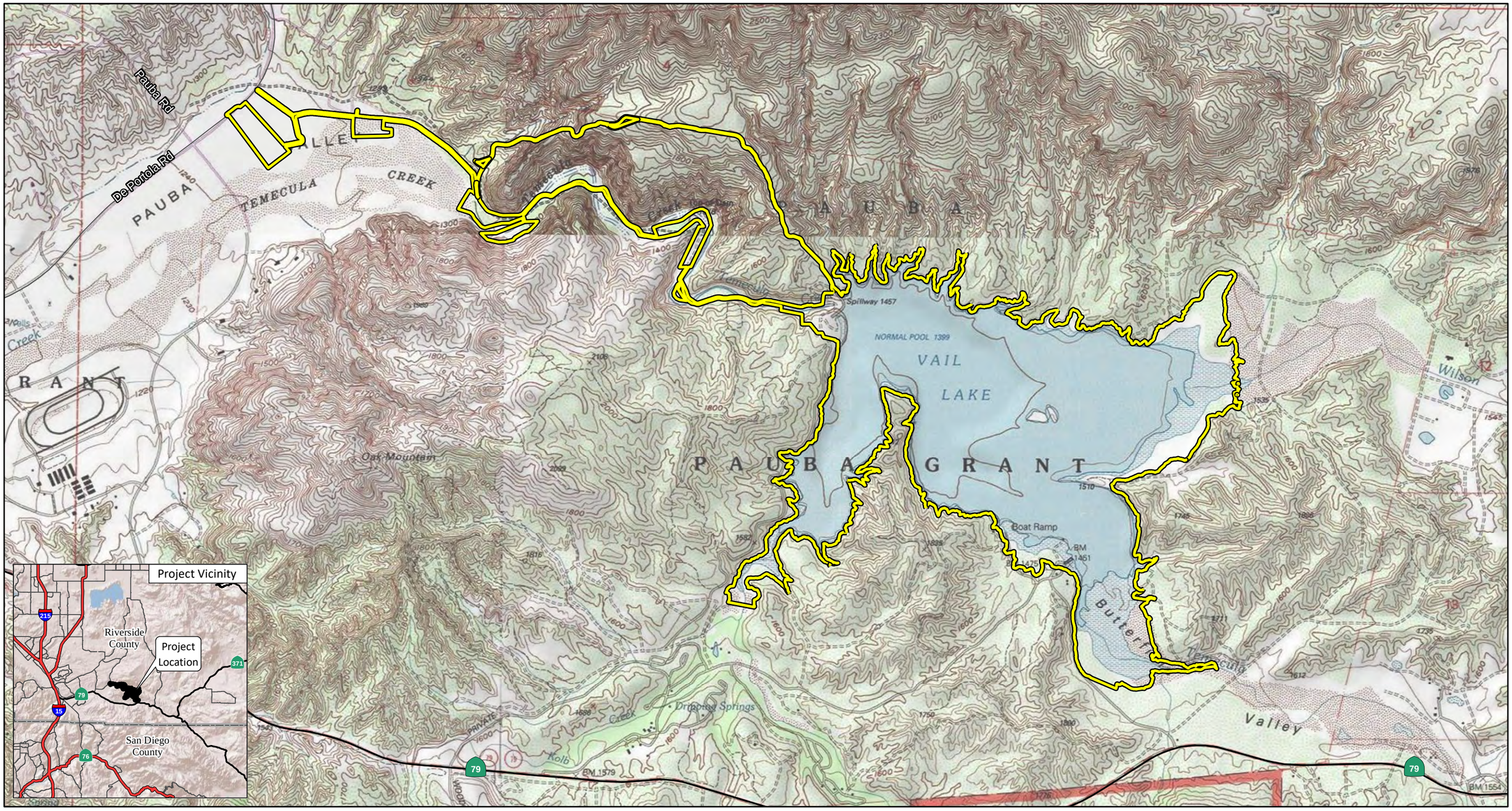
Figure 1: Project Location and Vicinity

Figure 2: Project Plans

Figure 3: Potential Jurisdictional Waters

Figure 4: Site Photographs

Figure 5: Soils



LSA

LEGEND

Jurisdictional Delineation Study Area

FIGURE 1

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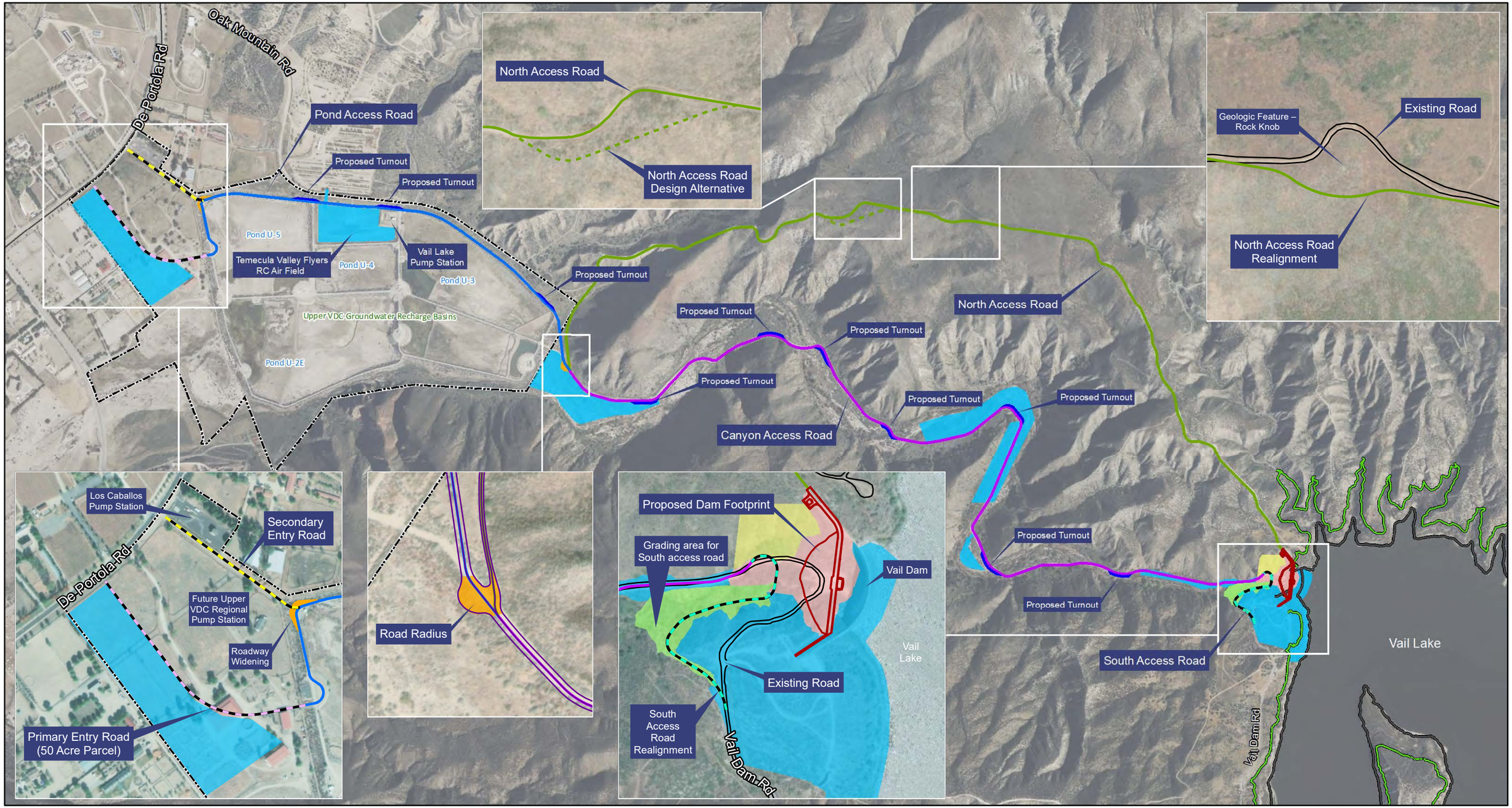
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SOURCE: USGS 7.5' Quad - *Bachelor Mtn, CA* (1978), *Pechanga, CA* (1988), *Sage, CA* (1954), and *Vail Lake, CA* (1988)

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Vail Dam Seismic and Hydrologic Remediation Project

Project Location and Vicinity



LSA

LEGEND

- Canyon Access Road
- North Access Road
- North Access Road Design Alternative
- Primary Entry Road (50 Acre Parcel)
- Secondary Entry Road
- Pond Access Road
- Realigned South Access Road
- Proposed Truck Turnout
- Roadway Radius
- Proposed Dam Footprint
- Property Boundary
- Dam Construction Area
- South Access Road Construction Area
- Staging and Laydown Area
- Temporary Construction Area
- Spillway Crest Elevation (1472.6' NAVD88)
- Current Water Level (1428.2' NAVD88)

N

0 500 1000
FEET

SOURCE: Bing Maps (2020); AECOM (6/2022)

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FIGURE 2

Vail Dam Seismic and Hydrologic Remediation Project

Project Plans

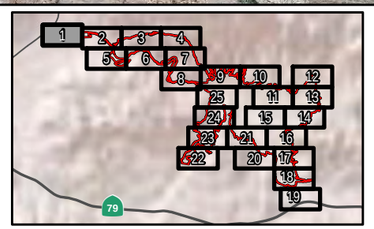


LSA

LEGEND

- Jurisdictional Delineation Study Area
- Sample Point
- CDFW/Riparian
- Nonwetland Waters of the U.S
- Wetland Waters of the U.S
- Nonwetland Waters of the State
- Wetland Waters of the State

0 100 200
FEET



SOURCE: Google Maps (2019); LSA UAV Imagery (2/2020 and 3/2020)

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FIGURE 3
Sheet 1 of 25

Vail Dam Seismic and Hydrologic Remediation Project

Potential Jurisdictional Waters



LSA

LEGEND

- Jurisdictional Delineation Study Area
- Sample Point
- CDFW/Riparian
- Nonwetland Waters of the U.S
- Wetland Waters of the U.S
- Nonwetland Waters of the State
- Wetland Waters of the State

0 100 200
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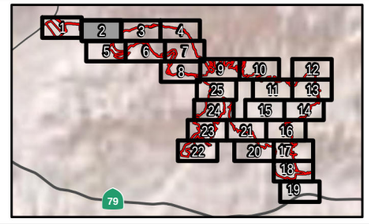


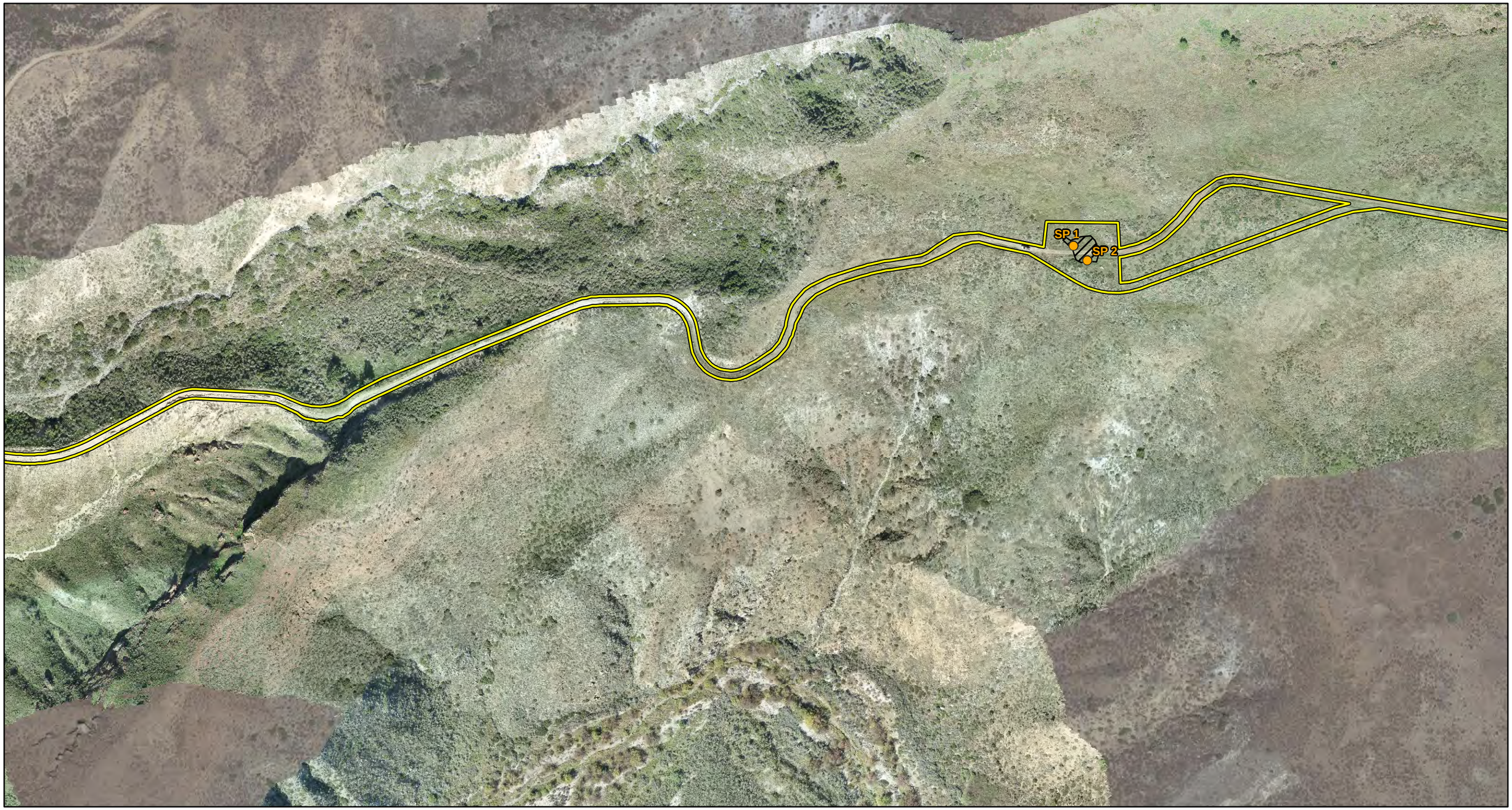
FIGURE 3
Sheet 2 of 25

Vail Dam Seismic and Hydrologic Remediation Project

Potential Jurisdictional Waters

SOURCE: Google Maps (2019); LSA UAV Imagery (2/2020 and 3/2020)

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LSA

LEGEND

- Jurisdictional Delineation Study Area
- Sample Point
- CDFW/Riparian
- Nonwetland Waters of the U.S
- Wetland Waters of the U.S
- Nonwetland Waters of the State
- Wetland Waters of the State

0 100 200
FEET

SOURCE: Google Maps (2019); LSA UAV Imagery (2/2020 and 3/2020)

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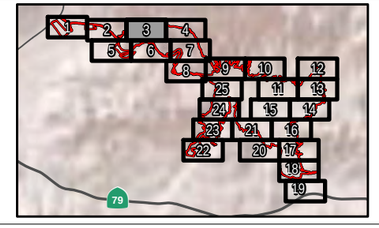


FIGURE 3
Sheet 3 of 25

Vail Dam Seismic and Hydrologic Remediation Project

Potential Jurisdictional Waters



LSA

LEGEND

- Jurisdictional Delineation Study Area
- Sample Point
- CDFW/Riparian
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- Wetland Waters of the U.S
- Nonwetland Waters of the State
- Wetland Waters of the State

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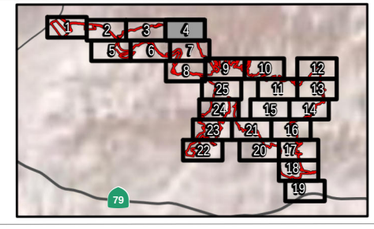


FIGURE 3
Sheet 4 of 25

Vail Dam Seismic and Hydrologic Remediation Project

Potential Jurisdictional Waters

SOURCE: Google Maps (2019); LSA UAV Imagery (2/2020 and 3/2020)

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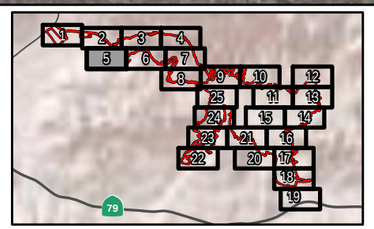


LSA

LEGEND

- Jurisdictional Delineation Study Area
- Sample Point
- CDFW/Riparian
- Nonwetland Waters of the U.S
- Wetland Waters of the U.S
- Nonwetland Waters of the State
- Wetland Waters of the State

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SOURCE: Google Maps (2019); LSA UAV Imagery (2/2020 and 3/2020)

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FIGURE 3
Sheet 5 of 25

Vail Dam Seismic and Hydrologic Remediation Project

Potential Jurisdictional Waters



LSA

LEGEND

- Jurisdictional Delineation Study Area
- Sample Point
- CDFW/Riparian
- Nonwetland Waters of the U.S
- Wetland Waters of the U.S
- Nonwetland Waters of the State
- Wetland Waters of the State

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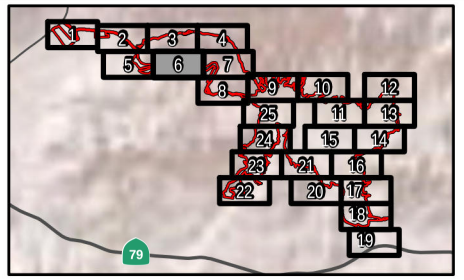


FIGURE 3
Sheet 6 of 25

Vail Dam Seismic and Hydrologic Remediation Project

Potential Jurisdictional Waters

SOURCE: Google Maps (2019); LSA UAV Imagery (2/2020 and 3/2020)

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Oak Mountain Rd

LSA

LEGEND

- Jurisdictional Delineation Study Area
- Sample Point
- CDFW/Riparian
- Nonwetland Waters of the U.S
- Wetland Waters of the U.S
- Nonwetland Waters of the State
- Wetland Waters of the State

N

0 100 200
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SOURCE: Google Maps (2019); LSA UAV Imagery (2/2020 and 3/2020)

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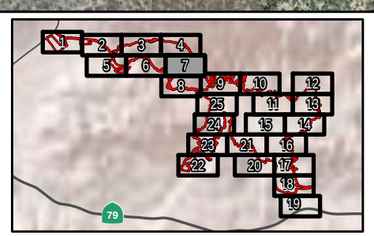


FIGURE 3
Sheet 7 of 25

Vail Dam Seismic and Hydrologic Remediation Project

Potential Jurisdictional Waters



LSA

LEGEND

- Jurisdictional Delineation Study Area
- Sample Point
- CDFW/Riparian
- Nonwetland Waters of the U.S
- Wetland Waters of the U.S
- Nonwetland Waters of the State
- Wetland Waters of the State

0 100 200
FEET

SOURCE: Google Maps (2019); LSA UAV Imagery (2/2020 and 3/2020)

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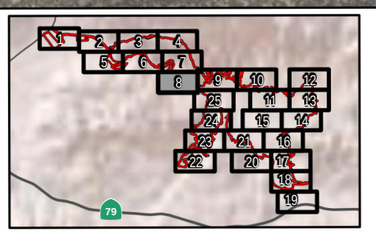
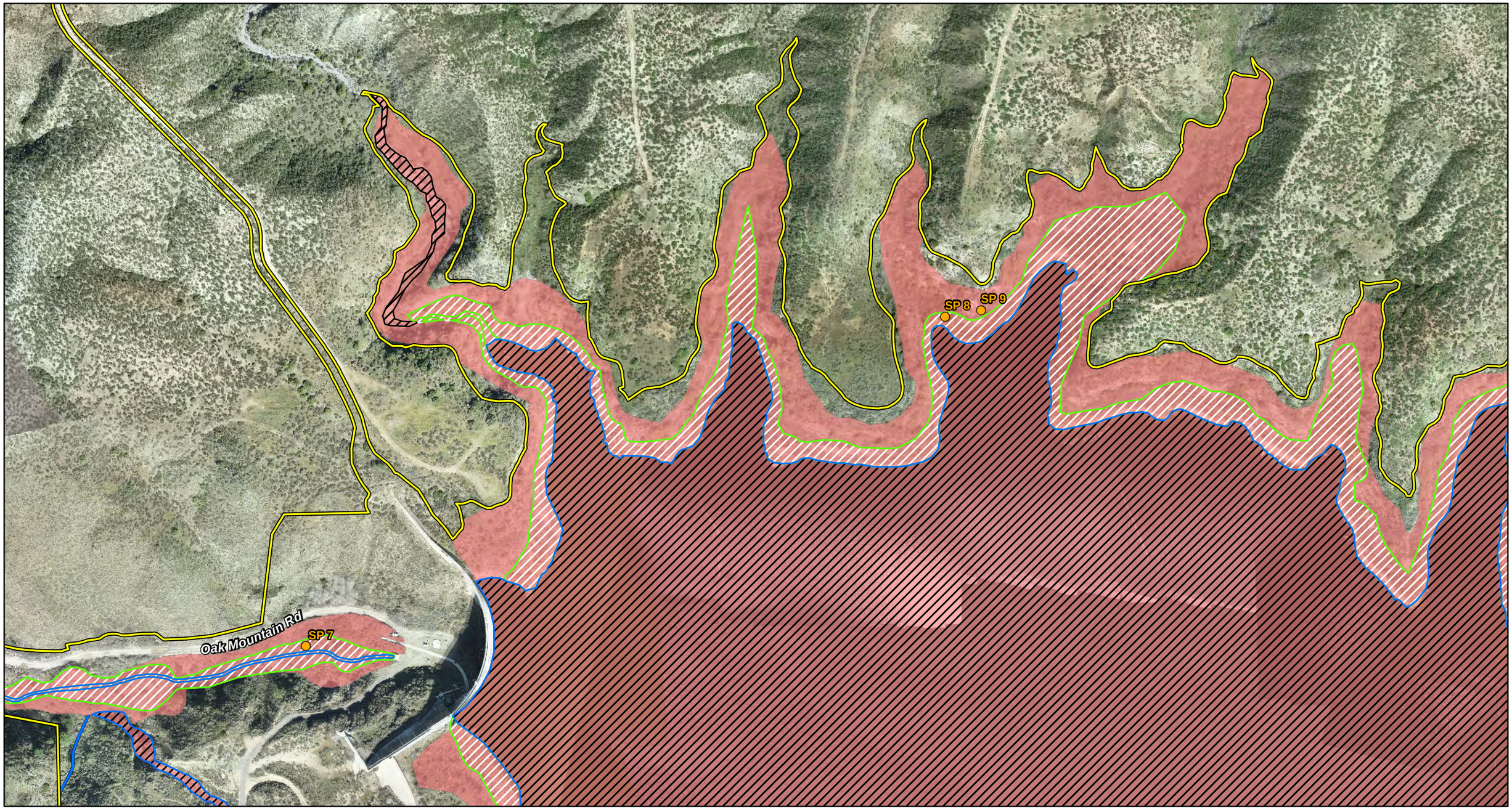


FIGURE 3
Sheet 8 of 25

Vail Dam Seismic and Hydrologic Remediation Project

Potential Jurisdictional Waters



LSA

LEGEND

- Jurisdictional Delineation Study Area
- Sample Point
- CDFW/Riparian
- Nonwetland Waters of the U.S
- Wetland Waters of the U.S
- Nonwetland Waters of the State
- Wetland Waters of the State

0 100 200
FEET

SOURCE: Google Maps (2019); LSA UAV Imagery (2/2020 and 3/2020)

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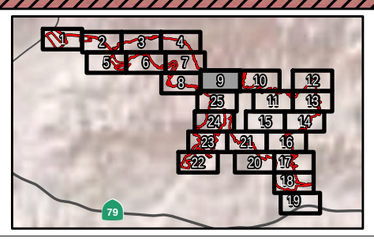


FIGURE 3
Sheet 9 of 25

Vail Dam Seismic and Hydrologic Remediation Project

Potential Jurisdictional Waters

LSA

LEGEND

- Jurisdictional Delineation Study Area
- Sample Point
- CDFW/Riparian
- Nonwetland Waters of the U.S
- Wetland Waters of the U.S
- Nonwetland Waters of the State
- Wetland Waters of the State

0 100 200
FEET

SOURCE: Google Maps (2019); LSA UAV Imagery (2/2020 and 3/2020)

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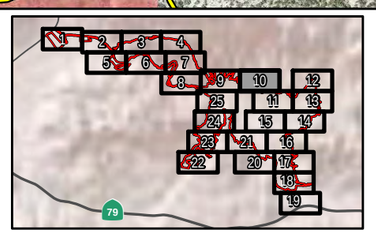


FIGURE 3
Sheet 10 of 25

Vail Dam Seismic and Hydrologic Remediation Project

Potential Jurisdictional Waters

SP 11

SP 10

Service Layer Credits: Copyright (c) 2014 Esri

LSA

LEGEND

- Jurisdictional Delineation Study Area
- Sample Point
- CDFW/Riparian
- Nonwetland Waters of the U.S
- Wetland Waters of the U.S
- Nonwetland Waters of the State
- Wetland Waters of the State

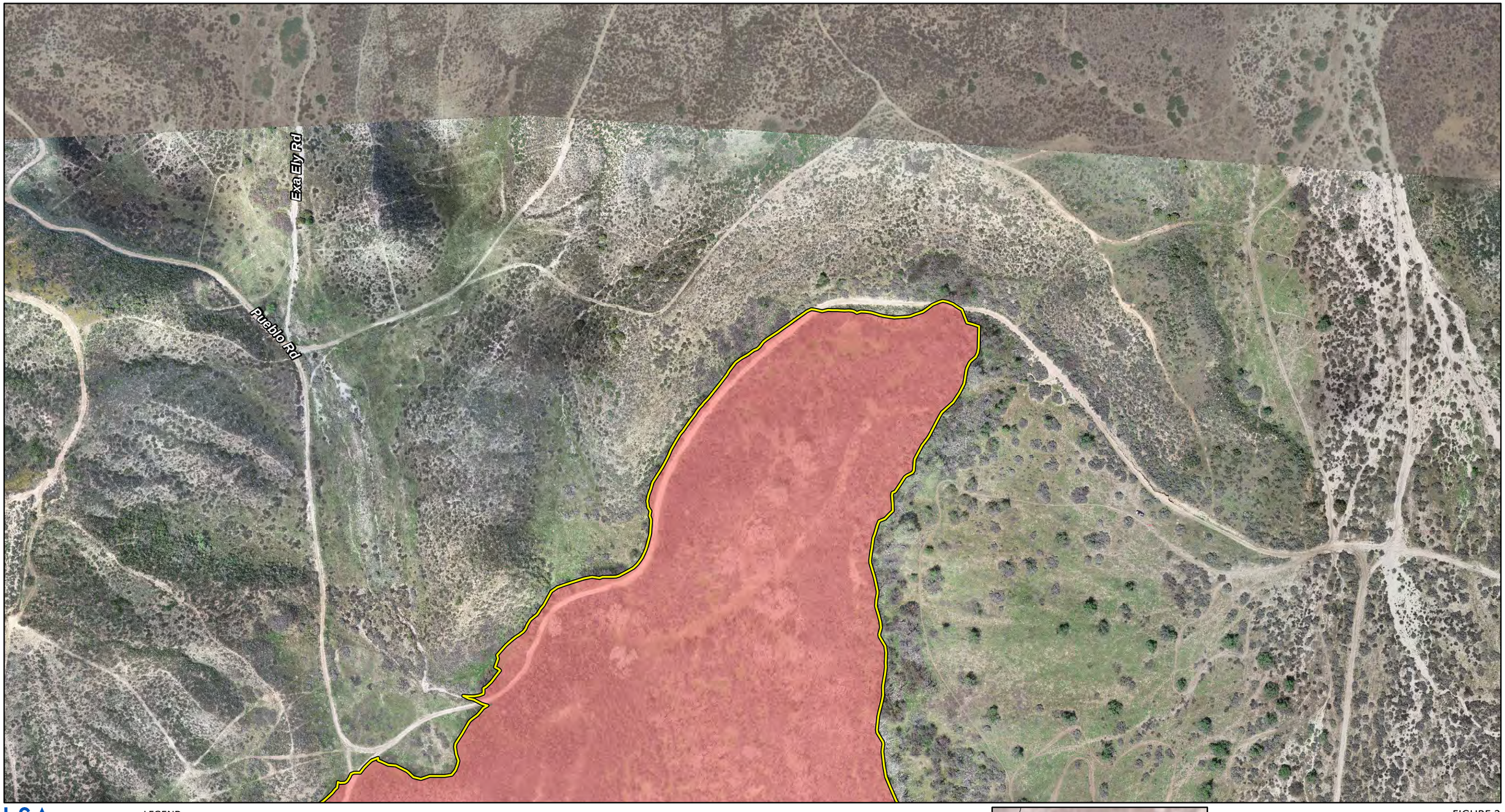
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SOURCE: Google Maps (2019); LSA UAV Imagery (2/2020 and 3/2020)
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FIGURE 3
Sheet 11 of 25

Vail Dam Seismic and Hydrologic Remediation Project
Potential Jurisdictional Waters

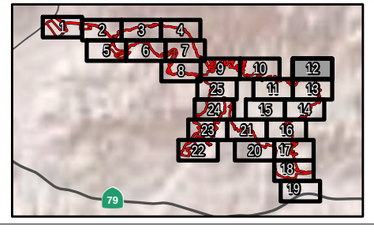


LSA

LEGEND

- Jurisdictional Delineation Study Area
- Sample Point
- CDFW/Riparian
- Nonwetland Waters of the U.S
- Wetland Waters of the U.S
- Nonwetland Waters of the State
- Wetland Waters of the State

0 100 200
FEET



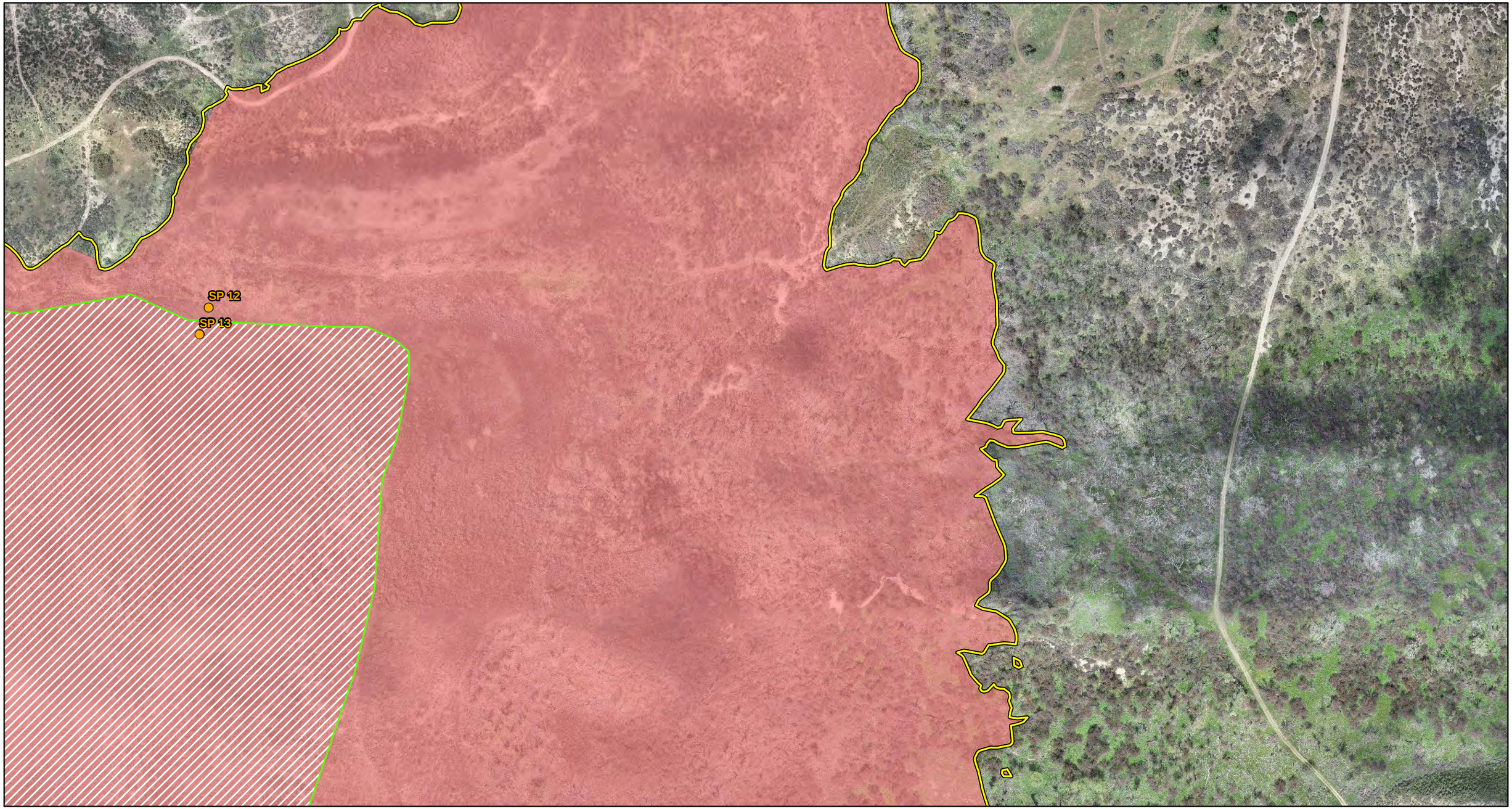
SOURCE: Google Maps (2019); LSA UAV Imagery (2/2020 and 3/2020)

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FIGURE 3
Sheet 12 of 25

Vail Dam Seismic and Hydrologic Remediation Project

Potential Jurisdictional Waters



LSA

LEGEND

- Jurisdictional Delineation Study Area
- Sample Point
- CDFW/Riparian
- Nonwetland Waters of the U.S
- Wetland Waters of the U.S
- Nonwetland Waters of the State
- Wetland Waters of the State

N

0 100 200
FEET

SOURCE: Google Maps (2019); LSA UAV Imagery (2/2020 and 3/2020)

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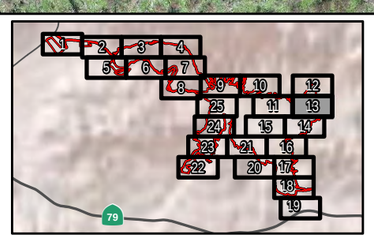


FIGURE 3
Sheet 13 of 25

Vail Dam Seismic and Hydrologic Remediation Project

Potential Jurisdictional Waters

LSA

LEGEND

- Jurisdictional Delineation Study Area
- Sample Point
- CDFW/Riparian
- Nonwetland Waters of the U.S
- Wetland Waters of the U.S
- Nonwetland Waters of the State
- Wetland Waters of the State

0 100 200
FEET

SOURCE: Google Maps (2019); LSA UAV Imagery (2/2020 and 3/2020)

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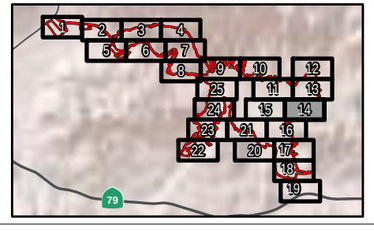


FIGURE 3
Sheet 14 of 25

Vail Dam Seismic and Hydrologic Remediation Project

Potential Jurisdictional Waters

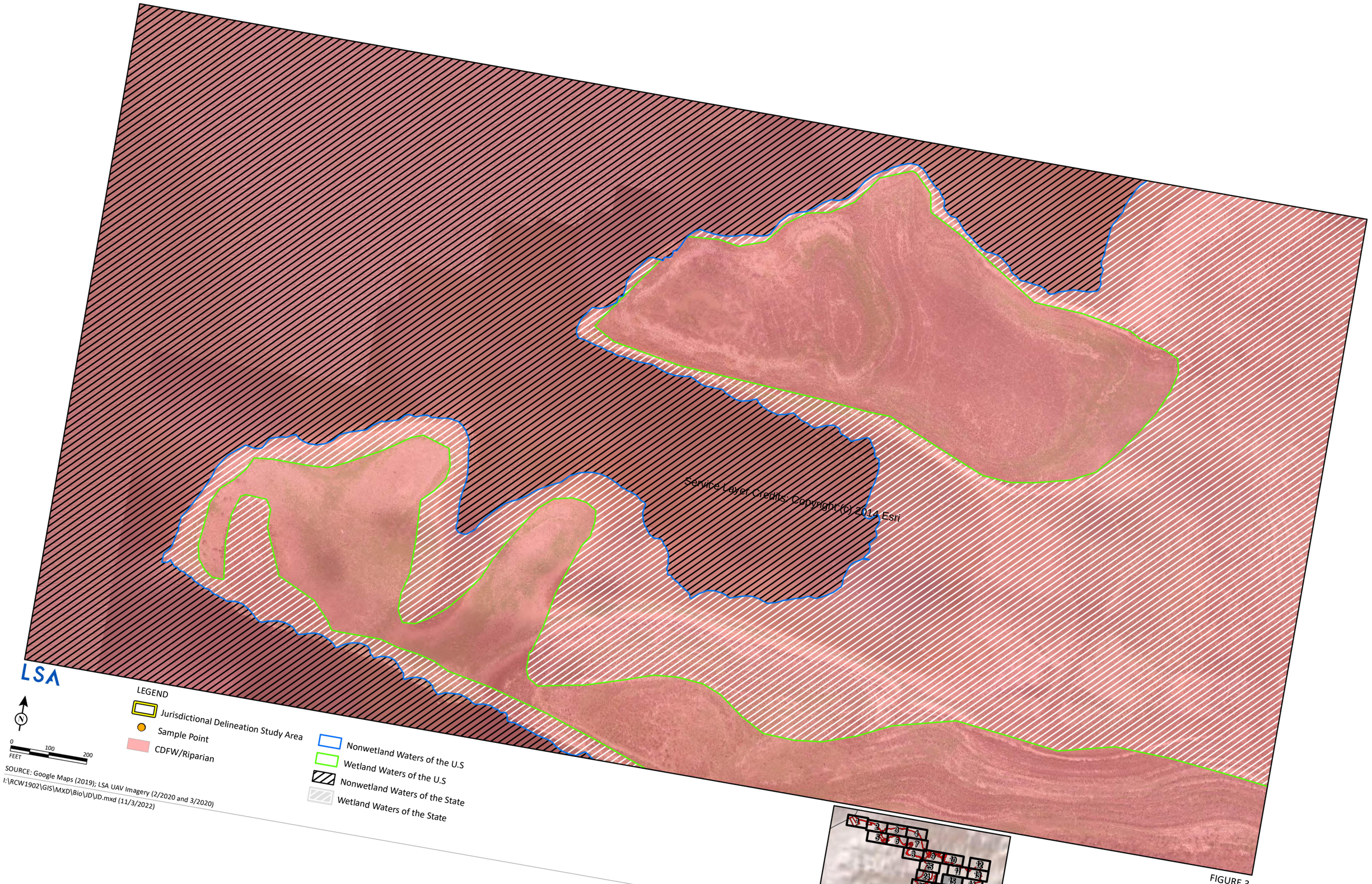


FIGURE 3
Sheet 15 of 25

Vail Dam Seismic and Hydrologic Remediation Project
Potential Jurisdictional Waters

LSA

LEGEND

- Jurisdictional Delineation Study Area
- Sample Point
- CDFW/Riparian
- Nonwetland Waters of the U.S
- Wetland Waters of the U.S
- Nonwetland Waters of the State
- Wetland Waters of the State

N

0 100 200
FEET

SOURCE: Google Maps (2019); LSA UAV Imagery (2/2020 and 3/2020)

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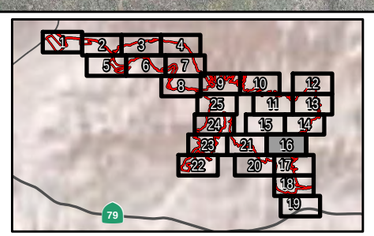


FIGURE 3
Sheet 16 of 25

Vail Dam Seismic and Hydrologic Remediation Project

Potential Jurisdictional Waters

LSA

LEGEND

- Jurisdictional Delineation Study Area
- Sample Point
- CDFW/Riparian
- Nonwetland Waters of the U.S
- Wetland Waters of the U.S
- Nonwetland Waters of the State
- Wetland Waters of the State

0 100 200
FEET

SOURCE: Google Maps (2019); LSA UAV Imagery (2/2020 and 3/2020)

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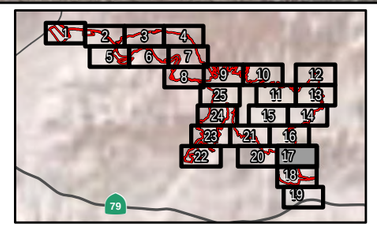
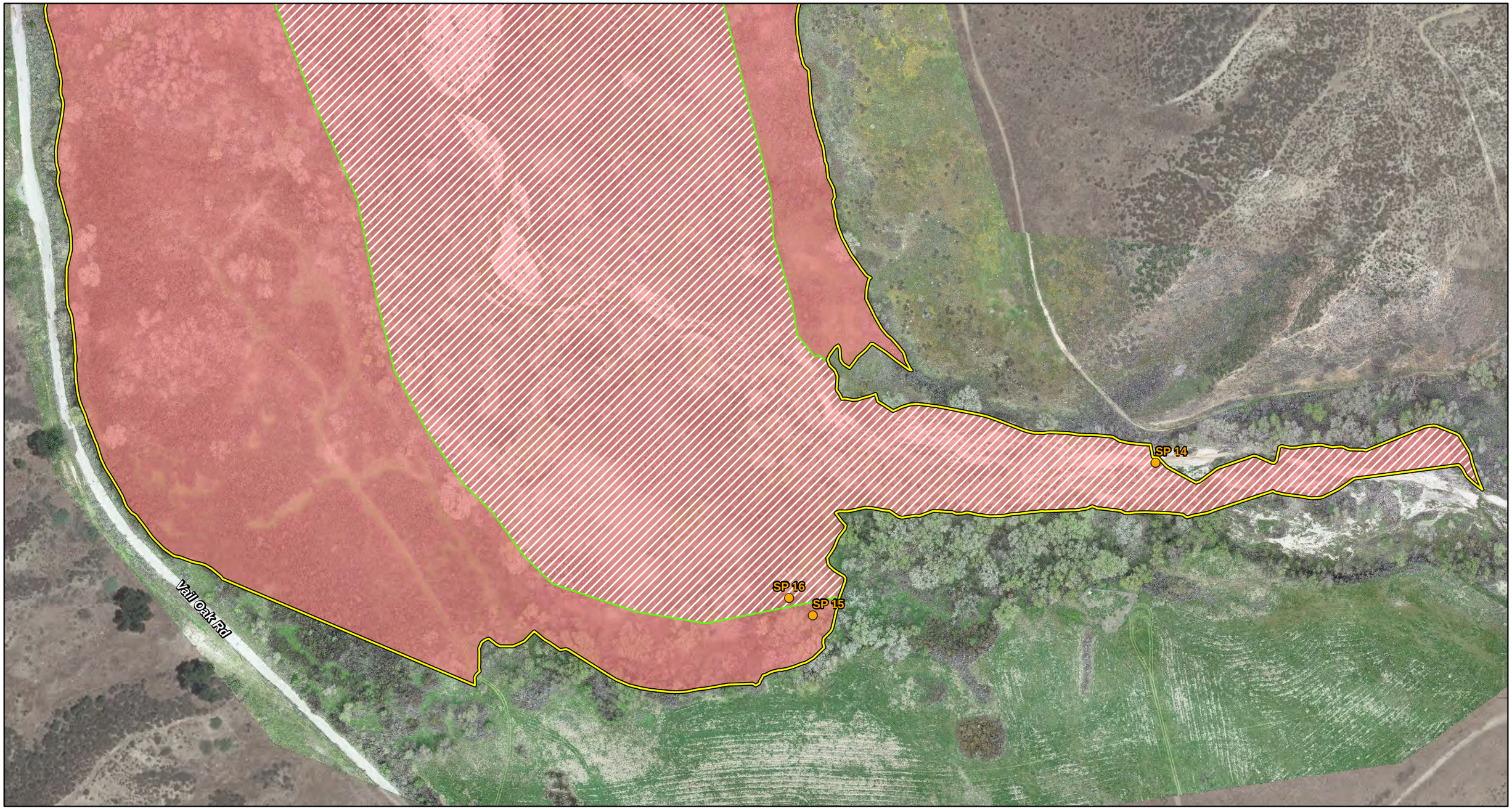


FIGURE 3
Sheet 17 of 25

Vail Dam Seismic and Hydrologic Remediation Project

Potential Jurisdictional Waters



LSA

LEGEND

- Jurisdictional Delineation Study Area
- Sample Point
- CDFW/Riparian
- Nonwetland Waters of the U.S
- Wetland Waters of the U.S
- Nonwetland Waters of the State
- Wetland Waters of the State

0 100 200
FEET

SOURCE: Google Maps (2019); LSA UAV Imagery (2/2020 and 3/2020)

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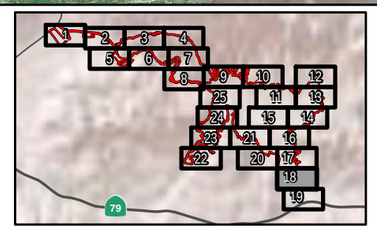


FIGURE 3
Sheet 18 of 25

Vail Dam Seismic and Hydrologic Remediation Project

Potential Jurisdictional Waters

LSA

LEGEND

- Jurisdictional Delineation Study Area
- Sample Point
- CDFW/Riparian
- Nonwetland Waters of the U.S
- Wetland Waters of the U.S
- Nonwetland Waters of the State
- Wetland Waters of the State

0 100 200
FEET

SOURCE: Google Maps (2019); LSA UAV Imagery (2/2020 and 3/2020)

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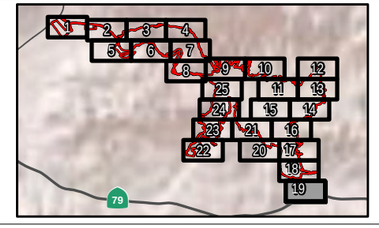


FIGURE 3
Sheet 19 of 25

Vail Dam Seismic and Hydrologic Remediation Project

Potential Jurisdictional Waters



LSA

LEGEND

- Jurisdictional Delineation Study Area
- Sample Point
- CDFW/Riparian
- Nonwetland Waters of the U.S
- Wetland Waters of the U.S
- Nonwetland Waters of the State
- Wetland Waters of the State

0 100 200
FEET

SOURCE: Google Maps (2019); LSA UAV Imagery (2/2020 and 3/2020)

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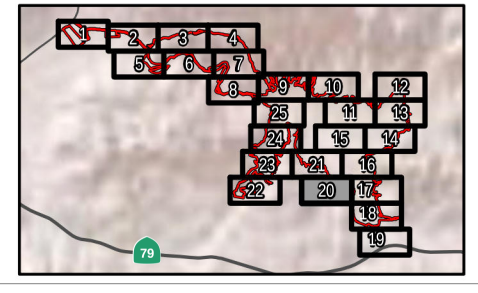


FIGURE 3
Sheet 20 of 25

Vail Dam Seismic and Hydrologic Remediation Project

Potential Jurisdictional Waters

LSA

LEGEND

- Jurisdictional Delineation Study Area
- Sample Point
- CDFW/Riparian
- Nonwetland Waters of the U.S
- Wetland Waters of the U.S
- Nonwetland Waters of the State
- Wetland Waters of the State

N

0 100 200
FEET

SOURCE: Google Maps (2019); LSA UAV Imagery (2/2020 and 3/2020)

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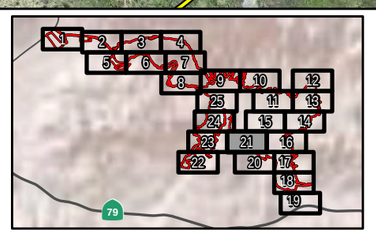
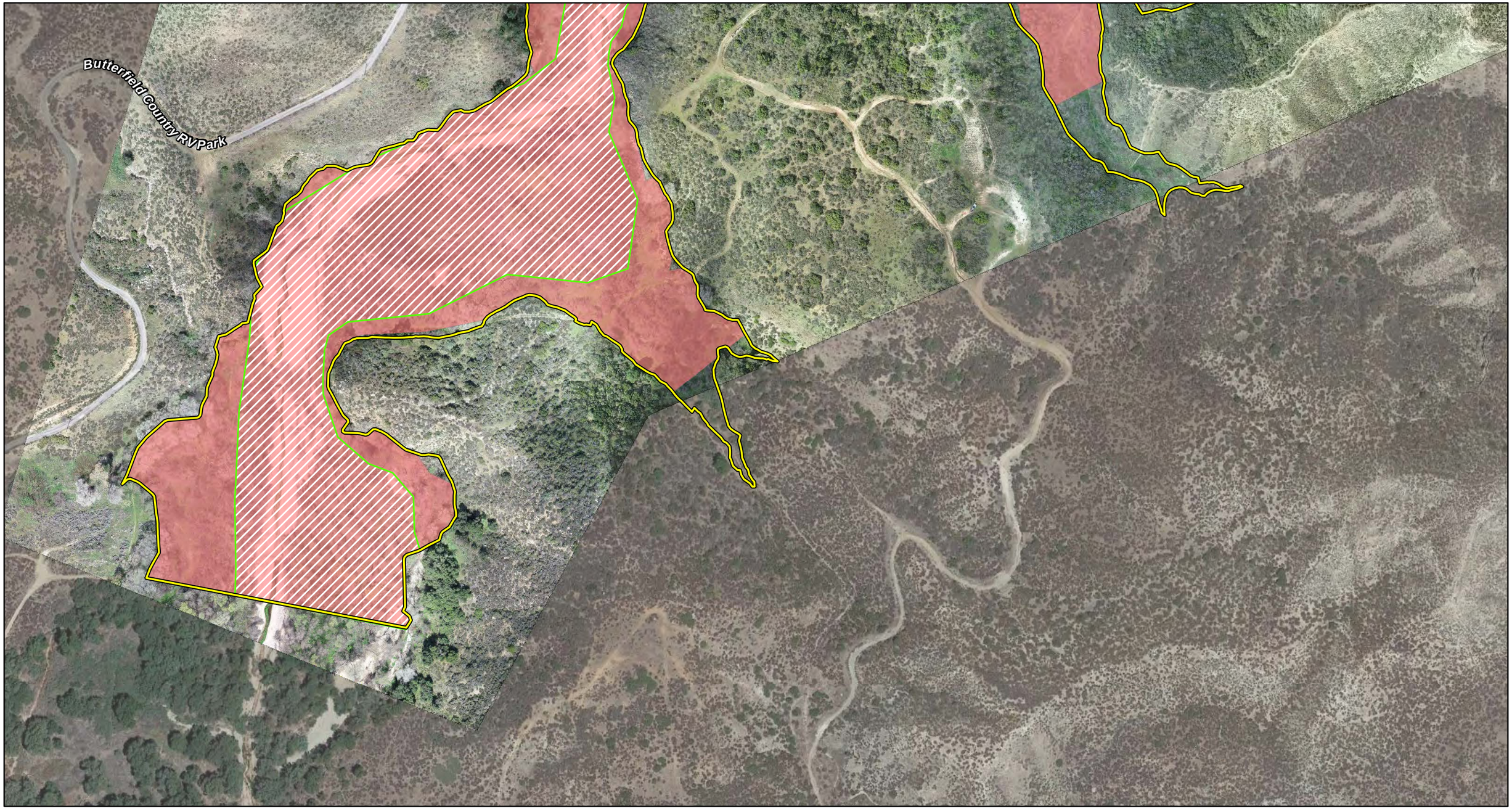


FIGURE 3
Sheet 21 of 25

Vail Dam Seismic and Hydrologic Remediation Project

Potential Jurisdictional Waters



LSA

LEGEND

- Jurisdictional Delineation Study Area
- Sample Point
- CDFW/Riparian
- Nonwetland Waters of the U.S
- Wetland Waters of the U.S
- Nonwetland Waters of the State
- Wetland Waters of the State

0 100 200
FEET

SOURCE: Google Maps (2019); LSA UAV Imagery (2/2020 and 3/2020)

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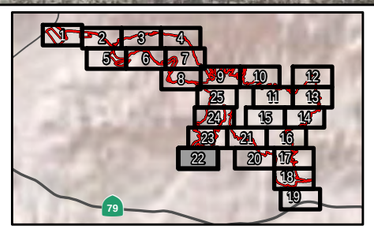


FIGURE 3
Sheet 22 of 25

Vail Dam Seismic and Hydrologic Remediation Project

Potential Jurisdictional Waters

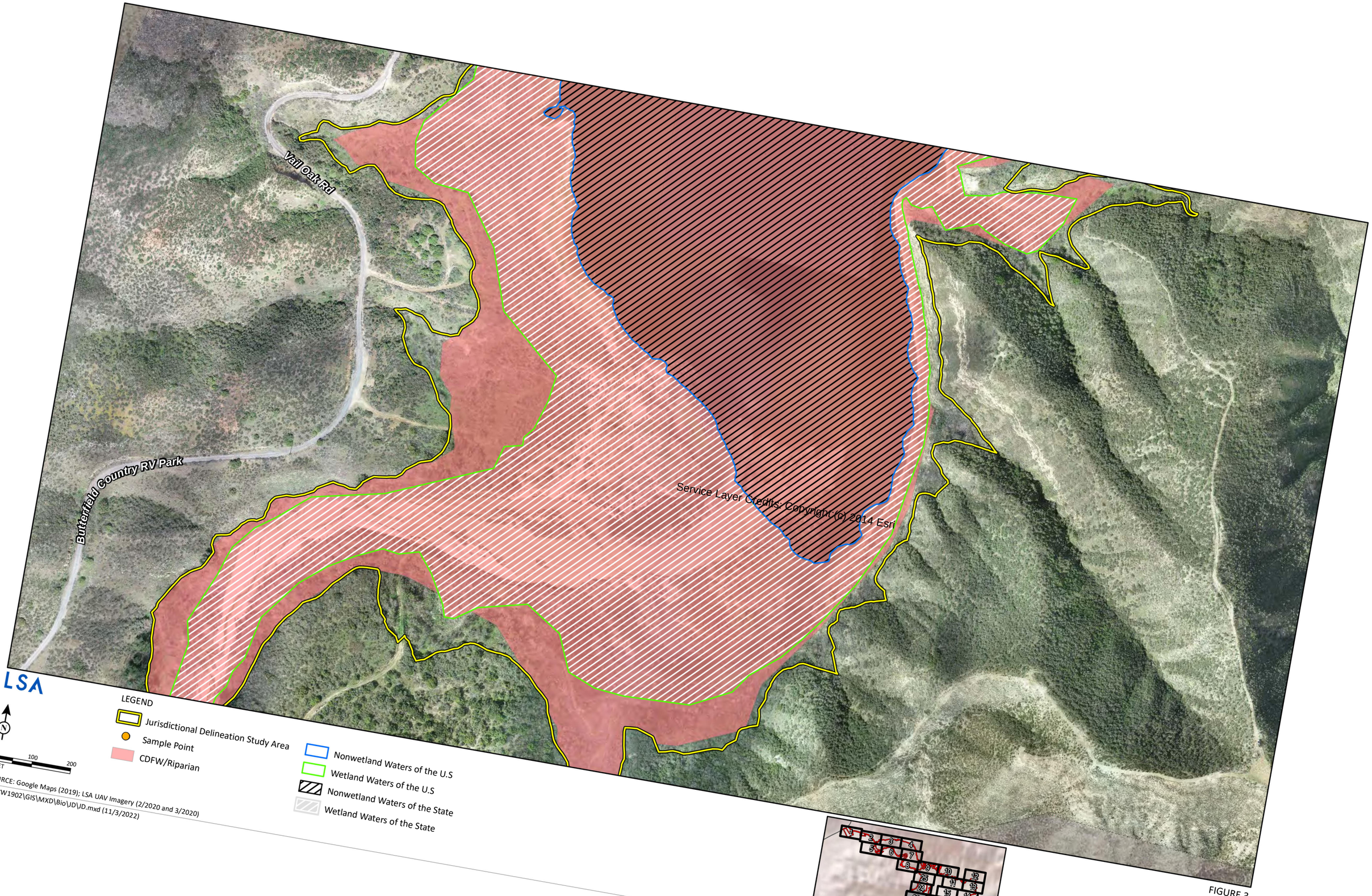
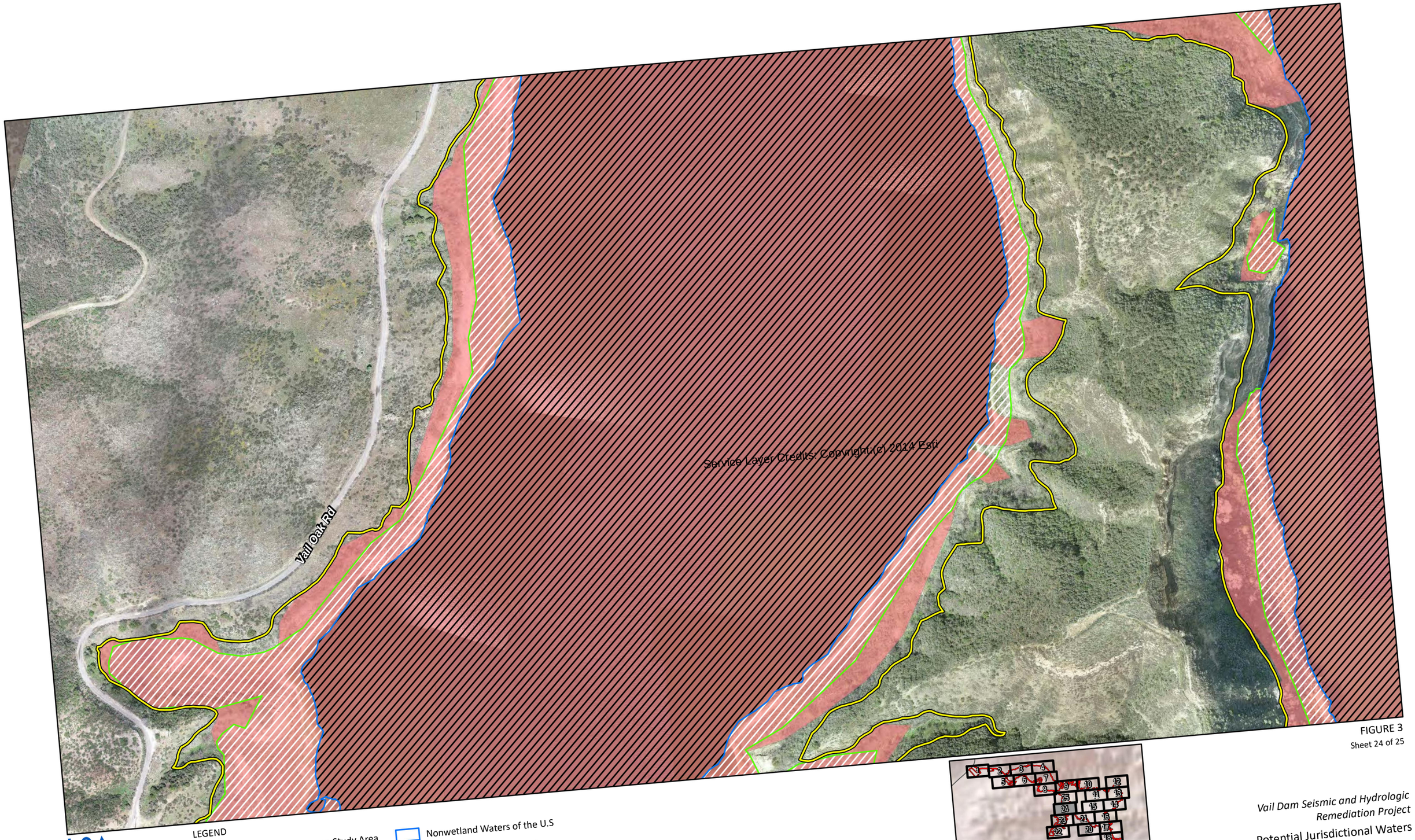


FIGURE 3
Sheet 23 of 25

Vail Dam Seismic and Hydrologic Remediation Project
Potential Jurisdictional Waters



LSA

LEGEND

- Jurisdictional Delineation Study Area
- Sample Point
- CDFW/Riparian
- Nonwetland Waters of the U.S
- Wetland Waters of the U.S
- Nonwetland Waters of the State
- Wetland Waters of the State

0 100 200
FEET

SOURCE: Google Maps (2019); LSA UAV Imagery (2/2020 and 3/2020)

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FIGURE 3
Sheet 24 of 25

Vail Dam Seismic and Hydrologic Remediation Project

Potential Jurisdictional Waters



FIGURE 3
Sheet 25 of 25

Vail Dam Seismic and Hydrologic Remediation Project
Potential Jurisdictional Waters



Photograph 1: View of Pauba Canyon, facing East.



Photograph 2: View of Pauba Canyon, facing west.



Photograph 3: View of the northern access road and Vail Lake, facing southeast. The seasonal pond is shown near the middle of this section of the access road.



Photograph 4: View of Vail Dam, the eastern terminus of Pauba Canyon, and Vail Lake, facing northeast.

LSA

FIGURE 4
(Page 1 of 4)

Vail Dam Seismic and Hydrologic Remediation Project
Site Photographs



Photograph 5: View of Arroyo Seco Creek and Vail Lake, facing north.



Photograph 6: View of the confluence of Wilson Creek and Vail Lake, facing west.



Photograph 7: View of the peninsula at Vail Lake, facing east.



Photograph 8: View of the shoreline along the northern edge of Vail Lake , facing northeast.



Photograph 9: View of the seasonal pond along the northern access road, facing northwest.



Photograph 10: View of Pulgas Creek Road crossing Temecula Creek, facing west.



Photograph 11: View of Pulgas Creek Road crossing Temecula Creek, facing east.



Photograph 12: View of Pulgas Creek Road and Pauba Canyon from the base of Vail Dam, facing west.



Photograph 13: View of Pulgas Creek Road and Pauba Canyon, facing west.



Photograph 14: View of Vail Lake and the northern shoreline, facing south.



Photograph 15: View of the confluence of Wilson Creek and Vail Lake, facing south.



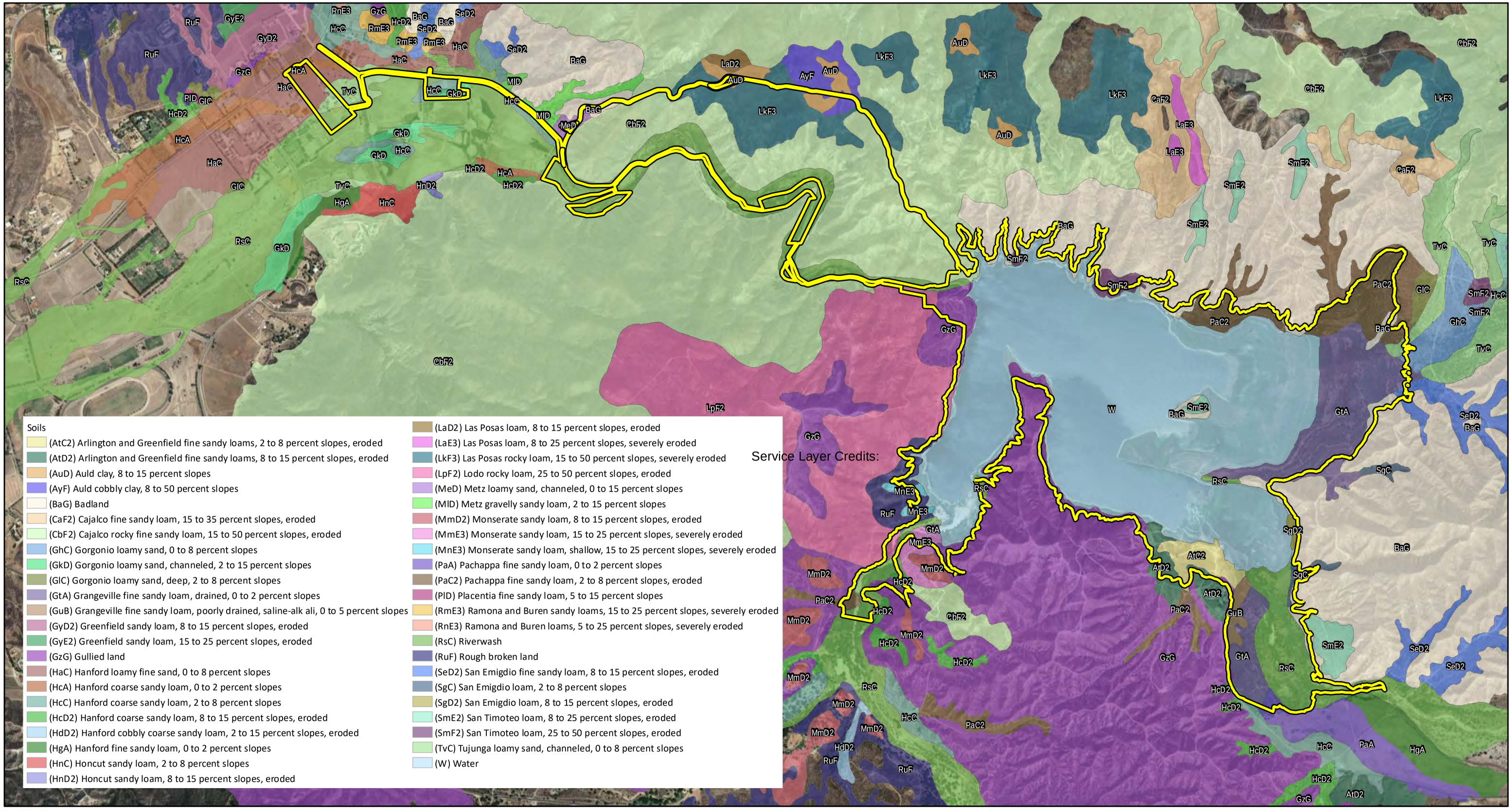
Photograph 16: View of Vail Lake and the area downstream of Temecula Creek, facing east.

LSA

FIGURE 4
(Page 4 of 4)

Vail Dam Seismic and Hydrologic Remediation Project
Site Photographs

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LSA

LEGEND

Jurisdictional Delineation Study Area

FIGURE 5

0 900 1800
FEET

SOURCE: Google Maps (2022); Esri SSURGO Soils (2022)

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Vail Dam Seismic and Hydrologic Remediation Project

Soils

APPENDIX B

WETLAND DETERMINATION DATA FORMS (COPIES)

WETLAND DETERMINATION DATA FORM – Arid West Region

6/16/20

Project/Site: Vail Dam Remediation City/County: Temecula / Riverside Sampling Date: __

Applicant/Owner: RCWD State: CA Sampling Point: 1

Investigator(s): Spencer, Greco, Morales Section, Township, Range: 00, 8S, 1W

Landform (hillslope, terrace, etc.): seasonal pond Local relief (concave, convex, none): concave Slope (%): __

Subregion (LRR): California Lat: 33.506577 Long: -116.993608 Datum: __

Soil Map Unit Name: Las Posas rocky loam, 15-15 % slopes NWI classification: NA

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No __ (If no, explain in Remarks.)

Are Vegetation __, Soil __, or Hydrology __ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No __

Are Vegetation __, Soil __, or Hydrology __ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes __	No ✓	**Is the Sampled Area within a Wetland?** Yes __ No ✓
Hydric Soil Present?	Yes __	No ✓	
Wetland Hydrology Present?	Yes ✓	No __	

Remarks: Depression north of road and lower elevation than road. → Along northern access road. Not a vernal pool because hydrophytic veg not dominant and hydric soils absent.

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:			
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:			
Herb Stratum			
1. Deinandra fasciculata	30	Y	UPL
2. Avena fatua	25	Y	UPL
3. Epilobium pygmaeum	6	N	OBL
4.			
5.			
6.			
7.			
8.			
Total Cover:	61		
Woody Vine Stratum			
1.			
2.			
Total Cover:			

% Bare Ground in Herb Stratum 39 % Cover of Biotic Crust __

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	6	x 1 =	6
FACW species		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species	55	x 5 =	275
Column Totals:	61 (A)		281 (B)

Prevalence Index = B/A = 4.6

Hydrophytic Vegetation Indicators:

__ Dominance Test is >50%

__ Prevalence Index is ≤3.0[1]

__ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes __ No ✓

Remarks:

SOIL

Sampling Point: 1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 3/3	100					silty clay	no redox, uniform

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ✓ Surface Soil Cracks (B6)
- ✓ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ✓ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Vail Dam Remediation City/County: Temecula/Riverside Sampling Date: 6/16/20

Applicant/Owner: RCWD State: Ca Sampling Point: 2

Investigator(s): Spencer, Greco, Morales Section, Township, Range: 00, 8S, 1W

Landform (hillslope, terrace, etc.): seasonal pond Local relief (concave, convex, none): none Slope (%): _____

Subregion (LRR): California Lat: 33.506467 Long: ~~33~~ -116.993534 Datum: _____

Soil Map Unit Name: Las Posas rocky loam, 15-50% slopes NWI classification: NA

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks: Vegetated area South of road and seasonal pond. Not a vernal pool because hydrophytic veg not dominant and hydric soils absent.

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:			
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:			
Herb Stratum			
1. Avena fatua	60	Y	UPL
2. Deinandra fasciculata	10	N	UPL
3. Epilobium pygmaeum	2	N	UPL OBL
4. Psilocarphus brevissimus	2	N	
5.			
6.			
7.			
8.			
Total Cover: 74			
Woody Vine Stratum			
1.			
2.			
Total Cover:			

% Bare Ground in Herb Stratum 26 % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:

SOIL

Sampling Point: 2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-12	10YR 3/3	100%					silty clay	no redox, uniform

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ✓ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ✓ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No ✓ Depth (inches): _____

Water Table Present? Yes ____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes ✓ No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Vail Dam Remediation City/County: Temecula/Riverside Sampling Date: 7/12/20

Applicant/Owner: RCWD State: _____ Sampling Point: 3

Investigator(s): Morales Section, Township, Range: 00, 8S, 1W

Landform (hillslope, terrace, etc.): channel Local relief (concave, convex, none): concave Slope (%): _____

Subregion (LRR): California Lat: 33.500156 Long: -116.991386 Datum: _____

Soil Map Unit Name: Riverwash NWI classification: R4SBA

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks: within drainage crossing. Hydrophytic veg present. Temecula Creek downstream of Dam

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. Salix gooddingii	40	Y	OBL
2. ~~Baccharis salicifolia~~	~~30~~	~~Y~~	~~FACW~~
3.			
4.			
	40	= Total Cover	
Sapling/Shrub Stratum (Plot size: _____)			
1. Baccharis salicifolia	30	Y	FACW
2.			
3.			
4.			
5.			
	30	= Total Cover	
Herb Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	_____	= Total Cover	
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____	= Total Cover	

% Bare Ground in Herb Stratum 30 % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

✓ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

SOIL

Sampling Point: 3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-16"	10YR 3/1	100					sandy loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR C)**
- ___ 1 cm Muck (A9) **(LRR D)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR C)**
- ___ 2 cm Muck (A10) **(LRR B)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks: dark soils meet F3.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ✓ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1) **(Nonriverine)**
- ___ Sediment Deposits (B2) **(Nonriverine)**
- ___ Drift Deposits (B3) **(Nonriverine)**
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ✓ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ✓ Water Marks (B1) **(Riverine)**
- ___ Sediment Deposits (B2) **(Riverine)**
- ✓ Drift Deposits (B3) **(Riverine)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ✓ No ___ Depth (inches): 0

Water Table Present? Yes ___ No ___ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No ___ Depth (inches): _____

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Water flowing w/in crossing.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Vail Dam Remediation City/County: Temecula / Riverside Sampling Date: 7/12/20

Applicant/Owner: RCWD State: Ca Sampling Point: 4

Investigator(s): Morales Section, Township, Range: 00, 8S, 1W

Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): none Slope (%): _____

Subregion (LRR): California Lat: 33.500162 Long: -116.991380 Datum: _____

Soil Map Unit Name: River wash NWI classification: R4SBA

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No _____	
Wetland Hydrology Present?	Yes _____	No _____	

Remarks: Area just outside channel. Hydrophytes dominant; transitional species; willows and typha in channel

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. Baccharis salicifolia	50	Y	FAC
2.			
3.			
4.			
5.			
	50 = Total Cover		
Herb Stratum (Plot size: _____)			
1. Cyperus eragrostis	20	Y	FACW
2. Ambrosia psilostachya	20	Y	FAC
3.			
4.			
5.			
6.			
7.			
8.			
	40 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 30 % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 66% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

✓ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

SOIL

Sampling Point: 4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-20'	10YR 3/3	100%					Sandy loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR C)**
- ___ 1 cm Muck (A9) **(LRR D)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR C)**
- ___ 2 cm Muck (A10) **(LRR B)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ___ No ✓

Remarks: Not expected to be hydric due to location just outside channel

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) **(Nonriverine)**
- ___ Sediment Deposits (B2) **(Nonriverine)**
- ___ Drift Deposits (B3) **(Nonriverine)**
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) **(Riverine)**
- ___ Sediment Deposits (B2) **(Riverine)**
- ✓ Drift Deposits (B3) **(Riverine)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): _____

Water Table Present? Yes ___ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes ___ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Just outside suitable hydrology → upland area w/ transitional species. Willows in channel.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Vail Dam Remediation City/County: Temecula/Riverside Sampling Date: 7/12/20
Applicant/Owner: RCWD State: Ca Sampling Point: 5
Investigator(s): Morales Section, Township, Range: 00, 8S, 1W
Landform (hillslope, terrace, etc.): channel Local relief (concave, convex, none): concave Slope (%): _____
Subregion (LRR): California Lat: 33.497384 Long: -116.98485 Datum: _____
Soil Map Unit Name: Riverwash NWI classification: R4SBA

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ✓ No _____
Hydric Soil Present? Yes ✓ No _____
Wetland Hydrology Present? Yes ✓ No _____

Is the Sampled Area within a Wetland? Yes ✓ No _____

Remarks:
Within a drainage crossing. Hydrophytic vegetation present.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. Salix goodingii	30	Y	Obl
2.			
3.			
4.			
	30 = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. Baccharis salicifolia	40	Y	FAC
2.			
3.			
4.			
5.			
	40 = Total Cover		
Herb Stratum (Plot size: _____)			
1. Typha domingensis	20	Y	Obl
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	20 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 30 % Cover of Biotic Crust _____

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:
✓ Dominance Test is >50%
___ Prevalence Index is ≤3.0[1]
___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:
Bareground = open water

SOIL

Sampling Point: 5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-16	10YR 2/1	100					Sandy loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ✓ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ✓ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ✓ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ✓ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ✓ No ___ Depth (inches): 0

Water Table Present? Yes ~~✓~~ No ___ Depth (inches): ~~0~~

Saturation Present? (includes capillary fringe) Yes ~~✓~~ No ___ Depth (inches): ~~0~~

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Water flowing w/in crossing

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Vail Dam Remediation City/County: Temecula / Riverside Sampling Date: 7/12/20

Applicant/Owner: RCWD State: Ca Sampling Point: 6

Investigator(s): Morales Section, Township, Range: 00, 8S, 1W

Landform (hillslope, terrace, etc.): Channel Local relief (concave, convex, none): concave Slope (%): _____

Subregion (LRR): California Lat: 33.496028 Long: -116.983173 Datum: _____

Soil Map Unit Name: Riverwash NWI classification: PSSC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:
@ Near edge of drainage w/in hydrophytic vegetation.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. Baccharis salicifolia	50	Y	FACW
2.			
3.			
4.			
5.			
	50 = Total Cover		
Herb Stratum (Plot size: _____)			
1. Polypogon monspeliensis	20	Y	FACW
2. Rumex salicifolia	15	Y	FACW
3.			
4.			
5.			
6.			
7.			
8.			
	35 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____ % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

✓ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

SOIL

Sampling Point: 6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-16"	10YR 3/1	100					Sandy loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain In Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ✓ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ✓ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): _____

Water Table Present? Yes ✓ No ___ Depth (inches): 12"

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 2"

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: No surface water. Saturation 2" below surface.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Vail Dam Remediation City/County: Temecula/Riverside Sampling Date: 7/12/20
Applicant/Owner: RCWD State: Ca Sampling Point: 7
Investigator(s): Morales Section, Township, Range: 02, 8S, 1W
Landform (hillslope, terrace, etc.): toe of bank Local relief (concave, convex, none): concave Slope (%): _____
Subregion (LRR): California Lat: 33.495861 Long: -116.978228 Datum: _____
Soil Map Unit Name: Riverwash NWI classification: PSSC
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)
Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____
Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks: Near edge of drainage adj. to bank (within creek bank).

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. Baccharis salicifolia	30	Y	FAC
2.			
3.			
4.			
5.			
	30 = Total Cover		
Herb Stratum (Plot size: _____)			
1. Xanthium strumarium	15	Y	FAC
2. Rumex crispus	10	Y	FAC
3. Urtica dioica	10	Y	FAC
4.			
5.			
6.			
7.			
8.			
	35 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 30 % Cover of Biotic Crust _____

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)
Total Number of Dominant Species Across All Strata: 4 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:
✓ Dominance Test is >50%
___ Prevalence Index is ≤3.0[1]
___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

SOIL

Sampling Point: 7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 2/1	100					Sandy loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ✓ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ✓ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): _____

Water Table Present? Yes ✓ No ___ Depth (inches): 10"

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 1"

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: No surface water. Saturation at 1" below surface

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Vail Dam Remediation City/County: Temecula / Riverside Sampling Date: 6/29/20
Applicant/Owner: RCWD State: Ca Sampling Point: 8
Investigator(s): Morales, Greco Section, Township, Range: 00, 8S, 1W
Landform (hillslope, terrace, etc.): lakeshore Local relief (concave, convex, none): none concave Slope (%): _____
Subregion (LRR): California Lat: 33.497699 Long: -116.973683 Datum: _____
Soil Map Unit Name: Badland NWI classification: L1UBHh
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)
Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____
Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks: lake shore just below old water level / bank / shelf

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. Salix goodingii	60	Y	FACW
2. Tamarix ramosissima	50	Y	FAC
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. Baccharis salicifolia	20	Y	FAC
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. Polypogon monspeliensis	20	Y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	_____ = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 30 % Cover of Biotic Crust _____

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)
Total Number of Dominant Species Across All Strata: 4 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:
✓ Dominance Test is >50%
___ Prevalence Index is ≤3.0[1]
___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

SOIL

Sampling Point: 8

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-20	10YR 4/1	90					clay loam	
12-20	10YR 3/1	10%	5YR 5/6	5		PL	clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks: Presence of redox features.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ✓ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): _____

Water Table Present? Yes ___ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Area above current water level. Evidence of past higher water levels at and above point.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Vail Dam Remediation City/County: Temecula/Riverside Sampling Date: 7/12/20

Applicant/Owner: RCWD State: Ca Sampling Point: 9

Investigator(s): Morales Section, Township, Range: 09, 8S, 1W

Landform (hillslope, terrace, etc.): lake shelf Local relief (concave, convex, none): none Slope (%): _____

Subregion (LRR): California Lat: 33.497778 Long: -116.973491 Datum: _____

Soil Map Unit Name: Badland NWI classification: L1UBHh

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks: lake shore just above lake shelf. No apparent hydrology. Abundant and dense hydrophytes.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. Salix goodingii	60	Y	FACW
2. Tamarix ramosissima	40	Y	FAC
3.			
4.			
	100 = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. Baccharis salicifolia	30	Y	FAC
2.			
3.			
4.			
5.			
	30 = Total Cover		
Herb Stratum (Plot size: _____)			
1. Pluchea sericea	20	Y	FACW
2. Xanthium strumarium	15	Y	FAC
3.			
4.			
5.			
6.			
7.			
8.			
	35 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 20 % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

✓ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: Densely vegetated area of the shoreline.

SOIL

Sampling Point: 9

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-24"	10YR 3.5/1	100					Sandy loam	no redox

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ____ No ✓

Remarks: Hydric soils not expected because the shelf is 5ish above current water level and hasn't been at that level for long period. low chroma but no redox features (40-50')

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No ____ Depth (inches): _____

Water Table Present? Yes ____ No ____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ____ No ____ Depth (inches): _____

Wetland Hydrology Present? Yes ____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Area approx 40-50' above current water level. Evidence of past higher water levels at and above this point.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Vail Dam Remediation City/County: Temecula/Riverside Sampling Date: 6/29/20
Applicant/Owner: RCWD State: Ca Sampling Point: 10
Investigator(s): Morales, Greco Section, Township, Range: 00, 8S, 1W
Landform (hillslope, terrace, etc.): lake shore Local relief (concave, convex, none): none Slope (%): _____
Subregion (LRR): California Lat: 33.493401 Long: -116.956936 Datum: _____
Soil Map Unit Name: Grangeville fine sandy loam, drained, 0-2 slopes NWI classification: L2BUHh
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)
Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____
Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ✓ No _____
Hydric Soil Present? Yes ✓ No _____
Wetland Hydrology Present? Yes ✓ No _____
Is the Sampled Area within a Wetland? Yes ✓ No _____

Remarks: lake shore far from water but below shelf where wetland hydrology and soils not expected. Limits of wetlands in anticipated area

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. Tamarix ramosissima	40	Y	FAC
2.			
3.			
4.			
	40 = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. Baccharis salicifolia	50	Y	FACW
2.			
3.			
4.			
5.			
	50 = Total Cover		
Herb Stratum (Plot size: _____)			
1. Heliotropium curassavicum	30	Y	FACU
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	30 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 25 % Cover of Biotic Crust _____

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 66% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:
✓ Dominance Test is >50%
___ Prevalence Index is ≤3.0[1]
___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: Dense and abundant hydrophytes.

SOIL

Sampling Point: 10

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-24	10YR 4/1	80					clay loam	
10-24	10YR 3/1	20	5YR 5/6	5		PL	~~Sandy~~ clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ✓ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ✓ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): _____

Water Table Present? Yes ___ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Evidence of past higher water levels at and above point. Drift deposits and water marks likely old.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Vail Dam Remediation City/County: Temecula/Riverside Sampling Date: 7/12/20
Applicant/Owner: RCWD State: Ca Sampling Point: 11
Investigator(s): Morales Section, Township, Range: 00, 8S, 1W
Landform (hillslope, terrace, etc.): lake shelf Local relief (concave, convex, none): none Slope (%): _____
Subregion (LRR): California Lat: 33.493759 Long: -116.956803 Datum: _____
Soil Map Unit Name: Grangeville fine sandy loam, drained, 0-2 slopes NWI classification: L7BUHh
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)
Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____
Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks: Just above lake shelf. No apparent hydrology and toss up if hydrophytes dominate.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. Tamarix ramosissima	20	Y	FAC
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. Pluchea sericea	40	Y	FACW
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. Bromus rubens	20	Y	UPL
2. Heliotropium curassavicum	10	Y	FACW
3.			
4.			
5.			
6.			
7.			
8.			
	_____ = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 40 % Cover of Biotic Crust _____

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 4 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	40	x 2 =	80
FAC species	20	x 3 =	60
FACU species	10	x 4 =	40
UPL species	20	x 5 =	100
Column Totals:	90 (A)		280 (B)

Prevalence Index = B/A = 3.11

Hydrophytic Vegetation Indicators:
___ Dominance Test is >50%
___ Prevalence Index is ≤3.0[1]
___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks: Some hydrophytes w/ infiltration of more upland species.

SOIL

Sampling Point: 11

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-24	10YR 3/1						Sandy loam	no redox

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR C)**
- ___ 1 cm Muck (A9) **(LRR D)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR C)**
- ___ 2 cm Muck (A10) **(LRR B)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks: Hydric soils not expected at this location. Low chroma but no redox features.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) **(Nonriverine)**
- ___ Sediment Deposits (B2) **(Nonriverine)**
- ___ Drift Deposits (B3) **(Nonriverine)**
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ✓ Water Marks (B1) **(Riverine)**
- ___ Sediment Deposits (B2) **(Riverine)**
- ___ Drift Deposits (B3) **(Riverine)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Evidence of past higher water levels ~~[illegible]~~ above this point. Not recent.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Vail Dam Remediation City/County: Temecula/Riverside Sampling Date: 7/12/20

Applicant/Owner: RCWD State: CA Sampling Point: 12

Investigator(s): Morales, Section, Township, Range: 00, 8S, 1W

Landform (hillslope, terrace, etc.): lake shelf Local relief (concave, convex, none): none Slope (%): _____

Subregion (LRR): California Lat: 33.493297 Long: -116.956127 Datum: _____

Soil Map Unit Name: Grangeville fine sandy loam, drained 0-2 s1 NWI classification: L1UBHh

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____ No ✓	
Wetland Hydrology Present?	Yes _____ No ✓	

Remarks: Just above lake shelf. Similar to SP11, but more hydrophytes, so testing for wetlands. Hydrology questionable.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. Baccharis salicifolia	30	Y	FACW
2. Pluchea sericea	20	Y	FACW
3.			
4.			
5.			
	50 = Total Cover		
Herb Stratum (Plot size: _____)			
1. Heliotropium curassavicum	30	Y	FACW
2. Bromus rubens	15	Y	UPL
3. Polypogon monspeliensis	15	Y	FACW
4.			
5.			
6.			
7.			
8.			
	60 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 40 % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 60 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species	x 1 =	
FACW species	x 2 =	
FAC species	x 3 =	
FACU species	x 4 =	
UPL species	x 5 =	
Column Totals: (A)		(B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

✓ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

SOIL

Sampling Point: 12

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-24	10YR 3/2	100					Sandy loam	no redox

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR C)**
- ___ 1 cm Muck (A9) **(LRR D)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR C)**
- ___ 2 cm Muck (A10) **(LRR B)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks: Low chroma but no redox features.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) **(Nonriverine)**
- ___ Sediment Deposits (B2) **(Nonriverine)**
- ___ Drift Deposits (B3) **(Nonriverine)**
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) **(Riverine)**
- ___ Sediment Deposits (B2) **(Riverine)**
- ___ Drift Deposits (B3) **(Riverine)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: No wetland hydrology indicators. Dug pit to check for presence of reduced iron.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Vail Dam Remediation City/County: Temecula/Riverside Sampling Date: 6/29/20
Applicant/Owner: RCWD State: Ca Sampling Point: 13
Investigator(s): Morales, Greco Section, Township, Range: 00, 8S, 1W
Landform (hillslope, terrace, etc.): lake shore Local relief (concave, convex, none): concave Slope (%): _____
Subregion (LRR): California Lat: 33.493281 Long: -116.954986 Datum: _____
Soil Map Unit Name: Grangeville fine sandy loam, drained, 0-2 slopes NWI classification: L1UBHh
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)
Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____
Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ✓ No _____
Hydric Soil Present? Yes ✓ No _____
Wetland Hydrology Present? Yes ✓ No _____
Is the Sampled Area within a Wetland? Yes ✓ No _____

Remarks: Lake shore far from water but below shelf. Lower elevation than SP12 to identify limits of wetlands. Least Bell's vireo heard around.

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1. Salix goodingii	60	Y	FACW
2.			
3.			
4.			
Total Cover:			
Sapling/Shrub Stratum			
1. Baccharis salicifolia	60	Y	FAC
2. Tamarix ramosissima	20	Y	FAC
3. Pluchea sericea	15	N	FACW
4.			
5.			
Total Cover:			
Herb Stratum			
1. Heliotropium curassavicum	50	Y	FACW
2. Bromus rubens	10	Y	UPL
3.			
4.			
5.			
6.			
7.			
8.			
Total Cover:			
Woody Vine Stratum			
1.			
2.			
Total Cover:			

% Bare Ground in Herb Stratum 25 % Cover of Biotic Crust _____

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)
Total Number of Dominant Species Across All Strata: 5 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 60 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:
✓ Dominance Test is >50%
___ Prevalence Index is ≤3.0[1]
___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: Dense and abundant hydrophytes.

SOIL

Sampling Point: 13

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-22"	10YR 3/1	95	5YR 5/6	5		PL	clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ✓ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ✓ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): _____

Water Table Present? Yes ___ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Evidence of past water levels at and above point. Drift deposits and water marks likely old.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Vail Dam Remediation City/County: Temecula / Riverside Sampling Date: 6/29/20
Applicant/Owner: RCWD State: Ca Sampling Point: 14
Investigator(s): Morales, Lorelo Section, Township, Range: 00, 8S, 1W
Landform (hillslope, terrace, etc.): channel Local relief (concave, convex, none): concave Slope (%): _____
Subregion (LRR): California Lat: 33.474872 Long: -116.952913 Datum: _____
Soil Map Unit Name: River wash NWI classification: PFOC
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)
Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____
Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks: In the Temecula Creek channel SE of Vail Lake

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1. Populus fremontii	70	Y	FAC
2. Salix laevigata	30	Y	FACW
3.			
4.			
Total Cover:	100		
Sapling/Shrub Stratum			
1. Baccharis salicifolia	20	Y	FAC
2.			
3.			
4.			
5.			
Total Cover:	20		
Herb Stratum			
1. Cyperus eragrostis	15	Y	FACW
2. Polypogon monspeliensis	15	Y	FACW
3. Baccharis salicifolia	10	Y	FAC
4. Ambrosia psilostachya	5	Y	FACU
5. Xanthium strumarium	5	Y	FAC
6.			
7.			
8.			
Total Cover:	50		
Woody Vine Stratum			
1.			
2.			
Total Cover:			

% Bare Ground in Herb Stratum 60 % Cover of Biotic Crust _____

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 7 (A)
Total Number of Dominant Species Across All Strata: 8 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 87.5% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:
✓ Dominance Test is >50%
___ Prevalence Index is ≤3.0[1]
___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: Thick tree canopy

SOIL

Sampling Point: 14

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-20	10YR 2/1	100					Sandy clay	no redox

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ✓ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ✓ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ✓ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): _____

Water Table Present? Yes ✓ No ___ Depth (inches): 12"

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 2"

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Vail Dam Remediation City/County: Temecula/Riverside Sampling Date: 3/12/20

Applicant/Owner: RCWD State: Ca Sampling Point: 15

Investigator(s): Morales, Section, Township, Range: 00, 8S, 1W

Landform (hillslope, terrace, etc.): creek terrace Local relief (concave, convex, none): none Slope (%):

Subregion (LRR): California Lat: 33.474184 Long: -116.955384 Datum:

Soil Map Unit Name: River wash NWI classification: PFOC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No (If no, explain in Remarks.)

Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No

Are Vegetation , Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No	**Is the Sampled Area within a Wetland?** Yes No ✓
Hydric Soil Present?	Yes	No ✓	
Wetland Hydrology Present?	Yes	No ✓	

Remarks: Temecula Creek channel terrace SE of Vail Lake

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1. Populus fremontii	50	Y	FAC
2. Salix lasiolepis	50	Y	FACW
3.			
4.			
Total Cover:	100		
Sapling/Shrub Stratum			
1. Baccharis salicifolia	40	Y	FAC
2.			
3.			
4.			
5.			
Total Cover:	40		
Herb Stratum			
1. Cyperus eragrostis	15	Y	FACW
2. Polypogon monspeliensis	15	Y	FACW
3.			
4.			
5.			
6.			
7.			
8.			
Total Cover:	30		
Woody Vine Stratum			
1.			
2.			
Total Cover:			

% Bare Ground in Herb Stratum 50 % Cover of Biotic Crust

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

✓ Dominance Test is >50%

Prevalence Index is ≤3.0[1]

Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ✓ No

Remarks: Thick tree canopy

SOIL

Sampling Point: 15

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-24	10YR 3/2	100					Sandy loam	no redox.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR C)**
- ___ 1 cm Muck (A9) **(LRR D)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR C)**
- ___ 2 cm Muck (A10) **(LRR B)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) **(Nonriverine)**
- ___ Sediment Deposits (B2) **(Nonriverine)**
- ___ Drift Deposits (B3) **(Nonriverine)**
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) **(Riverine)**
- ___ Sediment Deposits (B2) **(Riverine)**
- ✓ Drift Deposits (B3) **(Riverine)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: only riverine drift deposits present.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Vail Dam Remediation City/County: Temecula/Riverside Sampling Date: 7/12/20

Applicant/Owner: RCWD State: Ca Sampling Point: 16

Investigator(s): Morales Section, Township, Range: 00, 8S, 1W

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): none Slope (%): _____

Subregion (LRR): California Lat: 33.474555 Long: -116.955521 Datum: _____

Soil Map Unit Name: Riverwash NWI classification: PFOC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks: Temecula Creek channel floodplain SE of Vail Lake
Looking for wetland limits after SP15 not wetland

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1. Populus fremontii	40	Y	FAC
2. Salix lasiolepis	30	Y	FACW
3. Salix laevigata	30	Y	FACW
4.			
Total Cover:	100		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:			
Herb Stratum			
1. Cyperus eragrostis	20	Y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
Total Cover:	20		
Woody Vine Stratum			
1.			
2.			
Total Cover:			

% Bare Ground in Herb Stratum 60 % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

✓ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: Thick tree canopy and understory due to Salix lasiolepis.

SOIL

Sampling Point: 16

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-24	10YR 2/1	95	5YR 5/6	5		PL	Sandy loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ✓ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ✓ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): _____

Water Table Present? Yes ___ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

APPENDIX C

FUNCTIONS AND VALUES ANALYSIS

ANALYSIS OF FUNCTIONS AND VALUES OF POTENTIAL WATERS OF THE UNITED STATES

The following is an assessment of the functions and values attributable to the identified potential jurisdictional waters in the JSA. All waters have some degree of functionality, and no single drainage can perform all of the functions considered below. The following functions are analyzed at low, moderate, or high value levels. The individual water bodies (limited to riparian/riverine areas) are analyzed in Table C-1 (provided at the end of this appendix) based on the criteria outlined below.

C.1 HYDROLOGIC REGIME

This function is the ability of a wetland or stream to absorb and store water belowground. The degree of this saturation is dependent on the soil composition and is affected by prior flooding events. For example, clay soils possess more pore space than sandy soils. However, because the smaller pore size slows the rate at which water is absorbed and released, clay soil has a lower capacity to store water than sandy soils. The storage of water belowground allows for the fluctuation between anaerobic and aerobic conditions that benefits environmental conditions necessary for microbial cycling.

C.2 FLOOD STORAGE AND FLOOD FLOW MODIFICATION

This function is determined based on the ability of a wetland or stream at which the peak flow in a watershed can be attenuated during major storm events and during peak domestic flows to take in surface water that may otherwise cause flooding. This is dependent on the size of the wetland or stream, the amount of water it can hold, and the location in the watershed. For instance, larger wetlands or streams that have a greater capacity to receive waters have a greater ability to reduce flooding. In addition, areas high in the watershed may have more ability to reduce flooding in downstream areas, but areas lower in the watershed may have greater benefits to a specific area. Vegetation, shape, and the configuration of the wetland or stream may also affect flood storage by dissipating the energy of flows during flood events.

C.3 SEDIMENT RETENTION

Removal of sediment is the process that keeps sediments from migrating downstream. This is accomplished through the natural process of sediment retention and entrapment. This function is dependent on the sediment load being delivered by runoff into the watershed. Similar to above, the vegetation, shape, and configuration of a wetland will also affect sediment retention if water is detained for long durations, as would be the case with dense vegetation, a bowl-shaped watershed, or slow-moving water. This function would be demonstrated (i.e., high) if the turbidity of the incoming water is greater than that of the outgoing water.

C.4 NUTRIENT RETENTION AND TRANSFORMATION

Nutrient cycling consists of two variables: uptake of nutrients by plants and detritus turnover, in which nutrients are released for uptake by plants downstream. Wetland systems in general are much more productive with regard to nutrients than upland habitats. The regular availability of water associated with the wetland or stream may cause the growth of plants (nutrient uptake) and associated detritivores and generate nutrients that may be utilized by a variety of aquatic and terrestrial wildlife downstream.

C.5 TOXICANT TRAPPING

The major processes by which wetlands remove nutrients and toxicants are as follows: (1) by trapping sediments rich in nutrients and toxicants, (2) by absorption into soils high in clay content or organic matter, and (3) through nitrification and denitrification in alternating oxic and anoxic conditions. Removal of nutrients and toxicants is closely tied to the processes that provide for sediment removal.

C.6 SOCIAL SIGNIFICANCE

This is a measure of the probability that a wetland or stream will be utilized by the public for its natural features, economic value, official status, and/or location. This includes public use for recreational uses, such as boating, fishing, birding, walking, and other passive recreational activities. In addition, a wetland or stream that is utilized as an outdoor classroom, is a location for scientific study, or is near a nature center would have a higher social significance standing.

C.7 WILDLIFE HABITAT

General habitat suitability is the ability of a wetland to provide habitat for a wide range of wildlife. Vegetation is a large component of wildlife habitat. As plant community diversity increases along with connectivity with other habitats, so does potential wildlife diversity. In addition, a variety of open water, intermittent ponding, and perennial ponding is also an important habitat element for wildlife.

C.8 AQUATIC HABITAT

The ability of a wetland or stream to support aquatic species requires that there be ample food supply, pool and riffle complexes, and sufficient soil substrate. Food supply is typically in the form of aquatic invertebrates and detrital matter from nearby vegetation. Pool and riffle complexes provide a variety of habitats for species diversity as well as habitat for breeding and rearing activities. Species diversity is directly related to the complexity of the habitat structure.

Table C-1: Functions and Values of Features Within the JSA

Feature	Hydrologic Regime	Flood Storage and Flood Flow Modification	Sediment Retention	Nutrient Retention and Transformation	Toxicant Trapping	Social Significance	Wildlife Habitat	Aquatic Habitat
Temecula Creek downstream of Vail Lake	High	Moderate	High	Moderate	Moderate	Low	Moderate	Low
Temecula Creek upstream of Vail Lake	High	High	High	High	High	Moderate	High	Moderate
Arroyo Seco Creek	High	High	High	High	High	Moderate	High	Moderate
Wilson Creek	High	High	High	High	High	Moderate	High	Moderate

Source: LSA 2022.
JSA = Jurisdictional Study Area

APPENDIX D

DRY SEASON, WET SEASON, AND HATCHING STUDY FAIRY SHRIMP SURVEY REULTS

CARLSBAD
FRESNO
IRVINE
LOS ANGELES
PALM SPRINGS
POINT RICHMOND
RIVERSIDE
ROSEVILLE
SAN LUIS OBISPO

September 30, 2020

Stacey Love
Recovery Permit Coordinator
United Stated Fish and Wildlife Service
2177 Salk Avenue, Suite 250
Carlsbad, California 92008

Subject: Results of Dry Season Fairy Shrimp Survey for the Vail Dam Seismic and Hydrologic Remediation Project (LSA Project No. RCW1902)

Dear Ms. Love:

This letter provides the results of a 2020 dry season presence/absence survey for vernal pool branchiopods on the Vail Dam Seismic and Hydrologic Remediation Project site. The survey area is located at Universal Transverse Mercator (UTM) coordinates 3707445 Northing/ 500615 Easting in a portion of the project area northwest of Vail Lake in Riverside County, California, as shown on the U.S. Geological Survey (USGS) 7.5-minute series *Vail Lake, California* quadrangle (attached Figure 1). The survey area includes one small ponding feature (Figures 2 and 3).

METHODS

The 2020 dry season survey was conducted in accordance with the terms of Federal 10(a)(1)(A) Permits TE-777965 issued to LSA biologist Stan Spencer and TE-839213-3 issued to LSA biologist David Muth, and the May 31, 2015, Survey Guidelines for the Listed Large Branchiopods.

Soil samples were collected by Dr. Spencer (TE-777965) and processed by Mr. Muth (TE-839213). Dr. Spencer collected a series of 50 0.05-liter samples of soil from the ponding feature. The soil was dry at the time of collection. The 50 samples from the feature were combined and stored in a plastic zip-lock bag marked to indicate the site and date of collection.

The soil was processed and initially analyzed by Mr. Muth on September 3, 2020. Samples were processed by placing the collected material into 5-gallon buckets filled with 1 to 2 gallons of 5% brine solution to resaturate soils. During the approximately 10- to 15-minute saturation period, the bucket was occasionally stirred to ensure all biological material was released and floated to the surface. In small aliquots, the biological material was poured through a series of four sieves with mesh sizes of 710, 355, 212, and 150 microns. The sieves were stacked with the largest mesh size at the top and the smallest mesh size on the bottom. Material was washed through the set with water. Particles trapped in the three smallest sieve sizes were saved for analysis by washing them onto blotter paper to dry.

The sieved material was examined by Mr. Muth on September 3 and 11, 2020, using a 10- to 40-power Olympus stereo microscope. A reference cyst collection was available for comparison of any cysts found in the samples. Soil material will be stored with LSA until final deposition can be arranged.

RESULTS AND CONCLUSIONS

The sampled feature is a seasonal pool intersected by a dirt road. No other ponding features were identified in adjacent lands. Water enters the feature as direct rainfall and as sheet flow from adjacent slopes. The feature is dominated by non-native, upland plants. Native hydrophytic plants that are present are mostly within the compacted soil of the intersecting dirt road. Characteristics of the sampled feature are provided in Table A.

Table A: Characteristics of Feature Sampled

Feature	Estimated Maximum Depth (cm)	Estimated Maximum Size (m^2)	Origin	Vegetation	Fairy Shrimp Eggs Found in Samples
1	20	268	Natural topography, compaction in dirt road	*Avena fatua* *Bromus hordeaceous* *Deinandra fasciculata* *Avena fatua* *Epilobium campestre* *Brodiaea terrestris* *Psilocarphus brevissimus* *Veronica peregrina* *Deschampsia danthonioides* *Crassula aquatica*	*Branchinecta*

cm = centimeter(s)
m = meter(s)

A total of 22 *Branchinecta* eggs were found in the sampled feature. *Branchinecta* eggs are not considered differentiated enough to make a species determination. Given the location and habitat quality, the eggs most likely belong to versatile fairy shrimp (*Branchinecta lindahli*). A wet season survey will be needed to make a conclusive determination of species. No eggs of *Streptocephalus* were found. Other invertebrates detected include ostracods and ants.

Please contact me if you require any additional information.

Sincerely,
LSA Associates, Inc.

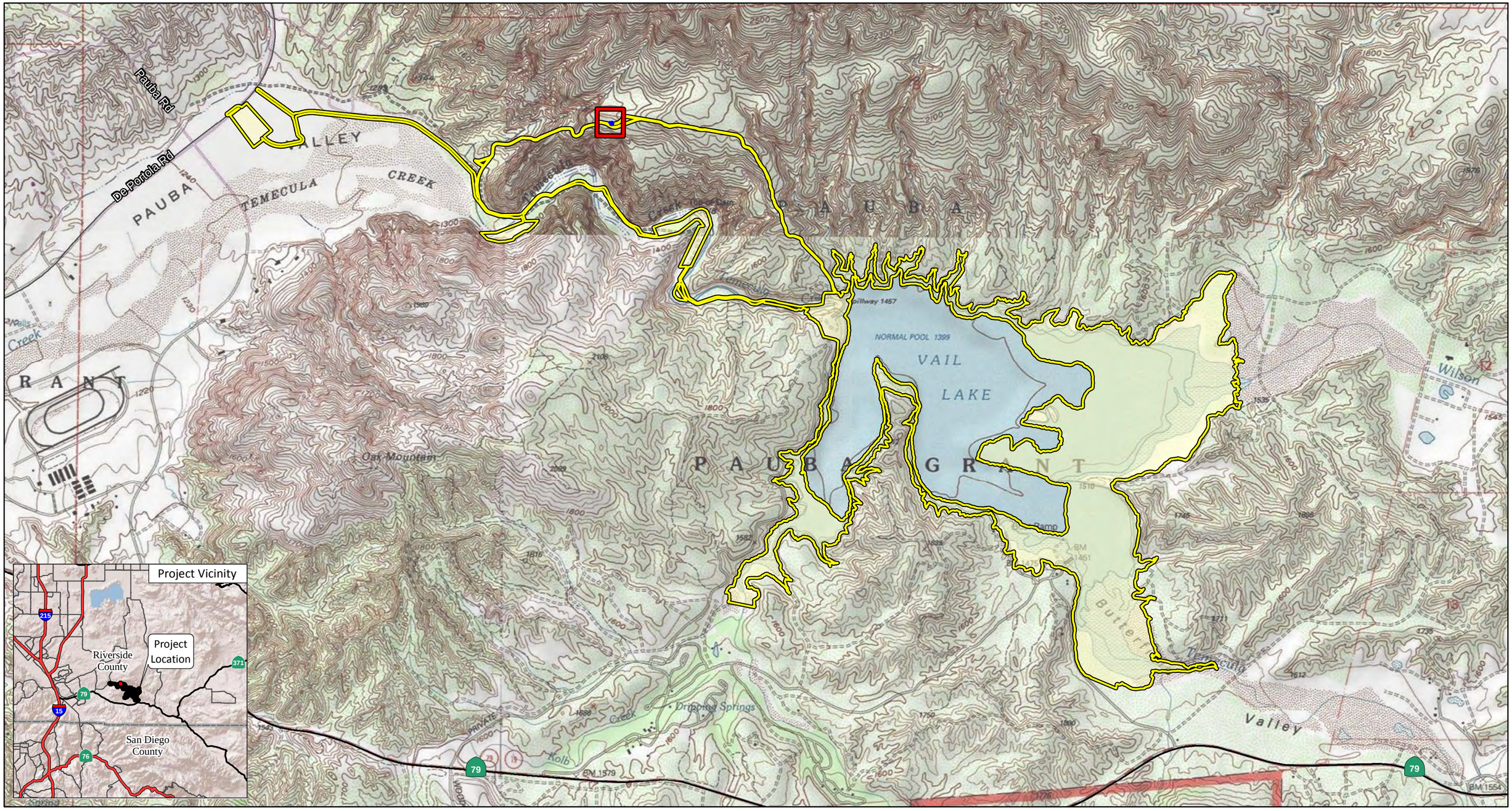
Stanley C. Spencer, Ph.D.
Associate/Senior Botanist

Attachments: Certification
Figure 1: Fairy Shrimp Survey Area
Figure 2: Feature Sampled
Figure 3: Site Photographs
Data Sheet for Dry Season Sample Analysis

cc: Karin Cleary-Rose, U.S. Fish and Wildlife Service
Melody Aimar, Western Riverside County MSHCP Biological Monitoring Program

WE CERTIFY THAT THE INFORMATION IN THIS SURVEY REPORT AND ATTACHED EXHIBITS FULLY AND ACCURATELY REPRESENTS OUR WORK:

SURVEYOR:	PERMIT NUMBER	DATE:
Stanley Spencer	TE-777965	September 30, 2020
David Muth	TE-839213	September 30, 2020



LSA

LEGEND

- Project Location
- Fairy Shrimp Survey Area
- Potential Fairy Shrimp Habitat

0 1000 2000
FEET

FIGURE 1

Vail Dam Seismic and Hydrologic Remediation Project

Fairy Shrimp Survey Area

SOURCE: USGS 7.5' Quad - *Bachelor Mtn, CA* (1978), *Pechanga, CA* (1988), *Sage, CA* (1954), and *Vail Lake, CA* (1988)

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LSA

LEGEND

Project Location

Feature Sampled

FIGURE 2

N

0 50 100

FEET

Vail Dam Seismic and Hydrologic Remediation Project

Feature Sampled

SOURCE: LSA UAV Imagery (2/2020 and 3/2020)

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Photograph 1. Feature 1, looking west.



Photograph 2. Feature 1 and surrounding area, looking west.

LSA

FIGURE 3

Vail Dam Seismic and Hydrologic Remediation Project

Site Photographs

U.S. Fish and Wildlife Service – Data Sheet for Dry Season Sample Analysis for Listed Large Branchiopods

Project Information		Biologist Information
Project Name: **Vail Dam Seismic and Hydrologic Remediation Project**	Quad :**Sage**	Name of Person(2) Who Conducted the Following Tasks and Permit Number(s):
USFWS Project Number**: None Issued**	Township: **8 South**	Soil Collection: **Dr Stan Spencer TE-777965**
County: **Riverside**	Range: 1 **West**	Soil Processing: **David Muth TE-839213**
UTMs for center of site: **3707445N/500615E**	Section: **Just South of Section 4**	Soil Analysis/Cysts ID: **David Muth TE-839213**
		Soil Collection Date: **August 27, 2020**

Pool/ Habitat/ Basin No.	Invertebrates Present (X)															Comments
	Insect Exo-Skeletons	Micro-Turbellaria Cysts	Cladocera Ephippia	Ostracods Live/Cysts/ Carapaces	Copepods Live/Cysts	Number of Large Branchiopod Cysts						Hydracarina Live	Nematoda	Collembola	Other Species	
						Branchinecta sp.	*Lepidurus packardi*	*Streptocephalus wootoni*	*Linderiella occidentalis*	*Lynceus brachyurus*	*Cyzicus californicus*					
1	ants			X		22										

CARLSBAD
FRESNO
IRVINE
LOS ANGELES
PALM SPRINGS
POINT RICHMOND
RIVERSIDE
ROSEVILLE
SAN LUIS OBISPO

June 23, 2021

Stacey Love
Recovery Permit Coordinator
United Stated Fish and Wildlife Service
2177 Salk Avenue, Suite 250
Carlsbad, California 92008

Subject: Results of the 2020–2021 Wet Season Fairy Shrimp Survey for the Vail Dam Seismic and Hydrologic Remediation Project (LSA Project No. RCW1902)

Dear Stacey:

This letter provides the results of a 2020–2021 wet season presence/absence survey for fairy shrimp for the Vail Dam Seismic and Hydrologic Remediation Project site. The survey area is located at Universal Transverse Mercator (UTM) coordinates 3707445 Northing/ 500615 Easting in a portion of the project area northwest of Vail Lake in Riverside County, California, as shown on the U.S. Geological Survey (USGS) 7.5-minute series *Sage, California* quadrangle (see Figure 1; all figures attached). The survey area includes one small ponding feature (Figures 2 and 3).

A dry season survey was conducted in 2020. Results of the dry season survey indicated the presence of *Branchinecta* in the sampled feature.

Rainfall conditions during the 2020-2021 wet season were not suitable for maturation and identification of fairy shrimp.

METHODS

The fairy shrimp survey was conducted for Riverside fairy shrimp (*Streptocephalus woottoni*) and vernal pool fairy shrimp (*Branchinecta lynchi*) by LSA Senior Biologist Stanley Spencer under LSA Federal 10(a)(1)(A) Permit TE 777965 and in accordance with the November 13, 2017, United States Fish and Wildlife Service Survey Guidelines for the Listed Large Branchiopods. Site checks were conducted on December 30, 2020, and on January 28, February 3, and March 9 and 17, 2021, to determine if water was present in ponding features following storm events. Ponded features were sampled at required intervals until they had dried and remained dry.

Features were sampled by drawing a handheld net through the water columns, occasionally bumping the bottom to stir up any benthic organisms. The net was periodically removed from the water to check for aquatic species.

Table A provides the dates and weather conditions for each site visit during which the feature was sampled. Wet season data sheets are attached.

Table A: Survey Dates, Weather Conditions, and Features Sampled

Date	Water Temperature (°C)	Air Temperature (°C)	Cloud Cover	Feature Sampled
1/28/21	14	16	<20%	1
2/3/21	23	23	<20%	1
3/17/21	21	18	80%	1

°C = degrees Celsius

RESULTS AND CONCLUSIONS

The sampled feature is a seasonal pool intersected by a dirt road. No other ponding features were identified in adjacent lands. Water enters the feature as direct rainfall and as sheet flow from adjacent slopes. The feature is dominated by non-native, upland plants. Native hydrophytic plants that are present are mostly within the compacted soil of the intersecting dirt road. Table B provides characteristics of the sampled feature.

Table B: Characteristics of Feature Sampled

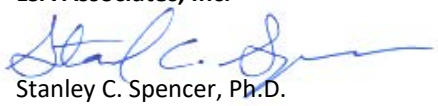
Feature	Estimated Maximum Depth (cm)	Estimated Maximum Size (m^2)	Origin	Vegetation	Fairy Shrimp Species Observed
1	20	268	Natural topography, compaction in dirt road	*Avena fatua* *Deinandra fasciculata* *Psilocarphus brevissimus*	*Branchinecta* sp.

cm = centimeter(s)
m = meter(s)

The 2020–2021 wet season was extremely dry. In the 2020–2021 wet season through June 9, Temecula (west of the project site) received only 3.38 inches of rainfall compared to a seasonal average of 12.00 inches, and Anza (east of the project site) received only 5.54 inches compared to a seasonal average of 13.03 inches.[1] As a result, the feature did not pond water long enough for fairy shrimp to mature. Two individuals of the genus *Branchinecta* were observed in the feature on the February 3 visit but were too small to identify to species. No other invertebrate or amphibian species was observed in the feature.

Please contact me if you require any additional information.

Sincerely,
LSA Associates, Inc.



Stanley C. Spencer, Ph.D.
Associate/Senior Botanist

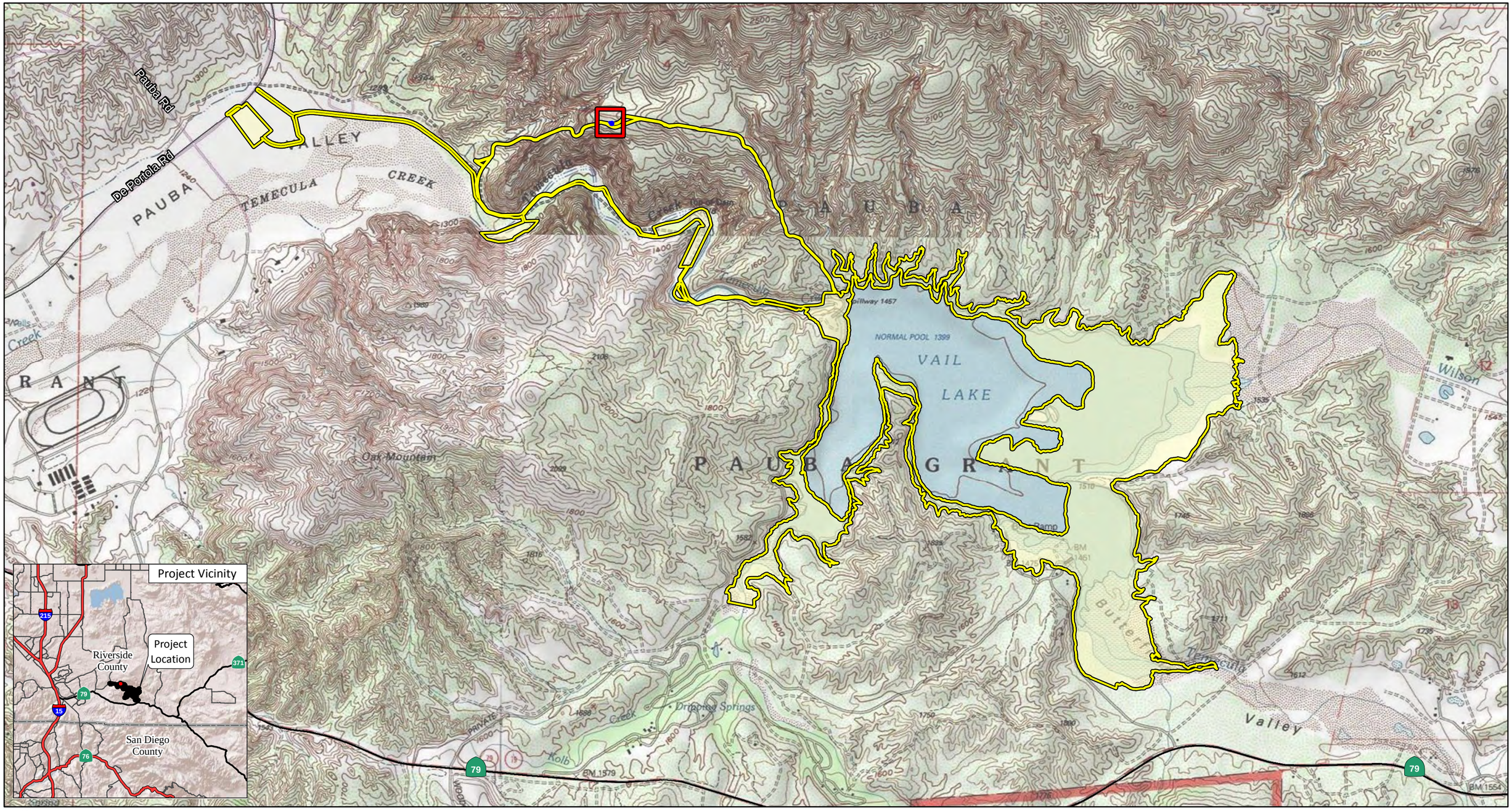
Attachments: Certification
Figure 1: Fairy Shrimp Survey Area
Figure 2: Feature Sampled
Figure 3: Site Photographs
Data Sheets

cc: Karin Cleary-Rose, U.S. Fish and Wildlife Service
Melody Aimar, Western Riverside County MSHCP Biological Monitoring Program

I CERTIFY THAT THE INFORMATION IN THIS SURVEY REPORT AND ATTACHED EXHIBITS FULLY AND ACCURATELY REPRESENTS MY WORK:

SURVEYOR:	PERMIT NUMBER	DATE:
	TE-777965	June 23, 2021
Stanley Spencer		

[1] Weather Currents. 2021. Current Weather for Southern California Communities. Website: weathercurrents.com (accessed June 2021).



LSA

LEGEND

- Project Location
- Fairy Shrimp Survey Area
- Potential Fairy Shrimp Habitat

0 1000 2000
FEET

FIGURE 1

Vail Dam Seismic and Hydrologic Remediation Project

Fairy Shrimp Survey Area

SOURCE: USGS 7.5' Quad - *Bachelor Mtn, CA* (1978), *Pechanga, CA* (1988), *Sage, CA* (1954), and *Vail Lake, CA* (1988)

I:\RCW1902\GIS\MXD\Bio\FairyShrimp\FairyShrimp_ProjectLocation.mxd (9/18/2020)



LSA

LEGEND

Project Location

Feature Sampled

FIGURE 2

N

0 50 100

FEET

Vail Dam Seismic and Hydrologic Remediation Project

Feature Sampled

SOURCE: LSA UAV Imagery (2/2020 and 3/2020)

I:\RCW1902\GIS\MXD\Bio\FairyShrimp\FeatureSampled.mxd (9/18/2020)



Photograph 1. Feature 1, looking east (2/3/21).



Photograph 2. Feature 1 and surrounding area, looking west (5/12/20).

LSA

FIGURE 3

Vail Dam Seismic and Hydrologic Remediation Project

Site Photographs

U.S. Fish and Wildlife Service – Data Sheet for Wet Season Surveys for Listed Large Branchiopods

Site or Project Name: Vail Dam Seismic and Hydrologic Remediation	County: RIV	Quad: Sage	Township: 8S	Range: 1W	Section: 04 (projected)

SURVEYOR / Permit Number:	Stan Spencer / TE-777965

Date:	1/28/21	Time:	1550	Weather Conditions:	<20% cloud cover

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°C)		Depth (cm)		Surface Area (m × m)		Crustaceans					Insects				Platyhelminths (flatworms)	Habitat Condition	Notes/ Voucher Information
		Air	Water	Average	Est. Max.	Present	Est. Max.	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomida			
1	3707445, 500615 WGS84	16	14	6	10	1x0.5	15x18											D TT	

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahli). For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed: with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present. (Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

U.S. Fish and Wildlife Service – Data Sheet for Wet Season Surveys for Listed Large Branchiopods

Site or Project Name: Vail Dam Seismic and Hydrologic Remediation	County: RIV	Quad: Sage	Township: 8S	Range: 1W	Section: 04 (projected)

SURVEYOR / Permit Number:	Stan Spencer / TE-777965

Date:	2/3/21	Time:	1340	Weather Conditions:	<20% cloud cover

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°C)		Depth (cm)		Surface Area (m × m)		Crustaceans					Insects				Platyhelminths (flatworms)	Habitat Condition	Notes/ Voucher Information
		Air	Water	Average	Est. Max.	Present	Est. Max.	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomida			
1	3707445, 500615 WGS84	23	23	6	10	6x0.2	15x18	BR										D TT	

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahli). For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed: with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present. (Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

U.S. Fish and Wildlife Service – Data Sheet for Wet Season Surveys for Listed Large Branchiopods

Site or Project Name: Vail Dam Seismic and Hydrologic Remediation	County: RIV	Quad: Sage	Township: 8S	Range: 1W	Section: 04 (projected)

SURVEYOR / Permit Number:	Stan Spencer / TE-777965

Date:	3/17/21	Time:	1500	Weather Conditions:	<20% cloud cover

Feature ID #	UTM (Northing, Easting, Datum)	Temp (°C)		Depth (cm)		Surface Area (m × m)		Crustaceans					Insects				Platyhelminths (flatworms)	Habitat Condition	Notes/ Voucher Information
		Air	Water	Average	Est. Max.	Present	Est. Max.	Anostracans	Notostracans	Copepods	Ostracods	Cladocera	Coleoptera	Hemiptera	Diptera Culicidae	Diptera Chironomida			
1	3707445, 500615 WGS84	18	21	2	10	1x0.5	15x18											D TT	

Notes: Fill in abbreviated names of Anostracans and Notostracans, for all others indicate presence with a check mark. Anostracan and Notostracan Abbreviations: Use first two letters of genus and species name (e.g., LIOC = Linderiella occidentalis, BRLI = Branchinecta lindahli). For habitat conditions use two letter abbreviation as follows: NP = Natural Pool, CP = Constructed Pool; UD = undisturbed, D = disturbed: with TT = tire tracks, T = trash, P = plowed; G = grazed, UG = ungrazed by: C = cattle, H = horses, S = sheep; AB = Algal blooms present. (Estimate grazing regime by height of grasses and forbs and density of hoof prints) LG = light grazing, MG = moderate grazing, HG = heavy grazing.

CARLSBAD
CLOVIS
IRVINE
LOS ANGELES
PALM SPRINGS
POINT RICHMOND
RIVERSIDE
ROSEVILLE
SAN LUIS OBISPO

September 20, 2021

Ms. Stacey Love
United States Fish and Wildlife Service
2177 Salk Avenue, Suite 250
Carlsbad, California 92008

Subject: Results of 2021 Fairy Shrimp Hatching Study for the Vail Dam Seismic and Hydrologic Remediation Project (LSA Project No. RCW1902)

Dear Ms. Love:

This letter provides the results of a 2021 fairy shrimp egg hatching study conducted in connection with a previously reported dry season survey (letter dated September 30, 2020) to determine the species of *Branchinecta* found in soil samples collected from the Vail Dam Seismic and Hydrologic Remediation Project. The survey area is located at Universal Transverse Mercator (UTM) coordinates 3707445 Northing/500615 Easting in a portion of the project area northwest of Vail Lake in Riverside County, California, as shown on the U.S. Geological Survey (USGS) 7.5 minute series V*ail Lake, California* quadrangle (attached Figure 1). The survey area includes one small ponding feature (attached Figure 2). Anostracan eggs identified as *Branchinecta* sp. were isolated from soil samples collected during the 2020 dry season presence/absence survey. LSA hatched the eggs in the laboratory and raised the nauplii to make a determination of species.

METHODS

The 2020 dry season survey was conducted in accordance with the terms of Federal 10(a)(1)(A) Permits TE-777965 issued to LSA biologist Stan Spencer and TE-839213 issued to LSA biologist David Muth, and the May 31, 2015, *Survey Guidelines for the Listed Large Branchiopods*. Additional soil was collected and processed during 2021 in order to augment the number of eggs available to rehydrate.

Dr. Spencer (TE-777965) collected 2.5 liters (L) of soil during the dry season survey on August 27, 2020, and an additional 5 L of soil from the same feature on August 2, 2021. The collected samples were stored dry in marked plastic bags. Mr. Muth processed the material on September 3, 2020, and August 9, 2021, by saturating soils and pouring them through a series of four sieves with mesh sizes of 710, 355, 212, and 150 microns. Particles trapped in the three smallest sieve sizes were saved for analysis by washing them onto blotter paper to dry. The sieved material was examined by Mr. Muth to confirm the presence of *Branchinecta* eggs. The methods and results of the dry season survey were provided to the USFWS in a letter report dated September 30, 2020.

Egg hatching was conducted in the basement of LSA's Point Richmond office by Mr. Muth (TE-839213). Six 15-quart Sterilite tubs were each filled with two gallons of Arrowhead® spring water and placed in a cool area adjacent to a window. The blotter paper material containing the eggs was poured into the tubs on August 13, 2021. A mixture of yeast and fish food was provided daily beginning August 20, 2021. Animals were captured with an aquarium net and preserved in 95

1500 Iowa Avenue, Suite 200, Riverside, California 92507 951.781.9310 www.lsa.net

LSA is a business name of LSA Associates, Inc.

percent ethyl alcohol on September 4, 2021. All preserved specimens were examined under an Olympus 10-60 stereo-optic microscope to determine species.

RESULTS AND CONCLUSIONS

The only species of fairy shrimp identified in this study was the versatile fairy shrimp, *Branchinecta lindahli*. *Branchinecta* eggs were detected in the soil samples collected during both 2020 and 2021. All specimens raised and preserved were examined to ensure proper species identification. Eight of the preserved fairy shrimp were immature *Branchinecta* that could not be identified to species. All of the adult females possessed brood pouches, some with fertile eggs. The size and shape of brood pouches was consistent with those of female *Branchinecta lindahli*. All male specimens were identified as *Branchinecta lindahli based on* antennal morphology. Table A provides the numbers and sexes of fairy shrimp raised from eggs retrieved from the soil samples.

Table A: Characteristics of Features Sampled

Feature	Species	Females	Males	Immature	Total
1	*Branchinecta lindahli* (non-listed species)	13	8	8	29

The studies conducted to date have not found evidence of occupation of this feature by any threatened or endangered species.

Please contact me if you require any additional information.

Sincerely,

LSA ASSOCIATES, INC.

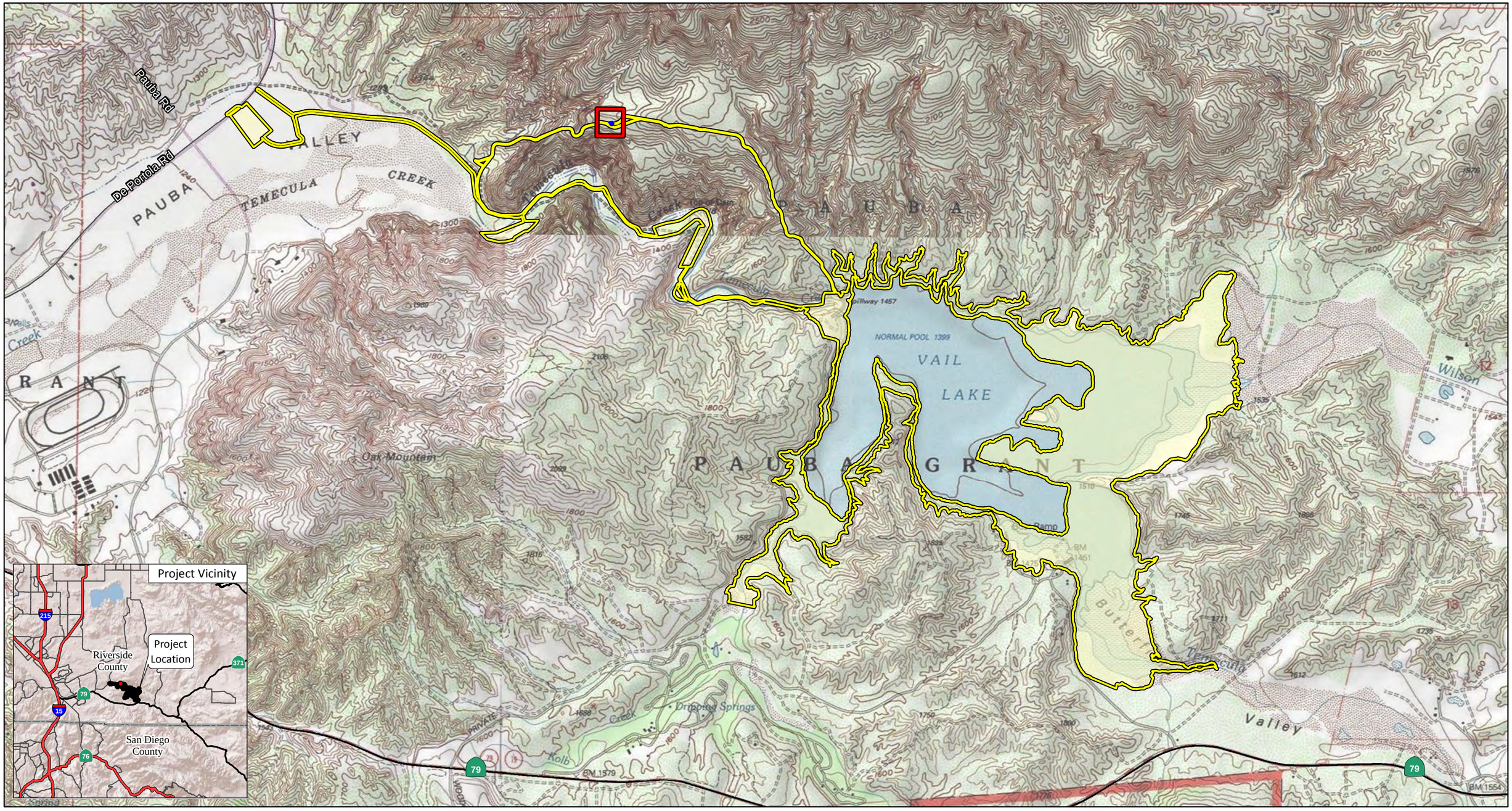
Stanley C. Spencer, Ph.D.
Associate/Senior Botanist

Attachments: Figure 1: Fairy Shrimp Survey Area
Figure 2: Feature Sampled

cc: Melody Aimar, Western Riverside County MSHCP Biological Monitoring Program

WE CERTIFY THAT THE INFORMATION IN THIS SURVEY REPORT AND ATTACHED EXHIBITS FULLY AND ACCURATELY REPRESENTS OUR WORK:

SURVEYOR:	PERMIT NUMBER	DATE:
Stanley Spencer	TE-777965	September 20, 2021
David Muth	TE-839213	September 20, 2021



LSA

LEGEND

- Project Location
- Fairy Shrimp Survey Area
- Potential Fairy Shrimp Habitat

0 1000 2000
FEET

FIGURE 1

Vail Dam Seismic and Hydrologic Remediation Project

Fairy Shrimp Survey Area

SOURCE: USGS 7.5' Quad - *Bachelor Mtn, CA* (1978), *Pechanga, CA* (1988), *Sage, CA* (1954), and *Vail Lake, CA* (1988)

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FIGURE 2

Vail Dam Seismic and Hydrologic Remediation Project

Feature Sampled

APPENDIX E

LEAST BELL'S VIREO AND SOUTHWESTERN WILLOW FLYCATCHER SURVEY RESULTS

CARLSBAD
FRESNO
IRVINE
LOS ANGELES
PALM SPRINGS
POINT RICHMOND
RIVERSIDE
ROSEVILLE
SAN LUIS OBISPO

December 8, 2020

Stacey Love, Recovery Permit Coordinator
United States Fish and Wildlife Service
Carlsbad Field Office
2177 Salk Avenue, Suite 250
Carlsbad, CA 92008

Justin Garcia, Environmental Scientist
Nongame Wildlife Program
California Department of Fish and Wildlife
1812 9th Street
Sacramento, CA 95811

Subject: Least Bell's Vireo and Southwestern Willow Flycatcher Survey Results for the Vail Dam Seismic and Hydrologic Remediation Project, Riverside County, California (LSA Project No. RCW1902)

Dear Ms. Love and Mr. Garcia:

This letter report documents the results of protocol surveys LSA conducted for the least Bell's vireo (*Vireo bellii pusillus*) and southwestern willow flycatcher (*Empidonax traillii extimus*). LSA conducted these surveys for the proposed Vail Dam Seismic and Hydrologic Remediation Project, located in the unincorporated Vail Lake area of Riverside County, California (Figure 1; all figures provided as Attachment A).

STUDY AREA

The approximately 602-acre study area is primarily undeveloped and consists of riparian habitats along the shore of Vail Lake, Temecula Creek upstream and downstream from Vail Lake, Arroyo Seco Creek upstream from Vail Lake, Wilson Creek upstream from Vail Lake, Temecula Creek Upstream from Vail Lake, and unnamed drainage features on the north side of Vail Lake. The study area was broken down into seven survey areas ranging from 30 to 123 acres in size. Figure 2 shows the study area and survey areas.

The predominant plant communities in riparian habitat within the survey area are riparian forest, riparian scrub, and alluvial fan sage scrub. Riparian forest predominates at the east end of the study area and south of the lake along the south shore and in Arroyo Seco and Temecula Creek. Riparian scrub predominates along the west, north, and east lake shores. Vegetation below the dam within Temecula Creek consists of a mixture of riparian forest, riparian scrub, and alluvial fan sage scrub. Dominant species in the riparian forest include black willow (*Salix gooddingii*) and Fremont cottonwood (*Populus fremontii*). Dominants in the riparian scrub include Mediterranean tamarisk (*Tamarix ramosissima*), mule fat (*Baccharis salicifolia*), narrowleaf willow (*Salix exigua*), and arrowweed (*Pluchea sericea*), with nearly pure stands of tamarisk covering large areas of this plant community along the eastern shore. Dominants in the alluvial fan sage scrub include California buckwheat (*Eriogonum fasciculatum*), big saltbush (*Atriplex lentiformis*), and scalebroom (*Lepidospartum squamatum*).

METHODS

LSA Biologists Richard Erickson, Jeremy Rosenthal, Dr. Stan Spencer, and Denise Woodard, with field assistance from Jessica Lieuw, conducted eight protocol least Bell's vireo surveys from April 23 through July 30, 2020. Five protocol southwestern willow flycatcher surveys were conducted by Richard Erickson and Denise Woodard, with field assistance from Lonnie Rodriguez, Jeremy Rosenthal, and Dr. Stan Spencer, concurrent with the least Bell's vireo surveys.

The biologists surveyed the study area on foot and by boat along the Vail Lake shoreline. During each of the surveys, the biologist(s) moved slowly along the edge of riparian habitat, listening for least Bell's vireos and southwestern willow flycatchers. A recording of southwestern willow flycatcher songs was played periodically along the survey route during all of the flycatcher surveys. The surveying biologist, with the aid of binoculars for viewing wildlife species, waited for several minutes after each playing to look and listen for both least Bell's vireos and southwestern willow flycatchers. On concurrent surveys, southwestern willow flycatchers were the focus of early morning/beginning of the surveys (from the starting point to the end point) and least Bell's vireo were the focus of the surveys back to the starting point.

Surveys were conducted pursuant to LSA's Federal 10(a)(1)(A) Permit TE-777965-11 (May 3, 2018–May 2, 2023) and a California Department of Fish and Wildlife attachment to Scientific Collecting Permit SC-000777 providing Conditions for Research on Listed Birds (November 29, 2012–January 31, 2017, renewal pending). Table A provides the survey dates, times, and weather conditions for each site visit.

Table A: Survey Dates, Times, and Weather Conditions

Date (2020)	Biologist(s)	Time (24-hour) Start/Finish	Weather Conditions[1]		
			Cloud Cover	Wind	Temperature
Arroyo Seco Creek and West Shore					
April 23	JR	0615/1055	0%	3–8	55–77°F
May 6	SS	0710/1100	10%	1–8	65–85°F
May 18	RE	0515/0835	mostly overcast with drizzle	calm	cool
June 2	RE	0510/0835	cloudy	light	cool
June 14	RE	0500/0815	clear to cloudy	light	45°F
June 26	RE	0510/0830	mostly clear to partly cloudy	light	cool
July 10	RE	0525/0850	clear	calm	cool
July 23	SS	0657/1100	0–15%	1–3	61–78°F
South Shore					
April 23	SS	0615/1055	0%	3–8 mph	55–77°F
May 6	JR	0630/1000	5–10%	0–5 mph	63–90°F
May 18	DW, SS	0445/0745	50%	1–3 mph	61–65°F
June 1	DW, SS	0530/0915	5%	calm	56–76°F
June 15	DW, SS	0500/0840	0%	<1 mph	61–69°F
July 1	DW, SS	0530/0820	100%	calm	60–65°F
July 13	DW, SS	0530/0940	0%	1–3 mph	62–86°F
July 24	SS	0620/1100	0%	1–8 mph	65–78°F

Table A: Survey Dates, Times, and Weather Conditions

Date (2020)	Biologist(s)	Time (24-hour) Start/Finish	Weather Conditions[1]		
			Cloud Cover	Wind	Temperature
East Shore					
April 29	JR	0630/1100	0–2%	0–3 mph	66–80°F
May 8	SS	0610/1100	0%	1–8 mph	65–92°F
May 19	DW, SS	0520/0745	15%	1–3 mph	62–66°F
June 2	DW, SS	0505/0830	20–60%	1–3 mph	60–78°F
June 16	DW, SS	0515/0800	100%	1–3 mph	61°F
June 30	DW, SS	0520/0930	25%	1–3 mph	55–72°F
July 14	DW, SS	0530/0840	40%	calm	59–70°F
July 28	SS	0635/0945	0%	1–8 mph	67–83°F
Wilson Creek					
April 29	SS	0720/1100	20–100%	1–8 mph	62–85°F
May 8	JR	0630/1100	10%	3 mph	63°F
May 19	RE	0515/0855	mostly clear	calm to light	cold to cool
June 3	RE	0505/0805	*partly cloudy*	calm	cool
June 15	RE	0515/0850	partly cloudy	calm	cool
June 28	RE	0510/0740	partly cloudy	light	cool
July 13	RE	0520/0805	clear	calm	51°F
July 30	SS	0710/1100	0%	1–3 mph	60–92°F
Temecula Creek Upstream of Vail Lake					
April 14	SS	0630/1100	0–5%	1–3 mph	60–74°F
April 27	SS	0635/1100	0%	1–8 mph	60–85°F
May 7	SS	0620/1100	5-10%	1–8 mph	62–92°F
May 20	RE	0510/0815	clear	calm	37°F
June 4	DW, SS	0515/0925	0%	1–3 mph	54–81°F
June 16	RE	0500/0750	low fog	calm to light	cool
July 1	RE	0510/0820	partly cloudy	calm	mild
July 15	RE, LR	0515/0850	partly cloudy	calm	cool
Temecula Creek Downstream Vail Lake					
April 17	SS, JR	0735/1100	30-–90%	1–10 mph	58–68°F
May 1	SS	0630/1100	30%	1–8 mph	63–70°F
May 11	SS	0645/1100	0%	1–8 mph	62–75°F
May 21	DW, JR	0520/0800	0%%	3–5 mph	56–60°F
June 5	RE	0505/0810	partly cloudy with mist	light	cool
June 18	DW, JR	0500/0720	100%	1–3 mph	58–59°F
July 2	DW, JR	0510/0730	100%	calm	63°F
July 17	DW, SS	0515/0720	0%	1–3 mph	62–64°F

Table A: Survey Dates, Times, and Weather Conditions

Date (2020)	Biologist(s)	Time (24-hour) Start/Finish	Weather Conditions[1]		
			Cloud Cover	Wind	Temperature
North Shore					
April 21	SS	0730/1100	90%	1–3 mph	55–68°F
May 1	JR	0630/1100	clear	0–5 mph	58–66°F
May 12	JR, JL	0730/1100	5%	<1 mph	50°F
May 22	DW, SS	0525/0830	0%	1–3 mph	53–67°F
June 5	DW, JR	0515/0800	overcast with drizzle	3–5 mph	58–61°F
June 19	DW, JR	0515/0800	100%	1–3 mph	56–62°F
July 3	DW, SS	0500/0820	0%	calm	55–75°F
July 15	DW, SS	0545/0930	30–100%	1-3 mph	57–72°F

Source: Compiled by LSA Associates, Inc. (2020).

[1] Weather condition descriptions vary by surveying biologist

°F = degrees Fahrenheit
DW = Denise Woodard
JL = Jessica Lieuw
JR = Jeremy Rosenthal
LR = Lonnie Rodriguez
mph = mile(s) per hour
RE = Richard Erickson
SS = Dr. Stan Spencer

RESULTS

Sixteen singing least Bell's vireos were detected during the surveys. The nesting status of these individuals was not determined.

Richard Erickson detected one singing southwestern willow flycatcher on June 24, 25, and 26 while conducting focused surveys for Los Angeles pocket mouse (*Perognathus longimembris brevinasus*) and Aguanga kangaroo rat (*Dipodomys merriami collinus*), and on July 1 during the subject survey efforts. Denise Woodard and Dr. Stan Spencer also observed this same individual southwestern willow flycatcher on July 1. There was no evidence of a female associated with this southwestern willow flycatcher. In addition, five little willow flycatchers (*Empidonax traillii brewsteri*) were detected responding to the recording on May 19 and 22 and June 16. Attachment B provides the Willow Flycatcher Survey and Detection Form.

Other special-status species observed during the survey were least bittern (*Ixobrychus exilis*), great blue heron (*Ardea herodias*), bald eagle (*Haliaeetus leucocephalus*), peregrine falcon (*Falco peregrinus*), loggerhead shrike (*Lanius ludovicianus*), purple martin (*Progne subis*), coastal California gnatcatcher (*Polioptila californica californica*), yellow-breasted chat (*Icteria virens*), southern California rufous-crowned sparrow (*Aimophila ruficeps*), Bell's sage sparrow (*Artemisiospiza belli*), tricolored blackbird (*Agelaius tricolor*), yellow warbler (*Dendroica petechial*), and summer tanager (*Piranga rubra*).

Figure 3 depicts the locations of the special-status bird species discussed above, with the exception of peregrine falcon, tricolored blackbird, Southern California rufous-crowned sparrow, and Bell's sage sparrow, which were observed at numerous locations within the study area. Attachment C provides a list of bird species observed, and Attachment D provides California Native Species Field Survey Forms for special-status bird species observed during the surveys.

Please contact me at (951) 781-9310 or at denise.woodard@lsa.net if you require any additional information.

Sincerely,

LSA ASSOCIATES, INC.

Denise Woodard
Associate/Senior Biologist

Attachments: A – Figures
B – Willow Flycatcher Survey and Detection Form
C – Bird Species Observed
D – California Native Species Field Survey Forms

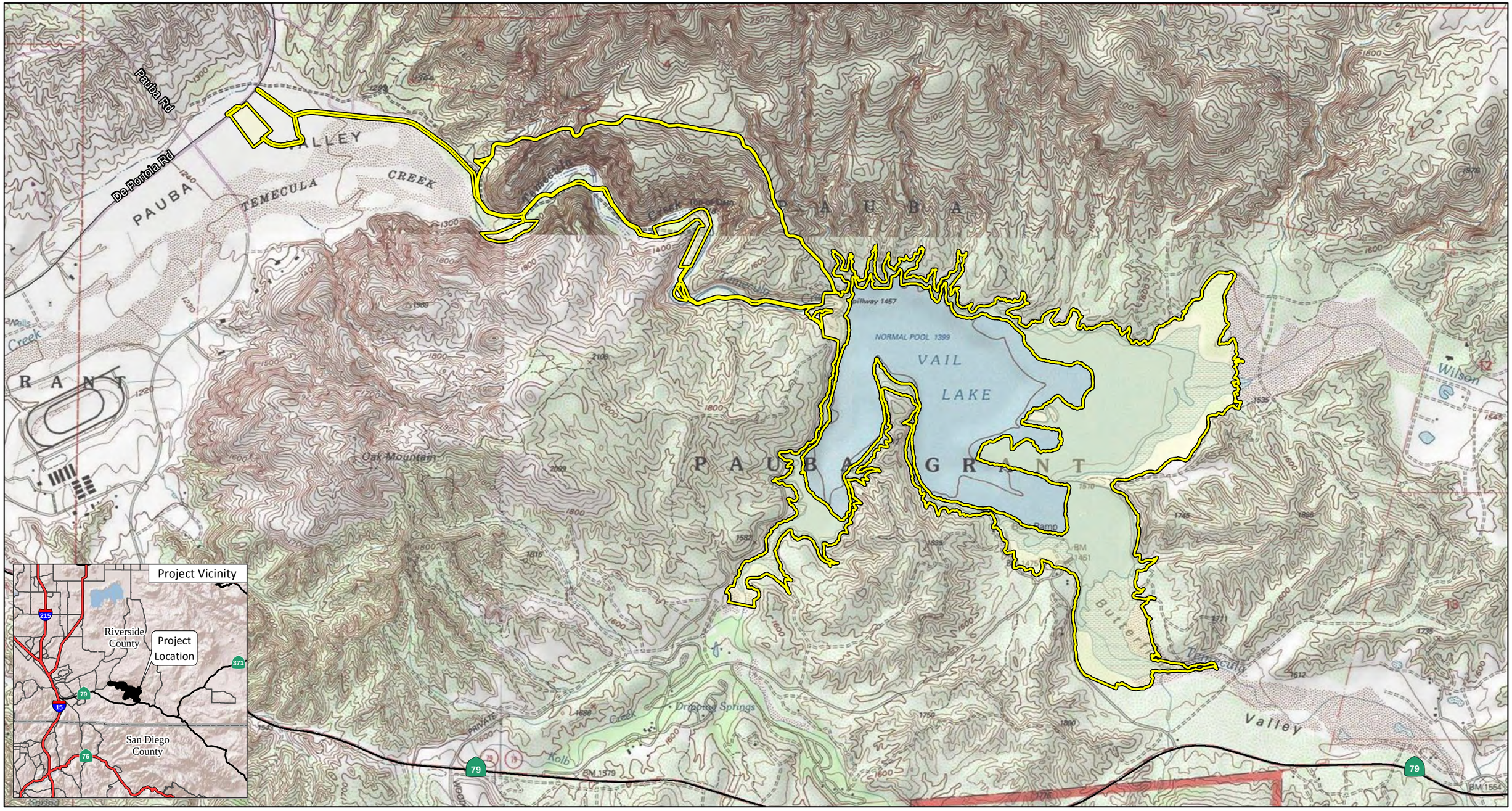
I CERTIFY THAT THE INFORMATION IN THIS SURVEY REPORT AND ATTACHED EXHIBITS FULLY AND ACCURATELY REPRESENTS MY WORK:

SURVEYOR:	PERMIT NUMBER	DATE:
Denise Woodard	TE-777965	December 8, 2020
Richard Erickson	TE-777965	December 8, 2020
Jeremy Rosenthal	TE-777965	December 8, 2020
Stan Spencer	TE-777965	December 8, 2020
Lonnie Rodriguez	TE-777965	December 8, 2020

ATTACHMENT A

FIGURES

Figure 1: Project Location
Figure 2. Study Area
Figure 3: Riparian Bird Survey Results



LSA

LEGEND

Project Location

FIGURE 1

0 1000 2000

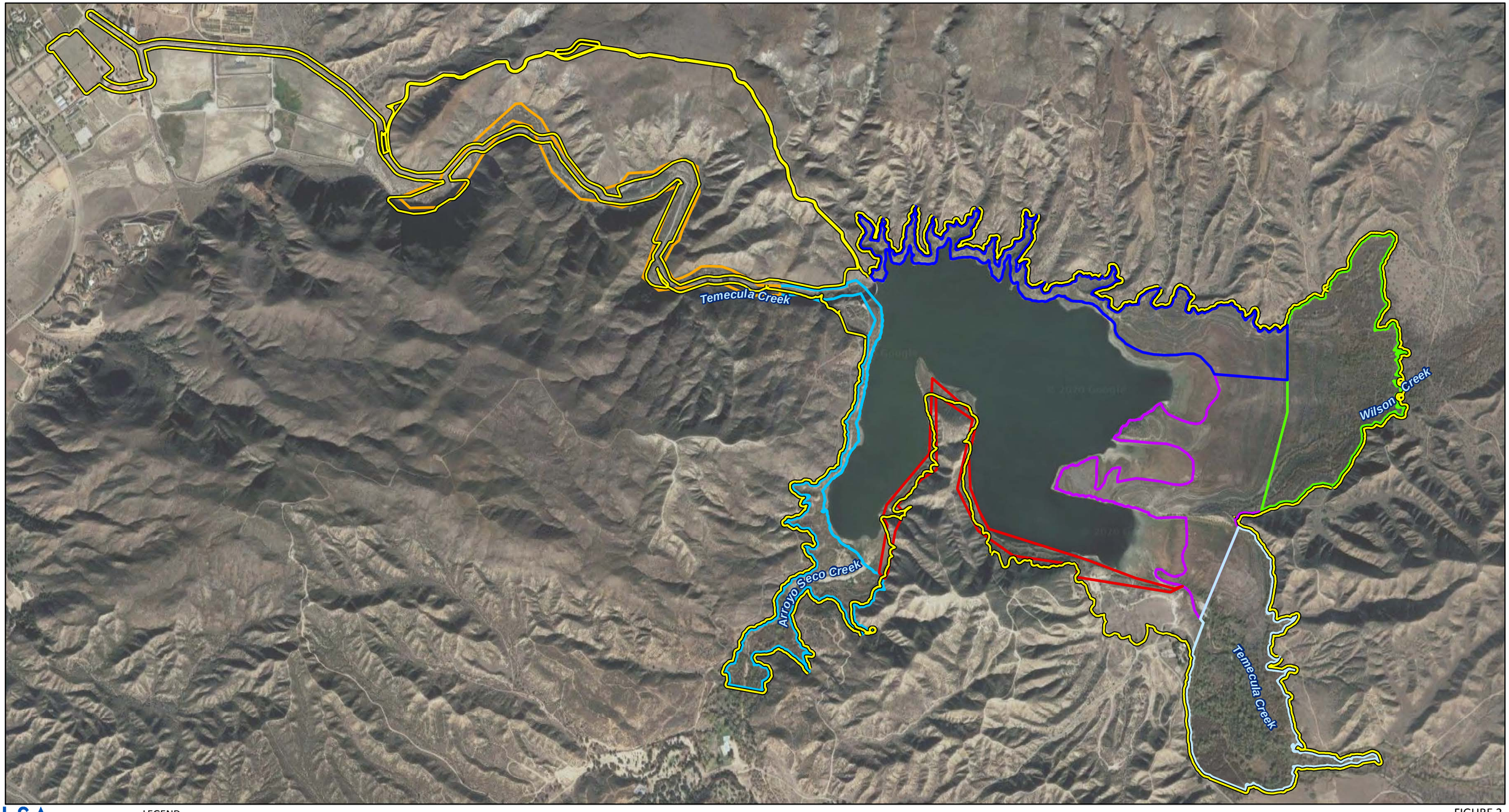
FEET

SOURCE: USGS 7.5' Quad - *Bachelor Mtn, CA* (1978), *Pechanga, CA* (1988), *Sage, CA* (1954), and *Vail Lake, CA* (1988)

I:\RCW1902\GIS\MXD\ProjectLocation_USGS.mxd (3/23/2020)

Vail Dam Seismic and Hydrologic Remediation Project

Project Location and Vicinity



LSA

LEGEND

Project Location

Survey Areas

- Arroyo Seco Creek and West Shore (64 acres)
- South Shore (30 acres)
- East Shore (120 acres)
- Wilson Creek (123 acres)
- Temecula Creek Upstream of Vail Lake (120 acres)
- Temecula Creek Downstream Vail Lake (63 acres)
- North Shore (82 acres)

N

0 750 1500
FEET

SOURCE: Google Maps (2019)

I:\RCW1902\GIS\MXD\Bio\RiparianBirds\RiparianBirdStudyArea.mxd (11/18/2020)

FIGURE 2

Vail Dam Seismic and Hydrologic Remediation Project

Study Area

Temecula Creek

LSA

LEGEND

Project Location

Riparian Bird Survey Results

- Bald eagle
- Coastal California gnatcatcher
- Great blue heron nest
- Least Bell's vireo
- Least bittern
- Little willow flycatcher (migrant)
- Loggerhead shrike
- Purple martin (migrant)
- Southwestern willow flycatcher
- Summer tanager
- White-tailed kite
- Yellow warbler
- Yellow-breasted chat

N

0 750 1500

FEET

SOURCE: Google Maps (2019); LSA UAV Imagery (2/2020 and 3/2020)

I:\RCW1902\GIS\MXD\Bio\RiparianBirds\RiparianBirdSurveyResults.mxd (11/20/2020)

FIGURE 3

Vail Dam Seismic and Hydrologic Remediation Project

Riparian Bird Survey Results

ATTACHMENT B

WILLOW FLYCATCHER SURVEY AND DETECTION FORM

Willow Flycatcher (WIFL) Survey and Detection Form (revised April, 2010)

Site Name: **Vail Dam Remediation Project** State: **California** County: **Riverside**

USGS Quad Name: **Vail Lake California** Elevation: **430** (meters)

Creek, River, or Lake Name: **East Shore of Vail Lake**

Is copy of USGS map marked with survey area and WIFL sightings attached (as required)? ***Yes*** **X** ***No*** ____

Survey Coordinates: Start: E **503585.00** N **3704720.00** UTM Datum: **WGS83** (See instructions)

Stop: E **503943.66** N **3705789.68** UTM Zone: **11**

If survey coordinates changed between visits, enter coordinates for each survey in comments section on back of this page.

*****Fill in additional site information on back of this page*****

Survey # Observer(s) (Full Name)	Date (m/d/y) Survey Time	Number of Adult WIFLs	Estimated Number of Pairs	Estimated Number of Territories	Nest(s) Found? Y or N If Yes, number of nests	Comments (e.g., bird behavior; evidence of pairs or breeding;-potential threats [livestock, cowbirds, *Diorhabda* spp.]). If *Diorhabda* found, contact USFWS and State WIFL coordinator.	GPS Coordinates for WIFL Detections (this is an optional column for documenting individuals, pairs, or groups of birds found on each survey). Include additional sheets if necessary.			
Survey # 1 Observer(s):	Date:5/19/2						# Birds	Sex	UTM E	UTM N
	Start:0520									
	Stop:0745	0	0	0	No					
	Total hrs: 2:25									
Survey # 2 Observer(s):	Date:6/2/20						# Birds	Sex	UTM E	UTM N
	Start:0505									
	Stop:0830	0	0	0	No					
	Total hrs: 3:25									
Survey # 3 Observer(s):	Date:6/16/2						# Birds	Sex	UTM E	UTM N
	Start:0515									
	Stop:0830	0	0	0	No					
	Total hrs: 3:15									
Survey # 4 Observer(s):	Date:6/30/2						# Birds	Sex	UTM E	UTM N
	Start:0520									
	Stop:0930	0	0	0	No					
	Total hrs: 4:10									
Survey # 5 Observer(s):	Date:7/14/2						# Birds	Sex	UTM E	UTM N
	Start:0530									
	Stop:0840	0	0	0	No					
	Total hrs: 3:10									
Overall Site Summary Totals do not equal the sum of each column. Include only resident adults. Do not include migrants, nestlings, and fledglings. Be careful not to double count individuals. Total survey hrs: 16.25		Total Adult Residents	Total Pairs	Total Territories	Total Nests	Were any WIFLs color-banded? Yes ____ No ____ If yes, report color combination(s) in the comments section on back of form and report to USFWS.				
		0	0	0	0					

Reporting Individual: **Denise Woodard** Date Report Completed: **11/23/2020**

US Fish & Wildlife Service Permit #: **TE-77965-11** State Wildlife Agency Permit #: **Permit SC-000777**

Submit form to USFWS and State Wildlife Agency by September 1st. Retain a copy for your records.

Fill in the following information completely. Submit form by September 1st. Retain a copy for your records.

Reporting Individual: **Denise Woodard** Phone #: **951-781-930**

Affiliation: **LSA Associates, Inc** E-mail: denise.woodard@lsa.net

Site Name: **Vail Dam Remediation Project** Date report Completed: **11/23/2020**

Was this site surveyed in a previous year? Yes____ No____ Unknown__X__

Did you verify that this site name is consistent with that used in previous yrs? Yes ____ No ____ Not Applicable **X**

If name is different, what name(s) was used in the past? ____

If site was surveyed last year, did you survey the same general area this year? Yes ____ No ____ If no, summarize below.

Did you survey the same general area during each visit to this site this year? Yes **X** No ____ If no, summarize below.

Management Authority for Survey Area: Federal ____ Municipal/County **X** State ____ Tribal ____ Private ____

Name of Management Entity or Owner (e.g., Tonto National Forest) **Rancho California Water District**

Length of area surveyed: **1.9** (km)

Vegetation Characteristics: Check (only one) category that best describes the predominant tree/shrub foliar layer at this site:

____ Native broadleaf plants (entirely or almost entirely, > 90% native)

X Mixed native and exotic plants (mostly native, 50 - 90% native)

____ Mixed native and exotic plants (mostly exotic, 50 - 90% exotic)

____ Exotic/introduced plants (entirely or almost entirely, > 90% exotic)

Identify the 2-3 predominant tree/shrub species in order of dominance. Use scientific name.

Salix gooddingii, Populus fremontii, Tamarix ramosissima

Average height of canopy (Do not include a range): **4.5** (meters)

Attach the following: 1) copy of USGS quad/topographical map (REQUIRED) of survey area, outlining survey site and location of WIFL detections;
2) sketch or aerial photo showing site location, patch shape, survey route, location of any detected WIFLs or their nests;
3) photos of the interior of the patch, exterior of the patch, and overall site. Describe any unique habitat features in Comments.

Comments (such as start and end coordinates of survey area if changed among surveys, supplemental visits to sites, unique habitat features. Attach additional sheets if necessary.

Territory Summary Table. Provide the following information for each verified territory at your site.

Territory Number	All Dates Detected	UTM E	UTM N	Pair Confirmed? Y or N	Nest Found? Y or N	Description of How You Confirmed Territory and Breeding Status (e.g., vocalization type, pair interactions, nesting attempts, behavior)

Attach additional sheets if necessary

Willow Flycatcher (WIFL) Survey and Detection Form (revised April, 2010)

Site Name: **Vail Dam Remediation Project** State: **California** County: **Riverside**

USGS Quad Name: **Vail Lake, Sage, Bachelor Mountain Califorina** Elevation: **430** (meters)

Creek, River, or Lake Name: **North Shore**

Is copy of USGS map marked with survey area and WIFL sightings attached (as required)? ***Yes*** **X** ***No*** ____

Survey Coordinates: Start: E **504909.44** N **3705814.20** UTM Datum: **WGS83** (See instructions)

Stop: E **502154.85** N **3706312.25** UTM Zone: **11**

If survey coordinates changed between visits, enter coordinates for each survey in comments section on back of this page.

*****Fill in additional site information on back of this page*****

Survey # Observer(s) (Full Name)	Date (m/d/y) Survey Time	Number of Adult WIFLs	Estimated Number of Pairs	Estimated Number of Territories	Nest(s) Found? Y or N If Yes, number of nests	Comments (e.g., bird behavior; evidence of pairs or breeding;-potential threats [livestock, cowbirds, *Diorhabda* spp.]). If *Diorhabda* found, contact USFWS and State WIFL coordinator.	GPS Coordinates for WIFL Detections (this is an optional column for documenting individuals, pairs, or groups of birds found on each survey). Include additional sheets if necessary.			
Survey # 1 Observer(s):	Date:5/22/2 Start:0525 Stop:0830 Total hrs: 3:05	3	0	0	No	Migrants - Empidonax traillii brewsteri responding to recording.	# Birds	Sex	UTM E	UTM N
							1	M	502426.08	3706441.49
							1	M	502271.7	3706419.28
							1	M	502158.01	3706462.03
Survey # 2 Observer(s):	Date:6/05/2 Start:0515 Stop:0800 Total hrs: 2:45	0	0	0	No		# Birds	Sex	UTM E	UTM N
Survey # 3 Observer(s):	Date:6/19/2 Start:0515 Stop:0800 Total hrs: 2:45	0	0	0	No		# Birds	Sex	UTM E	UTM N
Survey # 4 Observer(s):	Date:7/03/2 Start:0500 Stop:0820 Total hrs: 3:20	0	0	0	No		# Birds	Sex	UTM E	UTM N
Survey # 5 Observer(s):	Date:7/15/2 Start:0545 Stop:0930 Total hrs: 3:45	0	0	0	No		# Birds	Sex	UTM E	UTM N

Overall Site Summary Totals do not equal the sum of each column. Include only resident adults. Do not include migrants, nestlings, and fledglings. Be careful not to double count individuals. Total survey hrs: 15:40	Total Adult Residents	Total Pairs	Total Territories	Total Nests	Were any WIFLs color-banded? Yes ____ No **x** If yes, report color combination(s) in the comments section on back of form and report to USFWS.
	3	0	0	0	

Reporting Individual: **Denise Woodard** Date Report Completed: **11/23/2020**

US Fish & Wildlife Service Permit #: **TE-77965-11** State Wildlife Agency Permit #: **Permit SC-000777**

Submit ***form to USFWS and State Wildlife Agency by September 1st. Retain a copy for your records.***

Fill in the following information completely. Submit form by September 1st. Retain a copy for your records.

Reporting Individual: **Denise Woodard** Phone #: **951-781-930**

Affiliation: **LSA Associates, Inc** E-mail: denise.woodard@lsa.net

Site Name: **Vail Dam Remediation Project** Date report Completed: **11/23/2020**

Was this site surveyed in a previous year? Yes____ No____ Unknown__X__

Did you verify that this site name is consistent with that used in previous yrs? Yes ____ No ____ Not Applicable **X**

If name is different, what name(s) was used in the past?

If site was surveyed last year, did you survey the same general area this year? Yes ____ No ____ If no, summarize below.

Did you survey the same general area during each visit to this site this year? Yes **X** No ____ If no, summarize below.

Management Authority for Survey Area: Federal ____ Municipal/County **X** State ____ Tribal ____ Private ____

Name of Management Entity or Owner (e.g., Tonto National Forest) **Rancho California Water District**

Length of area surveyed: **2.24** (km)

Vegetation Characteristics: Check (only one) category that best describes the predominant tree/shrub foliar layer at this site:

____ Native broadleaf plants (entirely or almost entirely, > 90% native)

X Mixed native and exotic plants (mostly native, 50 - 90% native)

____ Mixed native and exotic plants (mostly exotic, 50 - 90% exotic)

____ Exotic/introduced plants (entirely or almost entirely, > 90% exotic)

Identify the 2-3 predominant tree/shrub species in order of dominance. Use scientific name.

Tamarix ramosissima, Baccharis salicifoli, Salix gooddigii

Average height of canopy (Do not include a range): **4.5** (meters)

Attach the following: 1) copy of USGS quad/topographical map (REQUIRED) of survey area, outlining survey site and location of WIFL detections;
2) sketch or aerial photo showing site location, patch shape, survey route, location of any detected WIFLs or their nests;
3) photos of the interior of the patch, exterior of the patch, and overall site. Describe any unique habitat features in Comments.

Comments (such as start and end coordinates of survey area if changed among surveys, supplemental visits to sites, unique habitat features. Attach additional sheets if necessary.

Territory Summary Table. Provide the following information for each verified territory at your site.

Territory Number	All Dates Detected	UTM E	UTM N	Pair Confirmed? Y or N	Nest Found? Y or N	Description of How You Confirmed Territory and Breeding Status (e.g., vocalization type, pair interactions, nesting attempts, behavior)

Attach additional sheets if necessary

Willow Flycatcher (WIFL) Survey and Detection Form (revised April, 2010)

Site Name: **Vail Dam Remediation Project** State: **California** County: **Riverside**

USGS Quad Name: **Vail Lake California** Elevation: **430** (meters)

Creek, River, or Lake Name: **South Shore of Vail Lake**

Is copy of USGS map marked with survey area and WIFL sightings attached (as required)? ***Yes*** **X** ***No*** ____

Survey Coordinates: Start: E **502154.89** N **3704862.00** UTM Datum: **WGS83** (See instructions)

Stop: E **503581.00** N **3704733.00** UTM Zone: **11**

If survey coordinates changed between visits, enter coordinates for each survey in comments section on back of this page.

*****Fill in additional site information on back of this page*****

Survey # Observer(s) (Full Name)	Date (m/d/y) Survey Time	Number of Adult WIFLs	Estimated Number of Pairs	Estimated Number of Territories	Nest(s) Found? Y or N If Yes, number of nests	Comments (e.g., bird behavior; evidence of pairs or breeding;-potential threats [livestock, cowbirds, *Diorhabda* spp.]). If *Diorhabda* found, contact USFWS and State WIFL coordinator.	GPS Coordinates for WIFL Detections (this is an optional column for documenting individuals, pairs, or groups of birds found on each survey). Include additional sheets if necessary.			
Survey # 1 Observer(s):	Date:5/18/2 Start:0445 Stop:074 Total hrs: 3:00	0	0	0	No		# Birds	Sex	UTM E	UTM N
Survey # 2 Observer(s):	Date:6/1/20 Start:0530 Stop:0915 Total hrs: 3:45	0	0	0	No		# Birds	Sex	UTM E	UTM N
Survey # 3 Observer(s):	Date:6/15/2 Start:0500 Stop:0840 Total hrs: 3:40	0	0	0	No		# Birds	Sex	UTM E	UTM N
Survey # 4 Observer(s):	Date:7/1/20 Start:0530 Stop:0820 Total hrs: 2:50	1	0	1	No	Empidonax traillii extimus -lone male vocalizing.	# Birds 1	Sex Male	UTM E 503656.11	UTM N 3704762.84
Survey # 5 Observer(s):	Date:7/13/2 Start:0530 Stop:0940 Total hrs: 4:10	0	0	0	No		# Birds	Sex	UTM E	UTM N
Overall Site Summary Totals do not equal the sum of each column. Include only resident adults. Do not include migrants, nestlings, and fledglings. Be careful not to double count individuals. Total survey hrs: 17.25		Total Adult Residents 1	Total Pairs 0	Total Territories 1	Total Nests 0	Were any WIFLs color-banded? Yes ____ No **x** If yes, report color combination(s) in the comments section on back of form and report to USFWS.				

Reporting Individual: **Denise Woodard** Date Report Completed: **11/23/2020**

US Fish & Wildlife Service Permit #: **TE-77965-11** State Wildlife Agency Permit #: **Permit SC-000777**

Submit form to USFWS and State Wildlife Agency by September 1st. Retain a copy for your records.

Fill in the following information completely. Submit form by September 1st. Retain a copy for your records.

Reporting Individual: **Denise Woodard** Phone #: **951-781-930**

Affiliation: **LSA Associates, Inc** E-mail: denise.woodard@lsa.net

Site Name: **Vail Dam Remediation Project** Date report Completed: **11/23/2020**

Was this site surveyed in a previous year? Yes____ No____ Unknown__X__

Did you verify that this site name is consistent with that used in previous yrs? Yes ____ No ____ Not Applicable **X**

If name is different, what name(s) was used in the past?

If site was surveyed last year, did you survey the same general area this year? Yes ____ No ____ If no, summarize below.

Did you survey the same general area during each visit to this site this year? Yes **X** No ____ If no, summarize below.

Management Authority for Survey Area: Federal ____ Municipal/County **X** State ____ Tribal ____ Private ____

Name of Management Entity or Owner (e.g., Tonto National Forest) **Rancho California Water District**

Length of area surveyed: **3.12** (km)

Vegetation Characteristics: Check (only one) category that best describes the predominant tree/shrub foliar layer at this site:

____ Native broadleaf plants (entirely or almost entirely, > 90% native)

X Mixed native and exotic plants (mostly native, 50 - 90% native)

____ Mixed native and exotic plants (mostly exotic, 50 - 90% exotic)

____ Exotic/introduced plants (entirely or almost entirely, > 90% exotic)

Identify the 2-3 predominant tree/shrub species in order of dominance. Use scientific name.

Salix gooddingii, Populus fremontii, Tamarix ramosissima

Average height of canopy (Do not include a range): **4.5** (meters)

Attach the following: 1) copy of USGS quad/topographical map (REQUIRED) of survey area, outlining survey site and location of WIFL detections;
2) sketch or aerial photo showing site location, patch shape, survey route, location of any detected WIFLs or their nests;
3) photos of the interior of the patch, exterior of the patch, and overall site. Describe any unique habitat features in Comments.

Comments (such as start and end coordinates of survey area if changed among surveys, supplemental visits to sites, unique habitat features. Attach additional sheets if necessary.

Territory Summary Table. Provide the following information for each verified territory at your site.

Territory Number	All Dates Detected	UTM E	UTM N	Pair Confirmed? Y or N	Nest Found? Y or N	Description of How You Confirmed Territory and Breeding Status (e.g., vocalization type, pair interactions, nesting attempts, behavior)
1	6/24/20, 6/25/20, 6/26/20 and 7/1/20	503656.11	3704762.84	N	N	Vocalizing - fitz bew call.

Attach additional sheets if necessary

Willow Flycatcher (WIFL) Survey and Detection Form (revised April, 2010)

Site Name: **Vail Dam Remediation Project** State: **California** County: **Riverside**

USGS Quad Name: **Vail Lake California** Elevation: **410** (meters)

Creek, River, or Lake Name: **Temecula Creek Downstream of Vail Lake**

Is copy of USGS map marked with survey area and WIFL sightings attached (as required)? ***Yes*** **X** ***No*** ____

Survey Coordinates: Start: E **499772.98** N **3706785.01** UTM Datum: **WGS83** (See instructions)

Stop: E **501669.28** N **3706281.43** UTM Zone: **11**

If survey coordinates changed between visits, enter coordinates for each survey in comments section on back of this page.

*****Fill in additional site information on back of this page*****

Survey # Observer(s) (Full Name)	Date (m/d/y) Survey Time	Number of Adult WIFLs	Estimated Number of Pairs	Estimated Number of Territories	Nest(s) Found? Y or N If Yes, number of nests	Comments (e.g., bird behavior; evidence of pairs or breeding;-potential threats [livestock, cowbirds, *Diorhabda* spp.]). If *Diorhabda* found, contact USFWS and State WIFL coordinator.	GPS Coordinates for WIFL Detections (this is an optional column for documenting individuals, pairs, or groups of birds found on each survey). Include additional sheets if necessary.			
Survey # 1 Observer(s):	Date:5/21/2	0	0	0	No		# Birds	Sex	UTM E	UTM N
	Start:0520									
	Stop:0800									
	Total hrs: 2:40									
Survey # 2 Observer(s):	Date:6/05/2	0	0	0	No		# Birds	Sex	UTM E	UTM N
	Start:0505									
	Stop:0810									
	Total hrs: 3:05									
Survey # 3 Observer(s):	Date:6/18/2	0	0	0	No		# Birds	Sex	UTM E	UTM N
	Start:0500									
	Stop:0720									
	Total hrs: 2:20									
Survey # 4 Observer(s):	Date:7/02/2	0	0	0	No		# Birds	Sex	UTM E	UTM N
	Start:0510									
	Stop:0730									
	Total hrs: 2:20									
Survey # 5 Observer(s):	Date:7/17/2	0	0	0	No		# Birds	Sex	UTM E	UTM N
	Start:0515									
	Stop:0720									
	Total hrs: 2:05									
Overall Site Summary Totals do not equal the sum of each column. Include only resident adults. Do not include migrants, nestlings, and fledglings. Be careful not to double count individuals. Total survey hrs: 12:30		Total Adult Residents: 0	Total Pairs: 0	Total Territories: 0	Total Nests: 0	Were any WIFLs color-banded? Yes ____ No ____ If yes, report color combination(s) in the comments section on back of form and report to USFWS.				

Reporting Individual: **Denise Woodard** Date Report Completed: **11/23/2020**

US Fish & Wildlife Service Permit #: **TE-77965-11** State Wildlife Agency Permit #: **Permit SC-000777**

Submit form to USFWS and State Wildlife Agency by September 1st. Retain a copy for your records.

Fill in the following information completely. Submit form by September 1st. Retain a copy for your records.

Reporting Individual: **Denise Woodard** Phone #: **951-781-930**

Affiliation: **LSA Associates, Inc** E-mail: denise.woodard@lsa.net

Site Name: **Vail Dam Remediation Project** Date report Completed: **11/23/2020**

Was this site surveyed in a previous year? Yes____ No____ Unknown__X__

Did you verify that this site name is consistent with that used in previous yrs? Yes ____ No ____ Not Applicable **X**

If name is different, what name(s) was used in the past?

If site was surveyed last year, did you survey the same general area this year? Yes ____ No ____ If no, summarize below.

Did you survey the same general area during each visit to this site this year? Yes **X** No ____ If no, summarize below.

Management Authority for Survey Area: Federal ____ Municipal/County **X** State ____ Tribal ____ Private ____

Name of Management Entity or Owner (e.g., Tonto National Forest) **Rancho California Water District**

Length of area surveyed: **2.78** (km)

Vegetation Characteristics: Check (only one) category that best describes the predominant tree/shrub foliar layer at this site:

____ Native broadleaf plants (entirely or almost entirely, > 90% native)

X Mixed native and exotic plants (mostly native, 50 - 90% native)

____ Mixed native and exotic plants (mostly exotic, 50 - 90% exotic)

____ Exotic/introduced plants (entirely or almost entirely, > 90% exotic)

Identify the 2-3 predominant tree/shrub species in order of dominance. Use scientific name.

Salix gooddingii, Salix exigua, Pluchea sericea

Average height of canopy (Do not include a range): **3.6** (meters)

Attach the following: 1) copy of USGS quad/topographical map (REQUIRED) of survey area, outlining survey site and location of WIFL detections;
2) sketch or aerial photo showing site location, patch shape, survey route, location of any detected WIFLs or their nests;
3) photos of the interior of the patch, exterior of the patch, and overall site. Describe any unique habitat features in Comments.

Comments (such as start and end coordinates of survey area if changed among surveys, supplemental visits to sites, unique habitat features. Attach additional sheets if necessary.

Territory Summary Table. Provide the following information for each verified territory at your site.

Territory Number	All Dates Detected	UTM E	UTM N	Pair Confirmed? Y or N	Nest Found? Y or N	Description of How You Confirmed Territory and Breeding Status (e.g., vocalization type, pair interactions, nesting attempts, behavior)

Attach additional sheets if necessary

Willow Flycatcher (WIFL) Survey and Detection Form (revised April, 2010)

Site Name: **Vail Dam Remediation Project** State: **California** County: **Riverside**

USGS Quad Name: **Vail Lake California** Elevation: **430** (meters)

Creek, River, or Lake Name: **Arroyo Seco Creek and West Shore of Vail Lake**

Is copy of USGS map marked with survey area and WIFL sightings attached (as required)? ***Yes*** **X** ***No*** ____

Survey Coordinates: Start: E **501727.54** N **3706263.29** UTM Datum: **WGS83** (See instructions)

Stop: E **501459.53** N **3722509.79** UTM Zone: **11**

If survey coordinates changed between visits, enter coordinates for each survey in comments section on back of this page.

*****Fill in additional site information on back of this page*****

Survey # Observer(s) (Full Name)	Date (m/d/y) Survey Time	Number of Adult WIFLs	Estimated Number of Pairs	Estimated Number of Territories	Nest(s) Found? Y or N If Yes, number of nests	Comments (e.g., bird behavior; evidence of pairs or breeding;-potential threats [livestock, cowbirds, *Diorhabda* spp.]). If *Diorhabda* found, contact USFWS and State WIFL coordinator.	GPS Coordinates for WIFL Detections (this is an optional column for documenting individuals, pairs, or groups of birds found on each survey). Include additional sheets if necessary.			
Survey # 1 Observer(s):	Date:5/18/2 Start:0515 Stop:0835 Total hrs: 3:20	0	0	0	No		# Birds	Sex	UTM E	UTM N
Survey # 2 Observer(s):	Date:6/2/20 Start:0510 Stop:0835 Total hrs: 3:15	0	0	0	No		# Birds	Sex	UTM E	UTM N
Survey # 3 Observer(s):	Date:6/14/2 Start:0500 Stop:0815 Total hrs: 3:15	0	0	0	No		# Birds	Sex	UTM E	UTM N
Survey # 4 Observer(s):	Date:6/26/2 Start:0510 Stop:0830 Total hrs: 3:20	0	0	0	No		# Birds	Sex	UTM E	UTM N
Survey # 5 Observer(s):	Date:7/10/2 Start:0525 Stop:0850 Total hrs: 3:15	0	0	0	No		# Birds	Sex	UTM E	UTM N
Overall Site Summary Totals do not equal the sum of each column. Include only resident adults. Do not include migrants, nestlings, and fledglings. Be careful not to double count individuals. Total survey hrs: 16.25		Total Adult Residents: 0	Total Pairs: 0	Total Territories: 0	Total Nests: 0	Were any WIFLs color-banded? Yes ____ No ____ If yes, report color combination(s) in the comments section on back of form and report to USFWS.				

Reporting Individual: **Richard Erickson** Date Report Completed: **11/23/2020**

US Fish & Wildlife Service Permit #: **TE-77965-11** State Wildlife Agency Permit #: **Permit SC-000777**

Submit ***form to USFWS and State Wildlife Agency by September 1st. Retain a copy for your records.***

Fill in the following information completely. Submit form by September 1st. Retain a copy for your records.

Reporting Individual: **Richard Erickson** Phone #: **949-553-0666**

Affiliation: **LSA Associates, Inc** E-mail: richard.erickson@lsa.net

Site Name: **Vail Dam Remediation Project** Date report Completed: **11/23/2020**

Was this site surveyed in a previous year? Yes____ No____ Unknown__X__

Did you verify that this site name is consistent with that used in previous yrs? Yes ____ No ____ Not Applicable **X**

If name is different, what name(s) was used in the past? ____

If site was surveyed last year, did you survey the same general area this year? Yes ____ No ____ If no, summarize below.

Did you survey the same general area during each visit to this site this year? Yes **X** No ____ If no, summarize below.

Management Authority for Survey Area: Federal ____ Municipal/County **X** State ____ Tribal ____ Private ____

Name of Management Entity or Owner (e.g., Tonto National Forest) **Rancho California Water District**

Length of area surveyed: **2.8** (km)

Vegetation Characteristics: Check (only one) category that best describes the predominant tree/shrub foliar layer at this site:

____ Native broadleaf plants (entirely or almost entirely, > 90% native)

X Mixed native and exotic plants (mostly native, 50 - 90% native)

____ Mixed native and exotic plants (mostly exotic, 50 - 90% exotic)

____ Exotic/introduced plants (entirely or almost entirely, > 90% exotic)

Identify the 2-3 predominant tree/shrub species in order of dominance. Use scientific name.

Salix gooddingii, Populus fremontii, Tamarix ramosissima

Average height of canopy (Do not include a range): **4.5** (meters)

Attach the following: 1) copy of USGS quad/topographical map (REQUIRED) of survey area, outlining survey site and location of WIFL detections;
2) sketch or aerial photo showing site location, patch shape, survey route, location of any detected WIFLs or their nests;
3) photos of the interior of the patch, exterior of the patch, and overall site. Describe any unique habitat features in Comments.

Comments (such as start and end coordinates of survey area if changed among surveys, supplemental visits to sites, unique habitat features. Attach additional sheets if necessary.

Territory Summary Table. Provide the following information for each verified territory at your site.

Territory Number	All Dates Detected	UTM E	UTM N	Pair Confirmed? Y or N	Nest Found? Y or N	Description of How You Confirmed Territory and Breeding Status (e.g., vocalization type, pair interactions, nesting attempts, behavior)

Attach additional sheets if necessary

Willow Flycatcher (WIFL) Survey and Detection Form (revised April, 2010)

Site Name: **Vail Dam Remediation Project** State: **California** County: **Riverside**

USGS Quad Name: **Vail Lake California** Elevation: **445** (meters)

Creek, River, or Lake Name: **Temecula Creek Upstream of Vail Lake**

Is copy of USGS map marked with survey area and WIFL sightings attached (as required)? ***Yes*** **X** ***No*** ____

Survey Coordinates: Start: E **503755.00** N **3704691.00** UTM Datum: **WGS83** (See instructions)

Stop: E **504573.82** N **3703913.17** UTM Zone: **11**

If survey coordinates changed between visits, enter coordinates for each survey in comments section on back of this page.

*****Fill in additional site information on back of this page*****

Survey # Observer(s) (Full Name)	Date (m/d/y) Survey Time	Number of Adult WIFLs	Estimated Number of Pairs	Estimated Number of Territories	Nest(s) Found? Y or N If Yes, number of nests	Comments (e.g., bird behavior; evidence of pairs or breeding;-potential threats [livestock, cowbirds, *Diorhabda* spp.]). If *Diorhabda* found, contact USFWS and State WIFL coordinator.	GPS Coordinates for WIFL Detections (this is an optional column for documenting individuals, pairs, or groups of birds found on each survey). Include additional sheets if necessary.			
Survey # 1	Date:5/20/2						# Birds	Sex	UTM E	UTM N
Observer(s):										
	Start:0510									
		0	0	0	No					
	Stop:0815									
	Total hrs: 3:10									
Survey # 2	Date:6/4/20						# Birds	Sex	UTM E	UTM N
Observer(s):										
	Start:0515									
		0	0	0	No					
	Stop:0925									
	Total hrs: 2:24									
Survey # 3	Date:6/16/2						# Birds	Sex	UTM E	UTM N
Observer(s):							1	M	504055.52	3704608.58
	Start:0500									
		1	0	0	No					
	Stop:0750									
	Total hrs: 2:50									
Survey # 4	Date:7/01/2						# Birds	Sex	UTM E	UTM N
Observer(s):							1	M	503656.11	3704762.84
	Start:0510									
		1	0	1	No	Empidonax traillii extimus - lone male vocalizing				
	Stop:0820									
	Total hrs: 3:10									
Survey # 5	Date:7/15/2						# Birds	Sex	UTM E	UTM N
Observer(s):										
	Start:0515									
		0	0	0	No					
	Stop:0850									
	Total hrs: 3:35									
Overall Site Summary Totals do not equal the sum of each column. Include only resident adults. Do not include migrants, nestlings, and fledglings. Be careful not to double count individuals. Total survey hrs: 16:55		Total Adult Residents	Total Pairs	Total Territories	Total Nests	Were any WIFLs color-banded? Yes ____ No **X** If yes, report color combination(s) in the comments section on back of form and report to USFWS.				
		2	0	1	0					

Reporting Individual: **Richard Erickson** Date Report Completed: **11/23/2020**

US Fish & Wildlife Service Permit #: **TE-77965-11** State Wildlife Agency Permit #: **Permit SC-000777**

Submit ***form to USFWS and State Wildlife Agency by September 1st. Retain a copy for your records.***

Fill in the following information completely. Submit form by September 1st. Retain a copy for your records.

Reporting Individual: **Richard Erickson** Phone #: **949-553-0666**

Affiliation: **LSA Associates, Inc** E-mail: richard.erickson@lsa.net

Site Name: **Vail Dam Remediation Project** Date report Completed: **11/23/2020**

Was this site surveyed in a previous year? Yes____ No____ Unknown__X__

Did you verify that this site name is consistent with that used in previous yrs? Yes ____ No ____ Not Applicable **X**

If name is different, what name(s) was used in the past?

If site was surveyed last year, did you survey the same general area this year? Yes ____ No ____ If no, summarize below.

Did you survey the same general area during each visit to this site this year? Yes **X** No ____ If no, summarize below.

Management Authority for Survey Area: Federal ____ Municipal/County **X** State ____ Tribal ____ Private ____

Name of Management Entity or Owner (e.g., Tonto National Forest) **Rancho California Water District**

Length of area surveyed: **1.35** (km)

Vegetation Characteristics: Check (only one) category that best describes the predominant tree/shrub foliar layer at this site:

____ Native broadleaf plants (entirely or almost entirely, > 90% native)

X Mixed native and exotic plants (mostly native, 50 - 90% native)

____ Mixed native and exotic plants (mostly exotic, 50 - 90% exotic)

____ Exotic/introduced plants (entirely or almost entirely, > 90% exotic)

Identify the 2-3 predominant tree/shrub species in order of dominance. Use scientific name.

Salix gooddingii, Populus fremontii, Baccharis salicifolia

Average height of canopy (Do not include a range): **6.1** (meters)

Attach the following: 1) copy of USGS quad/topographical map (REQUIRED) of survey area, outlining survey site and location of WIFL detections;
2) sketch or aerial photo showing site location, patch shape, survey route, location of any detected WIFLs or their nests;
3) photos of the interior of the patch, exterior of the patch, and overall site. Describe any unique habitat features in Comments.

Comments (such as start and end coordinates of survey area if changed among surveys, supplemental visits to sites, unique habitat features. Attach additional sheets if necessary.

Territory Summary Table. Provide the following information for each verified territory at your site.

Territory Number	All Dates Detected	UTM E	UTM N	Pair Confirmed? Y or N	Nest Found? Y or N	Description of How You Confirmed Territory and Breeding Status (e.g., vocalization type, pair interactions, nesting attempts, behavior)
1	7/1/20	503656.11	3704608.58	N	N	Vocalizing - fitz bew call.

Attach additional sheets if necessary

Willow Flycatcher (WIFL) Survey and Detection Form (revised April, 2010)

Site Name: **Vail Dam Remediation Project** State: **California** County: **Riverside**

USGS Quad Name: **Vail Lake California** Elevation: **445** (meters)

Creek, River, or Lake Name: **Arroyo Seco Creek and West Shore of Vail Lake**

Is copy of USGS map marked with survey area and WIFL sightings attached (as required)? ***Yes*** **X** ***No*** ____

Survey Coordinates: Start: E **504039.04** N **3705152.40** UTM Datum: **WGS83** (See instructions)

Stop: E **504656.81** N **3806484.24** UTM Zone: **11**

If survey coordinates changed between visits, enter coordinates for each survey in comments section on back of this page.

*****Fill in additional site information on back of this page*****

Survey # Observer(s) (Full Name)	Date (m/d/y) Survey Time	Number of Adult WIFLs	Estimated Number of Pairs	Estimated Number of Territories	Nest(s) Found? Y or N If Yes, number of nests	Comments (e.g., bird behavior; evidence of pairs or breeding;-potential threats [livestock, cowbirds, *Diorhabda* spp.]). If *Diorhabda* found, contact USFWS and State WIFL coordinator.	GPS Coordinates for WIFL Detections (this is an optional column for documenting individuals, pairs, or groups of birds found on each survey). Include additional sheets if necessary.			
Survey # 1 Observer(s):	Date:5/19/2 Start:0515 Stop:0855 Total hrs: 3:40	1	0	0	No	Migrant - Empidonax traillii brewsteri responding to recording.	# Birds	Sex	UTM E	UTM N
							1	M	504409.56	3705349.35
Survey # 2 Observer(s):	Date:6/3/20 Start:0505 Stop:0805 Total hrs: 3:00	0	0	0	No		# Birds	Sex	UTM E	UTM N
Survey # 3 Observer(s):	Date:6/15/2 Start:0515 Stop:0850 Total hrs: 3:35	0	0	0	No		# Birds	Sex	UTM E	UTM N
Survey # 4 Observer(s):	Date:6/28/2 Start:0510 Stop:0740 Total hrs: 2:30	0	0	0	No		# Birds	Sex	UTM E	UTM N
Survey # 5 Observer(s):	Date:7/13/2 Start:0520 Stop:0805 Total hrs: 2:45	0	0	0	No		# Birds	Sex	UTM E	UTM N
Overall Site Summary Totals do not equal the sum of each column. Include only resident adults. Do not include migrants, nestlings, and fledglings. Be careful not to double count individuals. Total survey hrs: 15:30		Total Adult Residents	Total Pairs	Total Territories	Total Nests	Were any WIFLs color-banded? Yes ____ No **X** If yes, report color combination(s) in the comments section on back of form and report to USFWS.				
		1	0	0	0					

Reporting Individual: **Richard Erickson** Date Report Completed: **11/23/2020**

US Fish & Wildlife Service Permit #: **TE-77965-11** State Wildlife Agency Permit #: **Permit SC-000777**

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Fill in the following information completely. Submit form by September 1st. Retain a copy for your records.

Reporting Individual: **Richard Erickson** Phone #: **949-553-0666**

Affiliation: **LSA Associates, Inc** E-mail: richard.erickson@lsa.net

Site Name: **Vail Dam Remediation Project** Date report Completed: **11/23/2020**

Was this site surveyed in a previous year? Yes____ No____ Unknown__X__

Did you verify that this site name is consistent with that used in previous yrs? Yes ____ No ____ Not Applicable **X**

If name is different, what name(s) was used in the past?

If site was surveyed last year, did you survey the same general area this year? Yes ____ No ____ If no, summarize below.

Did you survey the same general area during each visit to this site this year? Yes **X** No ____ If no, summarize below.

Management Authority for Survey Area: Federal ____ Municipal/County **X** State ____ Tribal ____ Private ____

Name of Management Entity or Owner (e.g., Tonto National Forest) **Rancho California Water District**

Length of area surveyed: **1.5** (km)

Vegetation Characteristics: Check (only one) category that best describes the predominant tree/shrub foliar layer at this site:

____ Native broadleaf plants (entirely or almost entirely, > 90% native)

X Mixed native and exotic plants (mostly native, 50 - 90% native)

____ Mixed native and exotic plants (mostly exotic, 50 - 90% exotic)

____ Exotic/introduced plants (entirely or almost entirely, > 90% exotic)

Identify the 2-3 predominant tree/shrub species in order of dominance. Use scientific name.

Tamarix ramosissima, Baccharis salicifolia, Salix exigua

Average height of canopy (Do not include a range): **3.6** (meters)

Attach the following: 1) copy of USGS quad/topographical map (REQUIRED) of survey area, outlining survey site and location of WIFL detections;
2) sketch or aerial photo showing site location, patch shape, survey route, location of any detected WIFLs or their nests;
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Territory Summary Table. Provide the following information for each verified territory at your site.

Territory Number	All Dates Detected	UTM E	UTM N	Pair Confirmed? Y or N	Nest Found? Y or N	Description of How You Confirmed Territory and Breeding Status (e.g., vocalization type, pair interactions, nesting attempts, behavior)

Attach additional sheets if necessary

ATTACHMENT C

BIRD SPECIES OBSERVED

BIRD SPECIES OBSERVED

Scientific Name	Common Name
Anatidae	**Swans, Geese, and Ducks**
Mareca strepera	Gadwall
Anas platyrhynchos	Mallard
Oxyura jamaicensis	Ruddy duck
Odontophoridae	**New World Quail**
Callipepla californica	California quail
Phasianidae	**Pheasants**
Meleagris gallopavo (nonnative species)	Wild turkey
Podicipedidae	**Grebes**
Podilymbus podiceps	Pied-billed grebe
Podiceps nigricollis	Eared grebe
Aechmophorus occidentalis	Western grebe
Aechmophorus clarkii	Clark's grebe
Columbidae	**Pigeons and Doves**
Streptopelia decaocto (non-native species)	Eurasian collared dove
Zenaida asiatica	White-winged dove
Zenaida macroura	Mourning dove
Cuculidae	**Cuckoos and Roadrunners**
Geococcyx californianus	Greater roadrunner
Caprimulgidae	**Goatsuckers**
Chordeiles acutipennis	Lesser nighthawk
Phalaenoptilus nuttallii	Common poorwill
Apodidae	**Swifts**
Aeronautes saxatalis	White-throated swift
Trochilidae	**Hummingbirds**
Archilochus alexandri	Black-chinned hummingbird
Calypte anna	Anna's hummingbird
Calypte costae	Costa's hummingbird
Selasphorus rufus/sasin	Rufous/Allen's hummingbird
Rallidae	**Rails and Gallinules**
Gallinula galeata	Common gallinule
Fulica americana	American coot
Charadriidae	**Plovers and Lapwings**
Charadrius vociferus	Killdeer
Scolopacidae	**Sandpipers**
Actitis macularius	Spotted sandpiper
Tringa melanoleuca	Greater yellowlegs

BIRD SPECIES OBSERVED

Scientific Name	Common Name
Laridae	**Skuas, Gulls, Terns, Skimmers**
Sterna caspia	Caspian tern
Sterna forsteri	Forster's tern
Phalacrocoracidae	**Cormorant**
Phalacrocorax auritus	Double-crested cormorant
Ardeidae	**Herons, Egrets, and Bitterns**
Ixobrychus exilis	Least bittern
Ardea herodias	Great blue heron
Ardea alba	Great egret
Egretta thula	Snowy egret
Butorides virescens	Green heron
Nycticorax nycticorax	Black-crowned night-heron
Threskiornithidae	**Ibises and Spoonbills**
Plegadis chihi	White-faced ibis
Cathartidae	**American Vultures**
Cathartes aura	Turkey vulture
Accipitridae	**Kites, Hawks, and Eagles**
Elanus leucurus	White-tailed kite
Haliaeetus leucocephalus	Bald eagle
Accipiter cooperii	Cooper's hawk
Accipiter striatus	Sharp-shinned hawk
Buteo lineatus	Red-shouldered hawk
Buteo jamaicensis	Red-tailed hawk
Aquila chrysaetos	Golden eagle
Tytonidae	**Barn Owls**
Tyto alba	Barn owl
Strigidae	**Typical Owls**
Bubo virginianus	Great horned owl
Picidae	**Woodpeckers**
Melanerpes formicivorus	Acorn woodpecker
Picoides nuttallii	Nuttall's woodpecker
Picoides pubescens	Downy woodpecker
Colaptes auratus	Northern flicker
Falconidae	**Falcons**
Falco sparverius	American kestrel
Falco peregrinus	Peregrine falcon

BIRD SPECIES OBSERVED

Scientific Name	Common Name
Tyrannidae	**Tyrant Flycatchers**
Empidonax traillii brewsteri	Little willow flycatcher
Empidonax traillii extimus	Southwestern willow flycatcher
Sayornis nigricans	Black phoebe
Myiarchus cinerascens	Ash-throated flycatcher
Tyrannus vociferans	Cassin's kingbird
Tyrannus verticalis	Western kingbird
Laniidae	**Shrikes**
Lanius ludovicianus	Loggerhead shrike
Vireonidae	**Vireos**
Vireo bellii pusillus	Least Bell's vireo
Vireo gilvus	Warbling vireo
Corvidae	**Crows and Ravens**
Aphelocoma californica	California scrub-jay
Corvus brachyrhynchos	American crow
Corvus corax	Common raven
Alaudidae	**Larks**
Eremophila alpestris	Horned lark
Hirundinidae	**Swallows**
Tachycineta bicolor	Tree swallow
Stelgidopteryx serripennis	Northern rough-winged swallow
Progne subis	Purple martin
Petrochelidon pyrrhonota	Cliff swallow
Paridae	**Titmice**
Baeolophus inornatus	Oak titmouse
Aegithalidae	**Bushtits**
Psaltriparus minimus	Bushtit
Sittidae	**Nuthatches**
Sitta carolinensis	White-breasted nuthatch
Troglodytidae	**Wrens**
Salpinctes obsoletus	Rock wren
Catherpes mexicanus	Canyon wren
Thryomanes bewickii	Bewick's wren
Troglodytes aedon	House wren
Campylorhynchus brunneicapillus	Cactus wren
Polioptilidae	**Gnatcatchers and Gnatwrens**
Polioptila caerulea	Blue-gray gnatcatcher
Polioptila californica californica	Coastal California gnatcatcher

BIRD SPECIES OBSERVED

Scientific Name	Common Name
Sylviidae	**Sylviid Warblers**
Chamaea fasciata	Wrentit
Turdidae	**Thrushes**
Sialia mexicana	Western bluebird
Turdus migratorius	American robin
Mimidae	**Mockingbirds and Thrashers**
Mimus polyglottos	Northern mockingbird
Toxostoma redivivum	California thrasher
Sturnidae	**Starlings**
Sturnus vulgaris (non-native species)	European starling
Ptilogonatidae	**Silky flycatchers**
Phainopepla nitens	Phainopepla
Fringillidae	**Finches**
Haemorhous mexicanus	House finch
Spinus psaltria	Lesser goldfinch
Carduelis lawrencei	Lawrence's goldfinch
Carduelis tristis	American goldfinch
Passerellidae	**New World Sparrows**
Pipilo maculatus	Spotted towhee
Aimophila ruficeps	Southern California rufous-crowned sparrow
Melozone crissalis	California towhee
Spizella atrogularis	Black-chinned sparrow
Chondestes grammacus	Lark sparrow
Artemisiospiza belli	Bell's sparrow
Melospiza melodia	Song sparrow
Icteriidae	**Yellow-breasted Chats**
Icteria virens	Yellow-breasted chat
Icteridae	**Blackbirds, Orioles and Allies**
Icterus cucullatus	Hooded oriole
Icterus bullockii	Bullock's oriole
Agelaius phoeniceus	Red-winged blackbird
Agelaius tricolor	Tricolored blackbird
Molothrus ater	Brown-headed cowbird
Euphagus cyanocephalus	Brewer's blackbird
Quiscalus mexicanus	Great-tailed grackle

BIRD SPECIES OBSERVED

Scientific Name	Common Name
Parulidae	**Wood Warblers**
Oreothlypis celata	Orange-crowned warbler
Geothlypis trichas	Common yellowthroat
Setophaga ruticilla	American redstart
Setophaga petechia	Yellow warbler
Setophaga townsendi	Townsend's warbler
Cardellina pusilla	Wilson's warbler
Cardinalidae	**Cardinals, Grosbeaks, and Allies**
Piranga rubra	Summer tanager
Piranga ludoviciana	Western tanager
Pheucticus melanocephalus	Black-headed grosbeak
Passerina caerulea	Blue grosbeak
Passerina amoena	Lazuli bunting

ATTACHMENT D

CALIFORNIA NATIVE SPECIES FIELD SURVEY FORMS

Mail to:
California Natural Diversity Database
California Dept. of Fish & Wildlife
P.O. Box 944209
Sacramento, CA 94244-2090
CNDDB@wildlife.ca.gov

For Office Use Only
Source Code: _____ Quad Code: _____
Elm Code: _____ Occ No.: _____
EO Index: _____ Map Index: _____

Date of Field Work (mm/dd/yyyy): 04/14/2020

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: *Haliaeetus leucocephalus*

Common Name: Bald Eagle

Species Found? (●) Yes ( ) No _____ If not found, why?

Total No. Individuals: 3 Subsequent Visit? (●) Yes ( ) No

Is this an existing NDDB occurrence? _____ Yes, Occ. # ☐ No ☒ Unk.

Collection? If yes: _____ Number _____ Museum / Herbarium

Reporter: Denise Woodard
Address: 1500 Iowa Ave, Suite 200, Riverside, CA 92544
E-mail Address: denise.woodard@lsa.net
Phone: 951-781-9310

Plant Information

Phenology:

_____ % vegetative _____ % flowering _____ % fruiting

Animal Information

2 # adults | 1 # juveniles | _____ # larvae | _____ # egg masses | _____ # unknown

☐ wintering ☒ breeding ☒ nesting ☐ rookery ☐ burrow site ☐ lek ☐ other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

County: Riverside Landowner / Mgr: Rancho California Water District

Quad Name: _____ Elevation: _____

T___ R___ Sec___, ___¼ of ___ ¼, Meridian: H( ) M( ) S( ) Source of Coordinates (GPS, topo. map & type): _____

T___ R___ Sec___, ___¼ of ___ ¼, Meridian: H( ) M( ) S( ) GPS Make & Model: _____

DATUM: NAD27 ( ) NAD83 ( ) WGS84 ( ) Horizontal Accuracy: _____ meters/feet

Coordinate System: UTM Zone 10 ( ) UTM Zone 11 (●) *OR* Geographic (Latitude & Longitude) ( )

Coordinates: 503466.84 m E/3704867.88 m N, 502074.19 m E/3706005.45 m N, 502855.00 m E/3705844.00 m N, 503121.00 m E/3704825.00 m N

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

The predominant plant communities are riparian forest, riparian scrub, and alluvial fan sage scrub. Dominant species in the riparian forest/scrub include black willow (Salix gooddingii), Fremont cottonwood (Populus fremontii), Mediterranean tamarisk (Tamarix ramosissima), mule fat (Baccharis salicifolia), narrowleaf willow (Salix exigua), and arrowweed (Pluchea sericea). Dominants in the alluvial fan sage scrub include California buckwheat (Eriogonum fasciculatum), big saltbush (Atriplex lentiformis), and scalebroom (Lepidospartum squamatum).

Please fill out separate form for other rare taxa seen at this site.

Site Information

Overall site/occurrence quality/viability (site + population): (●) Excellent ( ) Good ( ) Fair ( ) Poor

Immediate AND surrounding land use: Recreation

Visible disturbances: Off highway vehical use, trash dumping

Threats: Inundation from increased lake level associated with proposed dam remediation project.

Comments:

Determination: *(check one or more, and fill in blanks)*

☐ Keyed (cite reference): _____
☐ Compared with specimen housed at: _____
☐ Compared with photo / drawing in: _____
☐ By another person (name): _____
☐ Other: _____

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	☐	☐	☐
Habitat	☐	☐	☐
Diagnostic feature	☐	☐	☐

May we obtain duplicates at our expense? ( ) yes ( ) no

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CNDDB@wildlife.ca.gov

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Elm Code: _____ Occ No.: _____
EO Index: _____ Map Index: _____

Date of Field Work (mm/dd/yyyy): 04/14/2020

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: *Polioptila californica Californica*

Common Name: Coastal California gnatcatcher

Species Found? (●) Yes ( ) No _____ If not found, why?

Total No. Individuals: 13 Subsequent Visit? (●) Yes ( ) No

Is this an existing NDDB occurrence? _____ Yes, Occ. # [ ] No [X] Unk.

Collection? If yes: _____ Number _____ Museum / Herbarium

Reporter: Denise Woodard
Address: 1500 Iowa Ave, Suite 200, Riverside, CA 92544
E-mail Address: denise.woodard@lsa.net
Phone: 951-781-9310

Plant Information

Phenology:

_____ % vegetative _____ % flowering _____ % fruiting

Animal Information

11 # adults | 2 # juveniles | _____ # larvae | _____ # egg masses | _____ # unknown

[ ] wintering [X] breeding [X] nesting [ ] rookery [ ] burrow site [ ] lek [ ] other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

Please see attached Figures 1, 2 and 3.

County: Riverside Landowner / Mgr: Rancho California Water District

Quad Name: _____ Elevation: _____

T___ R___ Sec___, ___¼ of ___ ¼, Meridian: H( ) M( ) S( ) Source of Coordinates (GPS, topo. map & type): _____

T___ R___ Sec___, ___¼ of ___ ¼, Meridian: H( ) M( ) S( ) GPS Make & Model: _____

DATUM: NAD27 ( ) NAD83 ( ) WGS84 ( ) Horizontal Accuracy: _____ meters/feet

Coordinate System: UTM Zone 10 ( ) UTM Zone 11 (●) *OR* Geographic (Latitude & Longitude) ( )

Coordinates: See attached second page.

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

The predominant plant communities are riparian forest, riparian scrub, and alluvial fan sage scrub. Dominant species in the riparian forest/scrub include black willow (Salix gooddingii), Fremont cottonwood (Populus fremontii), Mediterranean tamarisk (Tamarix ramosissima), mule fat (Baccharis salicifolia), narrowleaf willow (Salix exigua), and arrowweed (Pluchea sericea). Dominants in the alluvial fan sage scrub include California buckwheat (Eriogonum fasciculatum), big saltbush (Atriplex lentiformis), and scalebroom (Lepidospartum squamatum).

Please fill out separate form for other rare taxa seen at this site.

Site Information

Overall site/occurrence quality/viability (site + population): ( ) Excellent (●) Good ( ) Fair ( ) Poor

Immediate AND surrounding land use: Recreation

Visible disturbances: Off highway vehical use, trash dumping

Threats: Inundation from increased lake level associated with proposed dam remediation project.

Comments:

Determination: *(check one or more, and fill in blanks)*

- [ ] Keyed (cite reference): _____
- [ ] Compared with specimen housed at: _____
- [ ] Compared with photo / drawing in: _____
- [ ] By another person (name): _____
- [ ] Other: _____

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	[ ]	[ ]	[ ]
Habitat	[ ]	[ ]	[ ]
Diagnostic feature	[ ]	[ ]	[ ]

May we obtain duplicates at our expense? ( ) yes ( ) no

CALIFORINA GNATCATCHER LOCATION COORDINATES (UTM ZONE 11)

1. 499881.67 m E/3706839.17 m N
2. 500518.51m E/3707025.07m N
3. 502396.26 m E/3705409.76 m N
4. 501987.42 m E/3706489.89 m N
5. 501867.08 m E/3706287.01 m N
6. 501987.89 m E/3706032.04 m N
7. 502894.90 m E/3706382.79 m N
8. 504233.02 m E/3706188.87 m N
9. 504616.96 m E/3705567.29 m N
10. 504444.15 m E/3705327.04 m N
11. 504059.00 m E/3705131.84 m N

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Elm Code: _____ Occ No.: _____
EO Index: _____ Map Index: _____

Date of Field Work (mm/dd/yyyy): 04/14/2020

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: *Ixobrychus exilis*

Common Name: Least bittern

Species Found? (●) Yes ( ) No _____ If not found, why?

Total No. Individuals: 1 Subsequent Visit? (●) Yes ( ) No

Is this an existing NDDB occurrence? _____ Yes, Occ. # ☐ No ☒ Unk.

Collection? If yes: _____ Number _____ Museum / Herbarium

Reporter: Denise Woodard
Address: 1500 Iowa Ave, Suite 200, Riverside, CA 92544
E-mail Address: denise.woodard@lsa.net
Phone: 951-781-9310

Plant Information

Phenology:

_____ % vegetative _____ % flowering _____ % fruiting

Animal Information

1 # adults _____ # juveniles _____ # larvae _____ # egg masses _____ # unknown

☐ wintering ☐ breeding ☐ nesting ☐ rookery ☐ burrow site ☐ lek ☒ other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

Please see attached Figures 1, 2 and 3.

County: Riverside Landowner / Mgr: Rancho California Water District

Quad Name: _____ Elevation: _____

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DATUM: NAD27 ( ) NAD83 ( ) WGS84 ( ) Horizontal Accuracy: _____ meters/feet

Coordinate System: UTM Zone 10 ( ) UTM Zone 11 (●) *OR* Geographic (Latitude & Longitude) ( )

Coordinates: 503776.70 m E, 3705337.54 m N

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

The predominant plant communities are riparian forest, riparian scrub, and alluvial fan sage scrub. Dominant species in the riparian forest/scrub include black willow (Salix gooddingii), Fremont cottonwood (Populus fremontii), Mediterranean tamarisk (Tamarix ramosissima), mule fat (Baccharis salicifolia), narrowleaf willow (Salix exigua), and arrowweed (Pluchea sericea). Dominants in the alluvial fan sage scrub include California buckwheat (Eriogonum fasciculatum), big saltbush (Atriplex lentiformis), and scalebroom (Lepidospartum squamatum).

Please fill out separate form for other rare taxa seen at this site.

Site Information

Overall site/occurrence quality/viability (site + population): ( ) Excellent (●) Good ( ) Fair ( ) Poor

Immediate AND surrounding land use: Recreation

Visible disturbances: Off highway vehical use, trash dumping

Threats: Inundation from increased lake level associated with proposed dam remediation project.

Comments:

Determination: *(check one or more, and fill in blanks)*

☐ Keyed (cite reference): _____
☐ Compared with specimen housed at: _____
☐ Compared with photo / drawing in: _____
☐ By another person (name): _____
☐ Other: _____

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	☐	☐	☐
Habitat	☐	☐	☐
Diagnostic feature	☐	☐	☐

May we obtain duplicates at our expense? ( ) yes ( ) no

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EO Index: _____ Map Index: _____

Date of Field Work (mm/dd/yyyy): 04/14/2020

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: *Ixobrychus exilis*

Common Name: Least bittern

Species Found? (●) Yes ( ) No _____ If not found, why?

Total No. Individuals: 1 Subsequent Visit? (●) Yes ( ) No

Is this an existing NDDB occurrence? _____ Yes, Occ. # ☐ No ☒ Unk.

Collection? If yes: _____ Number _____ Museum / Herbarium

Reporter: Denise Woodard
Address: 1500 Iowa Ave, Suite 200, Riverside, CA 92544
E-mail Address: denise.woodard@lsa.net
Phone: 951-781-9310

Plant Information

Phenology:

_____ % vegetative _____ % flowering _____ % fruiting

Animal Information

1 # adults _____ # juveniles _____ # larvae _____ # egg masses _____ # unknown

☐ wintering ☐ breeding ☐ nesting ☐ rookery ☐ burrow site ☐ lek ☒ other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

Please see attached Figures 1, 2 and 3.

County: Riverside Landowner / Mgr: Rancho California Water District

Quad Name: _____ Elevation: _____

T___ R___ Sec___, ___¼ of ___ ¼, Meridian: H( ) M( ) S( ) Source of Coordinates (GPS, topo. map & type): _____

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DATUM: NAD27 ( ) NAD83 ( ) WGS84 ( ) Horizontal Accuracy: _____ meters/feet

Coordinate System: UTM Zone 10 ( ) UTM Zone 11 (●) *OR* Geographic (Latitude & Longitude) ( )

Coordinates: 503776.70 m E, 3705337.54 m N

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

The predominant plant communities are riparian forest, riparian scrub, and alluvial fan sage scrub. Dominant species in the riparian forest/scrub include black willow (Salix gooddingii), Fremont cottonwood (Populus fremontii), Mediterranean tamarisk (Tamarix ramosissima), mule fat (Baccharis salicifolia), narrowleaf willow (Salix exigua), and arrowweed (Pluchea sericea). Dominants in the alluvial fan sage scrub include California buckwheat (Eriogonum fasciculatum), big saltbush (Atriplex lentiformis), and scalebroom (Lepidospartum squamatum).

Please fill out separate form for other rare taxa seen at this site.

Site Information

Overall site/occurrence quality/viability (site + population): ( ) Excellent (●) Good ( ) Fair ( ) Poor

Immediate AND surrounding land use: Recreation

Visible disturbances: Off highway vehical use, trash dumping

Threats: Inundation from increased lake level associated with proposed dam remediation project.

Comments:

Determination: *(check one or more, and fill in blanks)*

☐ Keyed (cite reference): _____
☐ Compared with specimen housed at: _____
☐ Compared with photo / drawing in: _____
☐ By another person (name): _____
☐ Other: _____

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	☐	☐	☐
Habitat	☐	☐	☐
Diagnostic feature	☐	☐	☐

May we obtain duplicates at our expense? ( ) yes ( ) no

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CNDDB@wildlife.ca.gov

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EO Index: _____ Map Index: _____

Date of Field Work (mm/dd/yyyy): 04/14/2020

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: *Empidonax traillii brewsteri*

Common Name: Little willow flycatcher

Species Found? (●) Yes ( ) No _____ If not found, why?

Total No. Individuals: 5 Subsequent Visit? (●) Yes ( ) No

Is this an existing NDDB occurrence? _____ Yes, Occ. # [ ] No [X] Unk.

Collection? If yes: _____ Number _____ Museum / Herbarium

Reporter: Denise Woodard
Address: 1500 Iowa Ave, Suite 200, Riverside, CA 92544
E-mail Address: denise.woodard@lsa.net
Phone: 951-781-9310

Plant Information
Phenology:
_____ % vegetative _____ % flowering _____ % fruiting

Animal Information
5 # adults _____ # juveniles _____ # larvae _____ # egg masses _____ # unknown
[ ] wintering [ ] breeding [ ] nesting [ ] rookery [ ] burrow site [ ] lek [X] other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)
See attached Figures 1, 2 and 3.

County: Riverside Landowner / Mgr: Rancho California Water District
Quad Name: _____ Elevation: _____
T___ R___ Sec___, ___¼ of ___ ¼, Meridian: H( ) M( ) S( ) Source of Coordinates (GPS, topo. map & type): _____
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DATUM: NAD27 ( ) NAD83 ( ) WGS84 ( ) Horizontal Accuracy: _____ meters/feet
Coordinate System: UTM Zone 10 ( ) UTM Zone 11 (●) *OR* Geographic (Latitude & Longitude) ( )
Coordinates: 502426.08 m E/3706441.49 m N, 502271.70 m E/3706419.28 m N, 3706462.03 m N/502158.01 m E, 504409.56 m E/3705349.35 m N, 504055.52 m E/3704608.58 m N

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
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Please fill out separate form for other rare taxa seen at this site.

Site Information Overall site/occurrence quality/viability (site + population): ( ) Excellent (●) Good ( ) Fair ( ) Poor
Immediate AND surrounding land use: Recreation
Visible disturbances: Off highway vehical use, trash dumping
Threats: Inundation from increased lake level associated with proposed dam remediation project.
Comments:

Determination: *(check one or more, and fill in blanks)*
[ ] Keyed (cite reference): _____
[ ] Compared with specimen housed at: _____
[ ] Compared with photo / drawing in: _____
[ ] By another person (name): _____
[ ] Other: _____

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	[ ]	[ ]	[ ]
Habitat	[ ]	[ ]	[ ]
Diagnostic feature	[ ]	[ ]	[ ]

May we obtain duplicates at our expense? ( ) yes ( ) no

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Elm Code: _____ Occ No.: _____
EO Index: _____ Map Index: _____

Date of Field Work (mm/dd/yyyy): 04/14/2020

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: *Lanius ludovicianus*

Common Name: Loggerhead shrike

Species Found? (●) Yes ( ) No _____ If not found, why?

Total No. Individuals: 1 Subsequent Visit? (●) Yes ( ) No

Is this an existing NDDB occurrence? _____ Yes, Occ. # ☐ No ☒ Unk.

Collection? If yes: _____ Number _____ Museum / Herbarium

Reporter: Denise Woodard
Address: 1500 Iowa Ave, Suite 200, Riverside, CA 92544
E-mail Address: denise.woodard@lsa.net
Phone: 951-781-9310

Plant Information

Phenology:

_____ % vegetative _____ % flowering _____ % fruiting

Animal Information

1 # adults _____ # juveniles _____ # larvae _____ # egg masses _____ # unknown

☐ wintering ☒ breeding ☒ nesting ☐ rookery ☐ burrow site ☐ lek ☐ other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

Please see attached Figures 1, 2 and 3.

County: Riverside Landowner / Mgr: Rancho California Water District

Quad Name: _____ Elevation: _____

T___ R___ Sec___, ___¼ of ___ ¼, Meridian: H( ) M( ) S( ) Source of Coordinates (GPS, topo. map & type): _____

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DATUM: NAD27 ( ) NAD83 ( ) WGS84 ( ) Horizontal Accuracy: _____ meters/feet

Coordinate System: UTM Zone 10 ( ) UTM Zone 11 (●) *OR* Geographic (Latitude & Longitude) ( )

Coordinates: 501868.73 m E/3706246.01 m N, 503883.74 m E/3704186.01 m N, 504682.43 m E/3703883.00 m N, 503757.11 m E/3704598.48 m N

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

The predominant plant communities are riparian forest, riparian scrub, and alluvial fan sage scrub. Dominant species in the riparian forest/scrub include black willow (Salix gooddingii), Fremont cottonwood (Populus fremontii), Mediterranean tamarisk (Tamarix ramosissima), mule fat (Baccharis salicifolia), narrowleaf willow (Salix exigua), and arrowweed (Pluchea sericea). Dominants in the alluvial fan sage scrub include California buckwheat (Eriogonum fasciculatum), big saltbush (Atriplex lentiformis), and scalebroom (Lepidospartum squamatum).

Please fill out separate form for other rare taxa seen at this site.

Site Information

Overall site/occurrence quality/viability (site + population): ( ) Excellent ( ) Good (●) Fair ( ) Poor

Immediate AND surrounding land use: Recreation

Visible disturbances: Off highway vehical use, trash dumping

Threats: Inundation from increased lake level associated with proposed dam remediation project.

Comments:

Determination: *(check one or more, and fill in blanks)*

☐ Keyed (cite reference): _____
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☐ Compared with photo / drawing in: _____
☐ By another person (name): _____
☐ Other: _____

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	☐	☐	☐
Habitat	☐	☐	☐
Diagnostic feature	☐	☐	☐

May we obtain duplicates at our expense? ( ) yes ( ) no

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Date of Field Work (mm/dd/yyyy): 04/14/2020

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: *Progne subis*

Common Name: Purple martin

Species Found? (●) Yes ( ) No _____ If not found, why?

Total No. Individuals: 2 Subsequent Visit? (●) Yes ( ) No

Is this an existing NDDB occurrence? _____ Yes, Occ. # ☐ No ☒ Unk.

Collection? If yes: _____ Number _____ Museum / Herbarium

Reporter: Denise Woodard
Address: 1500 Iowa Ave, Suite 200, Riverside, CA 92544
E-mail Address: denise.woodard@lsa.net
Phone: 951-781-9310

Plant Information

Phenology:

_____ % vegetative _____ % flowering _____ % fruiting

Animal Information

2 # adults _____ # juveniles _____ # larvae _____ # egg masses _____ # unknown

☐ wintering ☐ breeding ☐ nesting ☐ rookery ☐ burrow site ☐ lek ☒ other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

Please see attached Figures 1, 2 and 3.

County: Riverside Landowner / Mgr: Rancho California Water District

Quad Name: _____ Elevation: _____

T___ R___ Sec___, ___¼ of ___ ¼, Meridian: H( ) M( ) S( ) Source of Coordinates (GPS, topo. map & type): _____

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Coordinate System: UTM Zone 10 ( ) UTM Zone 11 (●) *OR* Geographic (Latitude & Longitude) ( )

Coordinates: 503611.01 m E/3704925.39 m N

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
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The predominant plant communities are riparian forest, riparian scrub, and alluvial fan sage scrub. Dominant species in the riparian forest/scrub include black willow (Salix gooddingii), Fremont cottonwood (Populus fremontii), Mediterranean tamarisk (Tamarix ramosissima), mule fat (Baccharis salicifolia), narrowleaf willow (Salix exigua), and arrowweed (Pluchea sericea). Dominants in the alluvial fan sage scrub include California buckwheat (Eriogonum fasciculatum), big saltbush (Atriplex lentiformis), and scalebroom (Lepidospartum squamatum).

Please fill out separate form for other rare taxa seen at this site.

Site Information

Overall site/occurrence quality/viability (site + population): ( ) Excellent ( ) Good (●) Fair ( ) Poor

Immediate AND surrounding land use: Recreation

Visible disturbances: Off highway vehical use, trash dumping

Threats: Inundation from increased lake level associated with proposed dam remediation project.

Comments:

Determination: *(check one or more, and fill in blanks)*

☐ Keyed (cite reference): _____
☐ Compared with specimen housed at: _____
☐ Compared with photo / drawing in: _____
☐ By another person (name): _____
☐ Other: _____

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	☐	☐	☐
Habitat	☐	☐	☐
Diagnostic feature	☐	☐	☐

May we obtain duplicates at our expense? ( ) yes ( ) no

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Date of Field Work (mm/dd/yyyy): 04/14/2020

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: *Piranga rubra*

Common Name: Summer tanager

Species Found? (●) Yes ( ) No _____ If not found, why?

Total No. Individuals: 4 Subsequent Visit? (●) Yes ( ) No

Is this an existing NDDB occurrence? _____ Yes, Occ. # ☐ No ☒ Unk.

Collection? If yes: _____ Number _____ Museum / Herbarium

Reporter: Denise Woodard
Address: 1500 Iowa Ave, Suite 200, Riverside, CA 92544
E-mail Address: denise.woodard@lsa.net
Phone: 951-781-9310

Plant Information

Phenology:

_____ % vegetative _____ % flowering _____ % fruiting

Animal Information

4 # adults _____ # juveniles _____ # larvae _____ # egg masses _____ # unknown

☐ wintering ☒ breeding ☒ nesting ☐ rookery ☐ burrow site ☐ lek ☐ other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

Please see attached Figures 1, 2 and 3.

County: Riverside Landowner / Mgr: Rancho California Water District

Quad Name: _____ Elevation: _____

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Coordinates: 501868.73 m E/3706246.01 m N, 503883.74 m E/3704186.01 m N, 504682.43 m E/3703883.00 m N, 503757.11 m E/3704598.48 m N

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

The predominant plant communities are riparian forest, riparian scrub, and alluvial fan sage scrub. Dominant species in the riparian forest/scrub include black willow (Salix gooddingii), Fremont cottonwood (Populus fremontii), Mediterranean tamarisk (Tamarix ramosissima), mule fat (Baccharis salicifolia), narrowleaf willow (Salix exigua), and arrowweed (Pluchea sericea). Dominants in the alluvial fan sage scrub include California buckwheat (Eriogonum fasciculatum), big saltbush (Atriplex lentiformis), and scalebroom (Lepidospartum squamatum).

Please fill out separate form for other rare taxa seen at this site.

Site Information

Overall site/occurrence quality/viability (site + population): ( ) Excellent (●) Good ( ) Fair ( ) Poor

Immediate AND surrounding land use: Recreation

Visible disturbances: Off highway vehical use, trash dumping

Threats: Inundation from increased lake level associated with proposed dam remediation project.

Comments:

Determination: *(check one or more, and fill in blanks)*

☐ Keyed (cite reference): _____
☐ Compared with specimen housed at: _____
☐ Compared with photo / drawing in: _____
☐ By another person (name): _____
☐ Other: _____

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	☐	☐	☐
Habitat	☐	☐	☐
Diagnostic feature	☐	☐	☐

May we obtain duplicates at our expense? ( ) yes ( ) no

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For Office Use Only
Source Code: _____ Quad Code: _____
Elm Code: _____ Occ No.: _____
EO Index: _____ Map Index: _____

Date of Field Work (mm/dd/yyyy): 04/14/2020

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: *Empidonax traillii extimus*

Common Name: Southwestern willow flycatcher

Species Found? (●) Yes ( ) No _____ If not found, why?

Total No. Individuals: 1 Subsequent Visit? (●) Yes ( ) No

Is this an existing NDDB occurrence? _____ Yes, Occ. # ☐ No ☒ Unk.

Collection? If yes: _____ Number _____ Museum / Herbarium

Reporter: Denise Woodard
Address: 1500 Iowa Ave, Suite 200, Riverside, CA 92544
E-mail Address: denise.woodard@lsa.net
Phone: 951-781-9310

Plant Information

Phenology:

_____ % vegetative _____ % flowering _____ % fruiting

Animal Information

1 # adults _____ # juveniles _____ # larvae _____ # egg masses _____ # unknown

☐ wintering ☐ breeding ☐ nesting ☐ rookery ☐ burrow site ☐ lek ☒ other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

Please see attached Figures 1, 2 and 3.

County: Riverside Landowner / Mgr: Rancho California Water District

Quad Name: _____ Elevation: _____

T___ R___ Sec___, ___¼ of ___ ¼, Meridian: H( ) M( ) S( ) Source of Coordinates (GPS, topo. map & type): _____

T___ R___ Sec___, ___¼ of ___ ¼, Meridian: H( ) M( ) S( ) GPS Make & Model: _____

DATUM: NAD27 ( ) NAD83 ( ) WGS84 ( ) Horizontal Accuracy: _____ meters/feet

Coordinate System: UTM Zone 10 ( ) UTM Zone 11 (●) *OR* Geographic (Latitude & Longitude) ( )

Coordinates: 503656.11 m E/3704762.84 m N

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

The predominant plant communities are riparian forest, riparian scrub, and alluvial fan sage scrub. Dominant species in the riparian forest/scrub include black willow (Salix gooddingii), Fremont cottonwood (Populus fremontii), Mediterranean tamarisk (Tamarix ramosissima), mule fat (Baccharis salicifolia), narrowleaf willow (Salix exigua), and arrowweed (Pluchea sericea). Dominants in the alluvial fan sage scrub include California buckwheat (Eriogonum fasciculatum), big saltbush (Atriplex lentiformis), and scalebroom (Lepidospartum squamatum).

Please fill out separate form for other rare taxa seen at this site.

Site Information

Overall site/occurrence quality/viability (site + population): ( ) Excellent ( ) Good (●) Fair ( ) Poor

Immediate AND surrounding land use: Recreation

Visible disturbances: Off highway vehical use, trash dumping

Threats: Inundation from increased lake level associated with proposed dam remediation project.

Comments:

Determination: *(check one or more, and fill in blanks)*

☐ Keyed (cite reference): _____
☐ Compared with specimen housed at: _____
☐ Compared with photo / drawing in: _____
☐ By another person (name): _____
☐ Other: _____

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	☐	☐	☐
Habitat	☐	☐	☐
Diagnostic feature	☐	☐	☐

May we obtain duplicates at our expense? ( ) yes ( ) no

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Sacramento, CA 94244-2090
CNDDB@wildlife.ca.gov

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Source Code: _____ Quad Code: _____
Elm Code: _____ Occ No.: _____
EO Index: _____ Map Index: _____

Date of Field Work (mm/dd/yyyy): 04/14/2020

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: *Elanus leucurus*

Common Name: White-tailed kite

Species Found? (●) Yes ( ) No _____ If not found, why?

Total No. Individuals: 1 Subsequent Visit? (●) Yes ( ) No

Is this an existing NDDB occurrence? _____ Yes, Occ. # ☐ No ☒ Unk.

Collection? If yes: _____ Number _____ Museum / Herbarium

Reporter: Denise Woodard
Address: 1500 Iowa Ave, Suite 200, Riverside, CA 92544
E-mail Address: denise.woodard@lsa.net
Phone: 951-781-9310

Plant Information

Phenology:

_____ % vegetative _____ % flowering _____ % fruiting

Animal Information

1 # adults _____ # juveniles _____ # larvae _____ # egg masses _____ # unknown

☐ wintering ☒ breeding ☒ nesting ☐ rookery ☐ burrow site ☐ lek ☐ other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

County: Riverside Landowner / Mgr: Rancho California Water District

Quad Name: _____ Elevation: _____

T___ R___ Sec___, ___¼ of ___ ¼, Meridian: H ( ) M ( ) S ( ) Source of Coordinates (GPS, topo. map & type): _____

T___ R___ Sec___, ___¼ of ___ ¼, Meridian: H ( ) M ( ) S ( ) GPS Make & Model: _____

DATUM: NAD27 ( ) NAD83 ( ) WGS84 ( ) Horizontal Accuracy: _____ meters/feet

Coordinate System: UTM Zone 10 ( ) UTM Zone 11 (●) *OR* Geographic (Latitude & Longitude) ( )

Coordinates: 504816.97 m E/3705917.40 m N

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

The predominant plant communities are riparian forest, riparian scrub, and alluvial fan sage scrub. Dominant species in the riparian forest/scrub include black willow (Salix gooddingii), Fremont cottonwood (Populus fremontii), Mediterranean tamarisk (Tamarix ramosissima), mule fat (Baccharis salicifolia), narrowleaf willow (Salix exigua), and arrowweed (Pluchea sericea). Dominants in the alluvial fan sage scrub include California buckwheat (Eriogonum fasciculatum), big saltbush (Atriplex lentiformis), and scalebroom (Lepidospartum squamatum).

Please fill out separate form for other rare taxa seen at this site.

Site Information

Overall site/occurrence quality/viability (site + population): (●) Excellent ( ) Good ( ) Fair ( ) Poor

Immediate AND surrounding land use: Recreation

Visible disturbances: Off highway vehical use, trash dumping

Threats: Inundation from increased lake level associated with proposed dam remediation project.

Comments:

Determination: *(check one or more, and fill in blanks)*

☐ Keyed (cite reference): _____
☐ Compared with specimen housed at: _____
☐ Compared with photo / drawing in: _____
☐ By another person (name): _____
☐ Other: _____

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	☐	☐	☐
Habitat	☐	☐	☐
Diagnostic feature	☐	☐	☐

May we obtain duplicates at our expense? ( ) yes ( ) no

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Source Code: _____ Quad Code: _____
Elm Code: _____ Occ No.: _____
EO Index: _____ Map Index: _____

Date of Field Work (mm/dd/yyyy): 04/14/2020

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: *Icteria virens*

Common Name: Yellow-breasted chat

Species Found? (●) Yes ( ) No _____ If not found, why?

Total No. Individuals: 12 Subsequent Visit? (●) Yes ( ) No

Is this an existing NDDB occurrence? _____ Yes, Occ. # ☐ No ☒ Unk.

Collection? If yes: _____ Number _____ Museum / Herbarium

Reporter: Denise Woodard
Address: 1500 Iowa Avenue, Suite 200
Riverside CA 92507
E-mail Address: denise.woodard@lsa.net
Phone: 951-781-9310

Plant Information

Phenology:

_____ % vegetative _____ % flowering _____ % fruiting

Animal Information

12 # adults _____ # juveniles _____ # larvae _____ # egg masses _____ # unknown

☐ wintering ☒ breeding ☒ nesting ☐ rookery ☐ burrow site ☐ lek ☐ other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

Please see attached Figures 1, 2 and 3.

County: Riverside Landowner / Mgr: Rancho California Water District

Quad Name: _____ Elevation: _____

T___ R___ Sec___, ___¼ of ___ ¼, Meridian: H( ) M( ) S( ) Source of Coordinates (GPS, topo. map & type): _____

T___ R___ Sec___, ___¼ of ___ ¼, Meridian: H( ) M( ) S( ) GPS Make & Model: _____

DATUM: NAD27 ( ) NAD83 ( ) WGS84 (●) Horizontal Accuracy: _____ meters/feet

Coordinate System: UTM Zone 10 ( ) UTM Zone 11 (●) *OR* Geographic (Latitude & Longitude) ( )

Coordinates: Please see attached second page.

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

The predominant plant communities are riparian forest, riparian scrub, and alluvial fan sage scrub. Dominant species in the riparian forest/scrub include black willow (Salix gooddingii), Fremont cottonwood (Populus fremontii), Mediterranean tamarisk (Tamarix ramosissima), mule fat (Baccharis salicifolia), narrowleaf willow (Salix exigua), and arrowweed (Pluchea sericea). Dominants in the alluvial fan sage scrub include California buckwheat (Eriogonum fasciculatum), big saltbush (Atriplex lentiformis), and scalebroom (Lepidospartum squamatum).

Please fill out separate form for other rare taxa seen at this site.

Site Information

Overall site/occurrence quality/viability (site + population): (●) Excellent ( ) Good ( ) Fair ( ) Poor

Immediate AND surrounding land use: Recreation

Visible disturbances: Off highway vehical use, trash dumping.

Threats: Inundation from increased lake level associated with proposed dam remediation project.

Comments:

Determination: *(check one or more, and fill in blanks)*

☐ Keyed (cite reference): _____
☐ Compared with specimen housed at: _____
☐ Compared with photo / drawing in: _____
☐ By another person (name): _____
☐ Other: _____

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	☐	☐	☐
Habitat	☐	☐	☐
Diagnostic feature	☐	☐	☐

May we obtain duplicates at our expense? ( ) yes ( ) no

YELLOW-BREASTED CHAT LOCATION COORDINATES (UTM ZONE 11)

1. 503897.09 m E/3706011.55 m N
2. 503958.78 m E/3705974.09 m N
3. 504075.18 m E/3705990.08 m N
4. 504366.27 m E/3705772.05 m N
5. 503909.36 m E/3705298.99 m N
6. 503893.60 m E/3704817.75 m N
7. 503677.88 m E/3704793.39 m N
8. 503744.38 m E/3704642.00 m N
9. 503747.44 m E/3704531.37 m N
10. 503754.05 m E/3704453.81 m N
11. 503981.04 m E/3704049.92 m N
12. 501457.08 m E/3704441.54 m N

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CNDDB@wildlife.ca.gov

For Office Use Only
Source Code: _____ Quad Code: _____
Elm Code: _____ Occ No.: _____
EO Index: _____ Map Index: _____

Date of Field Work (mm/dd/yyyy): 04/14/2020

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: *Dendroica petechia*

Common Name: Yellow warbler

Species Found? (●) Yes ( ) No _____ If not found, why?

Total No. Individuals: 6 Subsequent Visit? (●) Yes ( ) No

Is this an existing NDDB occurrence? _____ Yes, Occ. # ☐ No ☒ Unk.

Collection? If yes: _____ Number _____ Museum / Herbarium

Reporter: Denise Woodard
Address: 1500 Iowa Ave, Suite 200, Riverside, CA 92544
E-mail Address: denise.woodard@lsa.net
Phone: 951-781-9310

Plant Information

Phenology:

_____ % vegetative _____ % flowering _____ % fruiting

Animal Information

6 # adults _____ # juveniles _____ # larvae _____ # egg masses _____ # unknown

☐ wintering ☒ breeding ☒ nesting ☐ rookery ☐ burrow site ☐ lek ☒ other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

See attached Figures 1, 2 and 3.

County: Riverside Landowner / Mgr: Rancho California Water District

Quad Name: _____ Elevation: _____

T___ R___ Sec___, ___¼ of ___ ¼, Meridian: H( ) M( ) S( ) Source of Coordinates (GPS, topo. map & type): _____

T___ R___ Sec___, ___¼ of ___ ¼, Meridian: H( ) M( ) S( ) GPS Make & Model: _____

DATUM: NAD27 ( ) NAD83 ( ) WGS84 ( ) Horizontal Accuracy: _____ meters/feet

Coordinate System: UTM Zone 10 ( ) UTM Zone 11 (●) *OR* Geographic (Latitude & Longitude) ( )

Coordinates: 502426.08 m E/3706441.49 m N, 502271.70 m E/3706419.28 m N, 3706462.03 m N/502158.01 m E, 504409.56 m E/3705349.35 m N, 504055.52 m E/3704608.58 m N

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

The predominant plant communities are riparian forest, riparian scrub, and alluvial fan sage scrub. Dominant species in the riparian forest/scrub include black willow (Salix gooddingii), Fremont cottonwood (Populus fremontii), Mediterranean tamarisk (Tamarix ramosissima), mule fat (Baccharis salicifolia), narrowleaf willow (Salix exigua), and arrowweed (Pluchea sericea). Dominants in the alluvial fan sage scrub include California buckwheat (Eriogonum fasciculatum), big saltbush (Atriplex lentiformis), and scalebroom (Lepidospartum squamatum).

Please fill out separate form for other rare taxa seen at this site.

Site Information

Overall site/occurrence quality/viability (site + population): (●) Excellent ( ) Good ( ) Fair ( ) Poor

Immediate AND surrounding land use: Recreation

Visible disturbances: Off highway vehical use, trash dumping

Threats: Inundation from increased lake level associated with proposed dam remediation project.

Comments:

Determination: *(check one or more, and fill in blanks)*

☐ Keyed (cite reference): _____
☐ Compared with specimen housed at: _____
☐ Compared with photo / drawing in: _____
☐ By another person (name): _____
☐ Other: _____

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	☐	☐	☐
Habitat	☐	☐	☐
Diagnostic feature	☐	☐	☐

May we obtain duplicates at our expense? ( ) yes ( ) no

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P.O. Box 944209
Sacramento, CA 94244-2090
CNDDB@wildlife.ca.gov

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Source Code: _____ Quad Code: _____
Elm Code: _____ Occ No.: _____
EO Index: _____ Map Index: _____

Date of Field Work (mm/dd/yyyy): 04/14/2020

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: *Vireo bellii pusillus*

Common Name: least Bell's vireo

Species Found? ○ Yes ○ No _____ If not found, why?

Total No. Individuals: 16 Subsequent Visit? ◉ Yes ○ No

Is this an existing NDDB occurrence? _____ Yes, Occ. # ☐ No ☒ Unk.

Collection? If yes: _____ Number _____ Museum / Herbarium

Reporter: Denise Woodard
Address: 1500 Iowa Ave, Suite 200, Riverside, CA 92544
E-mail Address: denise.woodard@lsa.net
Phone: 951-781-9310

Plant Information

Phenology:

_____ % vegetative _____ % flowering _____ % fruiting

Animal Information

16 # adults _____ # juveniles _____ # larvae _____ # egg masses _____ # unknown

☐ wintering ☒ breeding ☒ nesting ☐ rookery ☐ burrow site ☐ lek ☐ other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

Please see attached Figures 1, 2 and 3.

County: Riverside Landowner / Mgr: Rancho California Water District

Quad Name: _____ Elevation: _____

T___ R___ Sec___, ___¼ of ___ ¼, Meridian: H○ M○ S○ Source of Coordinates (GPS, topo. map & type): _____

T___ R___ Sec___, ___¼ of ___ ¼, Meridian: H○ M○ S○ GPS Make & Model: _____

DATUM: NAD27 ○ NAD83 ○ WGS84 ○ Horizontal Accuracy: _____ meters/feet

Coordinate System: UTM Zone 10 ○ UTM Zone 11 ◉ *OR* Geographic (Latitude & Longitude) ○

Coordinates: See attached second page.

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

The predominant plant communities are riparian forest, riparian scrub, and alluvial fan sage scrub. Dominant species in the riparian forest/scrub include black willow (Salix gooddingii), Fremont cottonwood (Populus fremontii), Mediterranean tamarisk (Tamarix ramosissima), mule fat (Baccharis salicifolia), narrowleaf willow (Salix exigua), and arrowweed (Pluchea sericea). Dominants in the alluvial fan sage scrub include California buckwheat (Eriogonum fasciculatum), big saltbush (Atriplex lentiformis), and scalebroom (Lepidospartum squamatum).

Please fill out separate form for other rare taxa seen at this site.

Site Information

Overall site/occurrence quality/viability (site + population): ◉ Excellent ○ Good ○ Fair ○ Poor

Immediate AND surrounding land use: Recreation

Visible disturbances: Off highway vehical use, trash dumping

Threats: Inundation from increased lake level associated with proposed dam remediation project.

Comments:

Determination: *(check one or more, and fill in blanks)*

- ☐ Keyed (cite reference): _____
- ☐ Compared with specimen housed at: _____
- ☐ Compared with photo / drawing in: _____
- ☐ By another person (name): _____
- ☐ Other: _____

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	☐	☐	☐
Habitat	☐	☐	☐
Diagnostic feature	☐	☐	☐

May we obtain duplicates at our expense? ○ yes ○ no

LEAST BELL'S VIREO LOCATION COORDINATES (UTM ZONE 11)

1. 500030.69 m E/3706743.95 m N
2. 500126.79 m E/3706845.17 m N
3. 501004.97 m E/3706703.67 m N
4. 501212.94 m E/3706907.01 m N
5. 504398.87 m E/3706108.89 m N
6. 504453.96 m E/3705691.61 m N
7. 503929.08 m E/3705180.33 m N
8. 503731.09 m E/3705103.47 m N
9. 503631.99 m E/3704795.44 m N
10. 503724.35 m E/3704637.40 m N
11. 503768.66 m E/3704537.50 m N
12. 503799.20 m E/3704363.34 m N
13. 503708.46 m E/3704270.13 m N
14. 503840.12 m E/3704257.14 m N
15. 503952.35 m E/3704034.45 m N
16. 504655.10 m E/3703900.95 m N

APPENDIX F

RARE PLANT SURVEY RESULTS

CARLSBAD
FRESNO
IRVINE
LOS ANGELES
PALM SPRINGS
POINT RICHMOND
RIVERSIDE
ROSEVILLE
SAN LUIS OBISPO

October 15, 2020

Jake Wiley
Rancho Water
42135 Winchester Road
Temecula, CA 92590

Subject: Rare Plant Survey Results for the Vail Dam Seismic and Hydrologic Remediation Project (D1911), Riverside County, California (LSA Project No. RCW1902)

Dear Mr. Wiley:

This report documents the results of a focused survey for Western Riverside County Multiple Species Habitat Conservation Plan (WR-MSHCP) special-status plant species for the Vail Dam Seismic and Hydrologic Remediation Project (project). The project area is in unincorporated southwestern Riverside County, east of the City of Temecula and north of State Route 79 (SR-79), as shown on the United States Geological Survey (USGS) *Bachelor Mountain, Pechanga, Sage* and *Vail Lake, California* 7.5-minute topographic quadrangles (Figure 1, attached).

For the proposed project, the WR-MSHCP requires a focused survey for the following special-status plant species within suitable habitat:

- Nevin's barberry (*Berberis nevinii*)
- Vail Lake ceanothus (*Ceanothus ophiochilus*)
- Round-leaved filaree (*Erodium macrophyllum*)
- Slender-horned spineflower (*Dodecahema leptoceras*)
- Many-stemmed dudleya (*Dudleya multicaulis*)

As described below, LSA conducted a focused survey for these plant species within suitable habitat in accordance with accepted protocol. The survey also targeted rare plant species such as chaparral sand-verbena (*Abronia villosa* var. *aurita*) that are not covered under the WR-MSHCP, but are known to occur in the project vicinity. The objective of the survey was to determine presence or absence of the target species and, if present, to quantify and map the distribution of the species on the project site.

METHODS

The plant survey was conducted by LSA botanist Stan Spencer, Ph.D., with assistance from LSA biologists Denise Woodard, Jaime Morales, and Jeremy Rosenthal. The survey was conducted to coincide with the expected flowering times of the target species. Survey dates and times are summarized in Table A, below. The project area ("Project Location" in Figures 1 and 2 [attached]) consists of three distinct areas:

- The project construction area, including construction, staging, laydown, and disposal areas;
- The access roads, including turnouts; and
- The dry perimeter of the reservoir between the current water level (1,424.5 feet (ft) NAVD88[1]) and the spillway crest elevation (1,472.6 ft NAVD88).

[1] NAVD88 = North American Vertical Datum of 1988

Table A: 2020 Plant Survey Dates and Times

Date	Area of Site Surveyed	Surveyors	Time (24-hour) (start/finish)
4/14	Southeast of lake, southern edge of lake (eastern part)	SS	1230/1400
4/17	Canyon west of dam	SS, JR	0800/1100
4/21	North edge of lake	SS	1100/1600
4/23	Southern edge of lake	SS	1035/1600
4/27	Southwest of lake, western edge of lake, southern edge of lake (western part)	SS/JM	1200/1700
4/28	Agricultural area west of dam	SS/DW	1000/1400
4/29	Northeast of lake	SS	1100/1300
5/1	Canyon west of dam	SS	1100/1345
5/7	Eastern edge of lake, southeast of lake	SS	0700/1200
5/12	Canyon west of dam, hills northwest of dam	SS	0830/1500
6/1	Southern edge of lake (western part)	SS	0600/0800
6/4	Southeast of lake	SS	0830/0930
6/11	Hills northwest of dam, agricultural area west of dam	SS	0830/1730
6/15	Southern edge of lake (central part)	SS	1000/1430
6/30	Hills northwest of dam	SS	1000/1150
7/16	Southern edge of lake (eastern part)	SS	0630/1400
7/17	Canyon west of dam	SS	0730/1530
7/23	Southwest of lake, western edge of lake	SS	1100/1630
7/24	Southern edge of lake (central part)	SS	1100/1530
7/30	Northeast of lake, eastern edge of lake, southeast of lake, hills northwest of dam	SS	1100/1900
7/31	Canyon west of dam, northern edge of lake	SS	0700/1900
8/3	Southwest of lake	SS	0930/1330

Surveyors: SS=Stan Spencer, DW=Denise Woodard, JM=Jaime Morales, JR=Jeremy Rosenthal

The plant survey area consists of the project area plus a 100 ft survey buffer (Figure 2) around that area.

The survey was conducted on foot by walking 10- to 50 ft transects in areas of potentially suitable habitat. Areas of potentially suitable habitat for the target species in the plant survey area consist of alluvial fan sage scrub, Riversidean sage scrub, and chaparral. The areas of Riversidean sage scrub and chaparral are mostly outside the project area but within the 100 ft buffer. Much of the project area consists of dense riparian vegetation. These areas do not provide suitable habitat for the target species and were not surveyed with transects. They were instead surveyed from their edges in order to document plant species throughout the site. Slopes that could not be safely accessed or walked were surveyed with binoculars. The survey was floristic in nature, and all species observed in the survey area were identified to the degree required to determine rarity status. Locations of target species observed during the survey were mapped using a global positioning system device or by plotting their locations directly on aerial images. A list of plant species observed in the survey area is provided in attached Table C.

Temecula area precipitation for the 2019–2020 wet season and normal season values were taken from the WeatherCurrents.com website (available at https://weathercurrents.com/temecula/Archive Precipitation.do). Total 2019–2020 wet season precipitation in the Riverside area was 19.3 inches, compared to an average season value of 13.3 inches.

RESULTS

Only one of the WR-MSHCP survey species – Nevin's barberry – was found during the survey.

The following additional special-status plant species were identified during the survey:

- Long-spined spineflower (*Chorizanthe polygonoides* var. *longispina*)
- Chaparral sand-verbena (*Abronia villosa* var. *aurita*)
- White rabbit-tobacco (*Pseudognaphalium leucocephalum*)

None of these species is State or federally listed as threatened or endangered. Long-spined spineflower and chaparral sand-verbena are California Rare Plant Rank (CRPR) 1B species. The 1B designation indicates that these species are considered rare, threatened, or endangered in California and elsewhere. White rabbit-tobacco is a CRPR 2B species. The 2B designation indicates that this species is considered to be rare, threatened, or endangered in California but more common elsewhere.

Long-spined spineflower is a WR-MSHCP covered species considered adequately conserved. This species was not found within the project area but was found only within the 100 ft survey buffer on the northern side of the reservoir. Chaparral sand-verbena and white rabbit-tobacco are not covered species under the WR-MSHCP. These species were present along Temecula Creek downstream of the reservoir. Figure 2 displays the locations of special-status plants species observed in the survey area.

Numbers of individuals observed of each species are summarized in Table B, below.

Table B: Numbers of Individuals Observed by Location

Species	Project Construction Area	Access Roads	Reservoir (below spillway crest at 1,472.6 ft NAVD88)	100 Ft Survey Buffer (around Construction Area, Access Roads, and Reservoir)	Total Observed
Nevin's barberry	7	0	38 (all between 1,435 and 1,472.6 ft NAVD88)	266	311
Chaparral sand-verbena	32	62	0	53	147
White rabbit-tobacco	1,524	0	0	603	2,127
Long-spined spineflower	0	0	0	4,000	4,000

ft = foot/feet
NAVD88 = North American Vertical Datum of 1988

Please contact me at (951) 781-9310 or at Stanley.Spencer@LSA.net if you have any questions regarding this study.

Sincerely,
LSA ASSOCIATES, INC.

Stan Spencer
Associate/Botanist

Attachments: Table C – Vascular Plant Species Observed
Figures 1 and 2

cc: Melody Aimar, WR-MSHCP Biological Monitoring Program

Table C: Vascular Plant Species Observed

Scientific Name	Common Name
LYCOPHYTES	
Selaginellaceae	**Spike moss family**
Selaginella bigelovii	Bushy spike moss
FERNS	
Pteridaceae	**Lip fern family**
Pellaea andromedifolia	Coffee fern
Pentagramma triangularis	Goldenback fern
CONIFERS	
Cupressaceae	**Cypress family**
Juniperus californica	California juniper
EUDICOT FLOWERING PLANTS	
Adoxaceae	**Muskroot family**
Sambucus nigra ssp. *caerulea*	Blue elderberry
Amaranthaceae	**Amaranth family**
*Amaranthus albus**	Tumble pigweed
Anacardiaceae	**Sumac family**
Malosma laurina	Laurel sumac
Rhus aromatica	Skunk bush
Rhus ovata	Sugar bush
Toxicodendron diversilobum	Pacific poison oak
Apiaceae	**Carrot family**
*Apium graveolens**	Common celery
Bowlesia incana	Hoary bowlesia
Daucus pusillus	American wild carrot
Apocynacecae	**Dogbane family**
Funastrum cynanchoides	Fringed twinevine
Asteraceae	**Sunflower family**
Acourtia microcephala	Sacapellote
Ambrosia acanthicarpa	Annual bur-sage
Ambrosia confertiflora	Weak-leaved burweed
Ambrosia psilostachya	Western ragweed
Artemisia californica	California sagebrush
Artemisia douglasiana	Mugwort
Artemisia dracunculus	Tarragon
Artemisia tridentata	Big sagebrush
Baccharis salicifolia	Mule fat
Baccharis salicina	Willow baccharis
Bahiopsis laciniata	San Diego County viguiera
Bebbia juncea	Sweetbush
Brickellia californica	California brickellbush
*Carduus pycnocephalus**	Italian Thistle
*Centaurea benedicta**	Blessed thistle
*Centaurea melitensis**	Maltese star-thistle
Chaenactis artemisiifolia	Artemisia-leaved chaenactis
Chaenactis glabriuscula var. *glabriuscula*	Yellow pincushion
*Cirsium vulgare**	Bull thistle
Corethrogyne filaginifolia	California aster

Table C: Vascular Plant Species Observed

Scientific Name	Common Name
Corethrogyne filaginifolia var. *filaginifolia*	California aster
*Cynara cardunculus**	Artichoke thistle
Deinandra fasciculata	Fascicled tarweed
Deinandra kelloggii	Kellogg's tarweed
Deinandra paniculata	Paniculate tarplant
Encelia actoni	Acton's encelia
Encelia farinosa	Brittlebush
Ericameria brachylepis	Boundary goldenbush
Erigeron canadensis	Canadian horseweed
Erigeron foliosus	Leafy daisy
Eriophyllum confertiflorum	Golden yarrow
*Gazania linearis**	Treasureflower
Gutierrezia sarothrae	San Joaquin matchweed
*Hedypnois cretica**	Crete weed
Heterotheca grandiflora	Telegraph weed
*Hypochaeris glabra**	Smooth cat's-ear
Isocoma menziesii var. *vernonioides*	Menzies' goldenbush
Iva axillaris	Poverty weed
*Lactuca serriola**	Prickly lettuce
Laennecia coulteri	Coulter's horseweed
Lasthenia coronaria	Goldfields
Lasthenia gracilis	Needle goldfields
Layia platyglossa	Coastal tidytips
Lepidospartum squamatum	Scalebroom
Logfia filaginoides	California cottonrose
*Logfia gallica**	Narrowleaf cottonrose
Malacothrix coulteri	Snake's head
Malacothrix saxatilis	Cliff malacothrix
Matricaria discoidea	Disc mayweed
*Oncosiphon pilulifer**	Stinknet
Pluchea sericea	Arrowweed
Porophyllum gracile	Slender poreleaf
Pseudognaphalium biolettii	Two-color rabbit-tobacco
Pseudognaphalium californicum	Ladies' tobacco
Pseudognaphalium leucocephalum	White rabbit-tobacco
*Pseudognaphalium luteoalbum**	Jersey cudweed
Pseudognaphalium stramineum	Cottonbatting plant
Psilocarphus brevissimus	Short woollyheads
Rafinesquia californica	California plumeseed
Senecio flaccidus	Shrubby butterweed
*Senecio vulgaris**	Common groundsel
*Sonchus asper**	Prickly sow thistle
*Sonchus oleraceus**	Common sow thistle
Stylocline gnaphaloides	Everlasting neststraw
Tetradymia comosa	Hairy horsebrush
Uropappus lindleyi	Silver puffs
Xanthium strumarium	Rough cocklebur

Table C: Vascular Plant Species Observed

Scientific Name	Common Name
Berberidaceae	**Barberry family**
Berberis nevinii	Nevin's barberry
Boraginaceae	**Borage family**
Amsinckia intermedia	Common fiddleneck
Cryptantha intermedia	Common cryptantha
Cryptantha muricata	Pointed cryptantha
Eriodictyon crassifolium	Yerba santa
Eucrypta chrysanthemifolia	Common eucrypta
Harpagonella palmeri	Palmer's grapplinghook
Heliotropium curassavicum	Salt heliotrope
Nemophila menziesii	Baby blue eyes
Pectocarya linearis	Narrow-toothed pectocarya
Phacelia distans	Distant phacelia
Phacelia minor	Wild Canterbury bells
Phacelia ramosissima	Branching phacelia
Pholistoma auritum	Blue fiesta flower
Plagiobothrys canescens	Valley popcornflower
Brassicaceae	**Mustard family**
*Brassica nigra**	Black mustard
*Brassica tournefortii**	Sahara mustard
*Capsella bursa-pastoris**	Shepherd's purse
Caulanthus lasiophyllus	California mustard
*Descurainia sophia**	Flixweed
*Hirschfeldia incana**	Shortpod mustard
Lepidium virginicum	Virginia pepperweed
*Sisymbrium irio**	London rocket
*Sisymbrium orientale**	Indian hedgemustard
Cactaceae	**Cactus family**
Cylindropuntia californica var. *parkeri*	Valley cholla
Opuntia basilaris var. *basilaris*	Beavertail prickleypear
Opuntia littoralis	Coastal prickleypear
Caprifoliaceae	**Honeysuckle family**
Lonicera subspicata	Honeysuckle
Caryophyllaceae	**Pink family**
*Herniaria hirsuta**	Hairy rupturewort
Loeflingia squarrosa	Spreading pygmyleaf
*Polycarpon tetraphyllum**	Fourleaf manyseed
*Stellaria media**	Common chickweed
Chenopodiaceae	**Saltbush family**
Atriplex canescens	Fourwing saltbush
Atriplex lentiformis	Big saltbush
*Atriplex semibaccata**	Australian saltbush
Chenopodium berlandieri	Pitseed goosefoot
Chenopodium californicum	California goosefoot
*Salsola tragus**	Russian thistle
Convolvulaceae	**Morning-glory family**
Calystegia macrostegia	Morning-glory
Cuscuta sp.	Dodder

Table C: Vascular Plant Species Observed

Scientific Name	Common Name
Crassulaceae	**Stonecrop family**
Crassula aquatica	Water pygmyweed
Crassula connata	Sand pygmyweed
Dudleya lanceolata	Lanceleaf dudleya
Dudleya pulverulenta	Chalky live-forever
Cucurbitaceae	**Gourd family**
Cucurbita foetidissima	Calabazilla
Marah macrocarpus	Cucamonga manroot
Ericaceae	**Blueberry family**
Arctostaphylos glauca	Bigberry manzanita
Euphorbiaceae	**Spurge family**
Croton californicus	California croton
Croton setigerus	Dove weed
Stillingia linearifolia	Queen's-root
Fabaceae	**Pea family**
Acmispon glaber	Deerweed
Acmispon heermannii	Lotus
Acmispon maritimus	Coastal lotus
Acmispon micranthus	Fishhook lotus
Acmispon strigosus	Strigose lotus
Amorpha fruticosa	False indigo
Astragalus didymocarpus	Dwarf white milkvetch
Astragalus pomonensis	Pomona locoweed
*Medicago polymorpha**	Bur-clover
*Melilotus albus**	White sweetclover
*Melilotus indicus**	Annual yellow sweetclover
Prosopis glandulosa var. torreyana	Honey mesquite
Lupinus bicolor	Miniature lupine
Lupinus microcarpus	Chick lupine
Lupinus sparsiflorus	Coulter's lupine
Lupinus succulentus	Arroyo lupine
Lupinus truncatus	Collar lupine
Lupinus excubitus var. *hallii*	Guard lupine
Fagaceae	**Beech family**
Quercus agrifolia	Coast live oak
Quercus berberidifolia	Scrub oak
Geraniaceae	**Geranium family**
*Erodium botrys**	Longbeak stork's bill
*Erodium cicutarium**	Redstem stork's bill
Erodium texanum	Texas stork's bill
Lamiaceae	**Mint family**
*Lamium amplexicaule**	Henbit deadnettle
*Marrubium vulgare**	Horehound
Salvia apiana	White sage
Salvia carduacea	Thistle sage
Salvia columbariae	Chia
Salvia mellifera	Black sage

Table C: Vascular Plant Species Observed

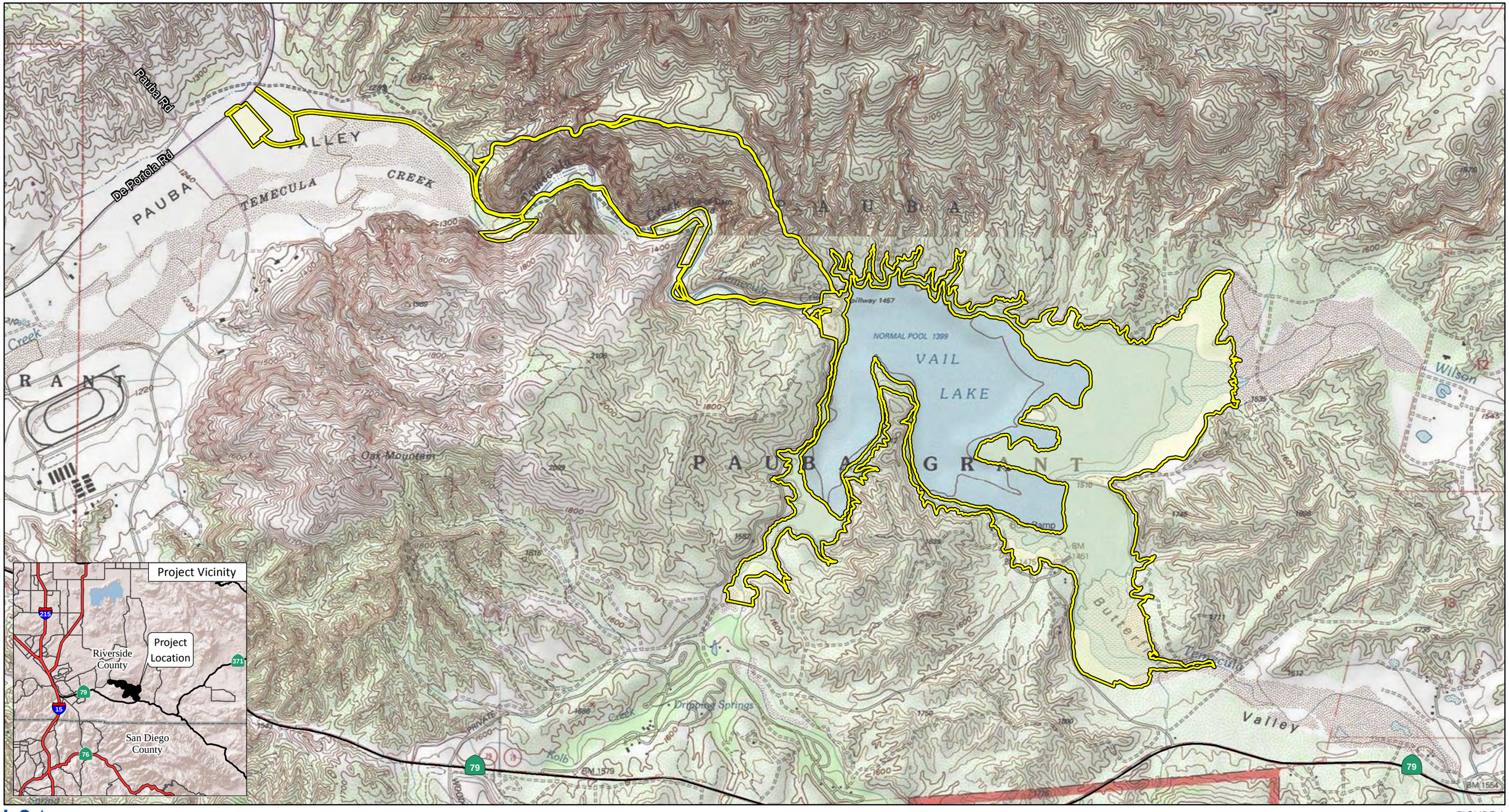
Scientific Name	Common Name
Malvaceae	**Mallow family**
Malacothamnus fasciculatus	Chaparral mallow
Montiaceae	**Miner's lettuce family**
Claytonia parviflora	Streambank springbeauty
Myrsinaceae	**Myrsine family**
*Lysmachia arvensis**	Scarlet pimpernel
Nyctaginaceae	**Four-o'clock family**
Abronia villosa var. *aurita*	Chaparral sand-verbena
Mirabilis laevis	Wishbone bush
Oleaceae	**Olive family**
Forestiera pubescens	Desert olive
Onagraceae	**Evening primrose family**
Camissonia strigulosa	Strigulose evening primrose
Camissoniopsis bistorta	Southern suncup
Clarkia epilobioides	Canyon clarkia
Clarkia purpurea ssp. *quadrivulnera*	Four-spot clarkia
Epilobium campestre	Smooth spike-primrose
Epilobium ciliatum	Green willow herb
Eulobus californicus	Mustard-like evening primrose
Oenothera californica ssp. *californica*	California evening primrose
Oenothera elata ssp. *hookeri*	Hooker's evening-primrose
Orobanchaceae	**Broom-Rape Family**
Castilleja exserta	Exserted Indian paintbrush
Castilleja foliolosa	Felt paintbrush
Papaveraceae	**Poppy family**
Argemone munita	Flatbud prickly poppy
Eschscholzia californica	California poppy
Papaver heterophyllum	Windpoppy
Phrymaceae	**Monkey-flower family**
Mimulus brevipes	Slope semiphore
Mimulus guttatus	Yellow monkey-flower
Mimulus pilosus	Downy monkey-flower
Plantaginaceae	**Plantain family**
Antirrhinum coulterianum	White snapdragon
Antirrhinum nuttallianum	Nuttall's snapdragon
Keckiella antirrhinoides	Yellow bush penstemon
*Nuttallianus texanus**	Texas toadflax
Penstemon spectabilis	Royal penstemon
Plantago erecta	Dotseed plantain
Plantago ovata	Desert Indianwheat
*Veronica anagallis-aquatica**	Great water speedwell
Veronica peregrina	Purslane speedwell
Platanaceae	**Sycamore family**
Platanus racemosa	California sycamore
Polemoniaceae	**Phlox family**
Eriastrum sapphirinum	Sapphire woollystar
Gilia angelensis	Los Angeles gilia

Table C: Vascular Plant Species Observed

Scientific Name	Common Name
Polygonaceae	**Buckwheat family**
Chorizanthe polygonoides var. *longispina*	Long-spined spineflower
Eriogonum elongatum	Longstem buckwheat
Eriogonum fasciculatum	California buckwheat
Eriogonum gracile	Slender buckwheat
Lastarriaea coriacea	Lastarriaea
Pterostegia drymarioides	Woodland pterostegia
Rumex hymenosepalus	Desert rhubarb
Rumex salicifolius	Willow dock
Portulacaeae	**Purslane family**
*Portulaca oleracea**	Common purslane
Ranunculaceae	**Buttercup family**
Clematis pauciflora	Ropevine clematis
Delphinium parryi ssp. *parryi*	San Bernardino larkspur
Rhamnaceae	**Buckthorn family**
Rhamnus crocea	Redberry buckthorn
Rosaceae	**Rose family**
Adenostoma fasciculatum	Chamise
Prunus fasciculata	Desert almond
Prunus ilicifolia	Hollyleaf cherry
Rosa californica	California rose
Rubiaceae	**Madder family**
Galium angustifolium ssp. *angustifolium*	Narrow-leaved bedstraw
Galium aparine	Goose grass
Salicaceae	**Willow family**
Populus fremontii	Fremont cottonwood
Salix exigua	Narrowleaf willow
Salix gooddingii	Goodding's willow
Salix laevigata	Red willow
Salix lasiolepis	Arroyo willow
Scrophulariaceae	**Figwort family**
Scrophularia californica	Coast figwort
Simmondsiaceae	**Jojoba family**
Simmondsia chinensis	Jojoba
Solanaceae	**Nightshade family**
Datura wrightii	Sacred thorn-apple
*Nicotiana glauca**	Tree tobacco
Nicotiana quadrivalvis	Indian tobacco
Solanum americanum	American black nightshade
Solanum douglasii	Greenspot nightshade
Solanum parishii	Parish's nightshade
Tamaricaceae	**Tamarisk family**
*Tamarix ramosissima**	Mediterranean tamarisk
Urticaceae	**Nettle Family**
Hesperocnide tenella	Western nettle
Urtica dioica ssp. *holosericea*	Hoary nettle
*Urtica urens**	Dwarf nettle

Table C: Vascular Plant Species Observed

Scientific Name	Common Name
Zygophyllaceace	**Caltrop family**
*Tribulus terrestris**	Puncture vine
MONOCOT FLOWERING PLANTS	
Agavaceae	**Agave family**
Hesperoyucca whipplei	Chaparral yucca
Yucca schidigera	Mojave yucca
Araceae	**Arum family**
Lemna sp.	Duckweed
Cyperaceae	**Sedge family**
Cyperus eragrostis	Tall flatsedge
Eleocharis parishii	Spikerush
Schoenoplectus californicus	California bulrush
Juncaceae	**Rush family**
Juncus mexicanus	Mexican rush
Juncus xiphioides	Iris-leaved rush
Liliaceae	**Lily family**
Calochortus splendens	Splendid mariposa lily
Poaceae	**Grass family**
*Avena barbata**	Slender wild oat
*Avena fatua**	Wild oat
*Bromus diandrus**	Ripgut brome
*Bromus madritensis**	Foxtail chess
*Bromus tectorum**	Cheatgrass
Cortaderia sp.*	Pampas grass
*Cynodon dactylon**	Bermuda grass
Deschampsia danthonioides	Annual hairgrass
Distichlis spicata	Saltgrass
Elymus condensatus	Giant wildrye
Elymus triticoides	Beardless wildrye
*Festuca myuros**	Annual fescue
*Hordeum murinum**	Mouse barley
*Lamarckia aurea**	Goldentop
Melica imperfecta	Coast range melic
Muhlenbergia microsperma	Littleseed muhly
Poa secunda	Sandberg bluegrass
*Polypogon monspeliensis**	Annual rabbitsfoot grass
*Schismus barbatus**	Common Mediterranean grass
Sporobolus airoides	Alkali sacaton
Stipa pulchra	Purple needlegrass
Themidaceae	**Brodiaea family**
Brodiaea terrestris	Dwarf brodiaea
Dichelostemma capitatum	Blue dicks
Muilla maritima	Common muilla
Typhaceae	**Cattail family**
Typha domingensis	Southern cattail



LSA

LEGEND

Project Location

FIGURE 1

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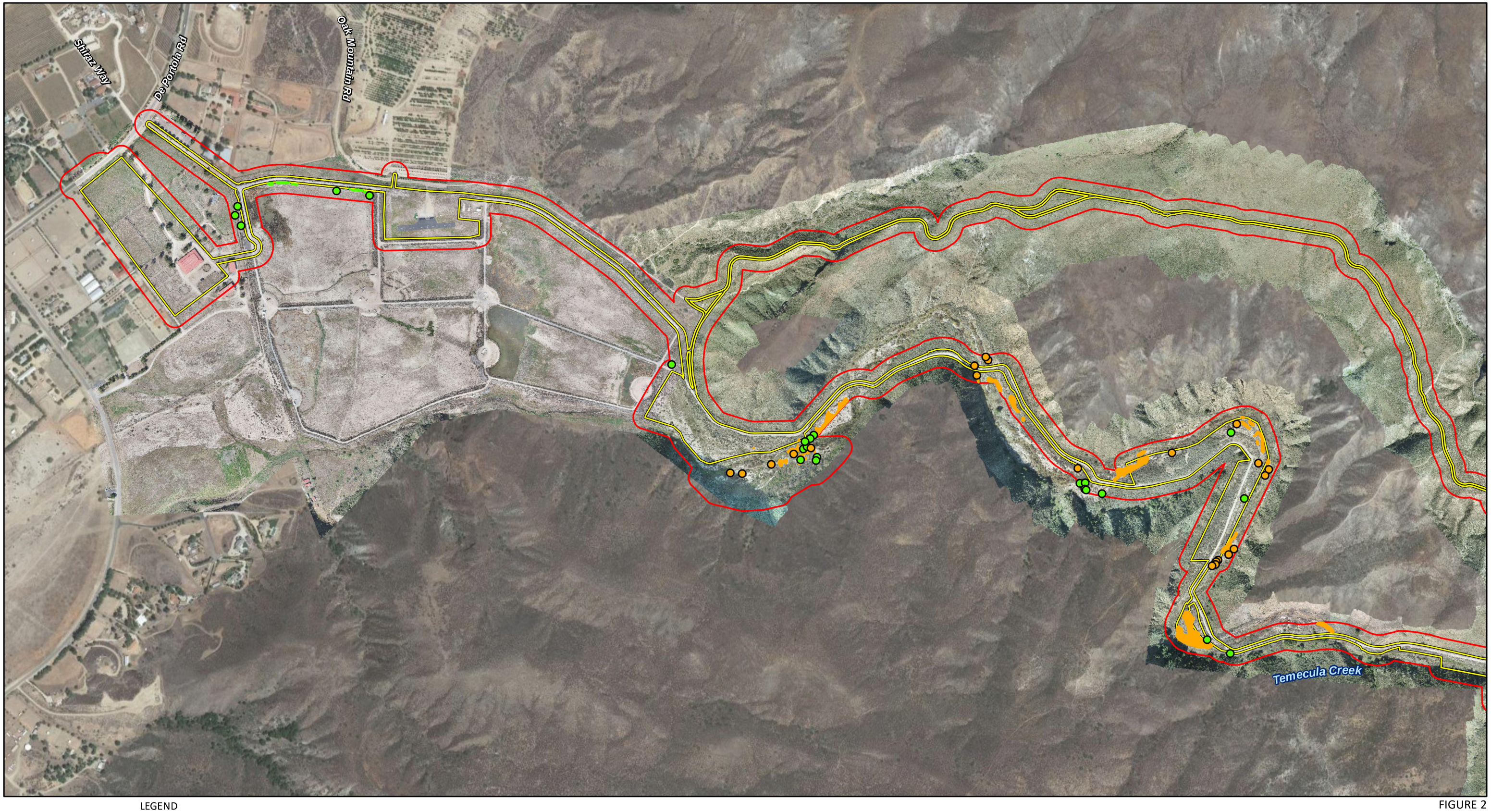
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SOURCE: USGS 7.5' Quad - *Bachelor Mtn, CA* (1978), *Pechanga, CA* (1988), *Sage, CA* (1954), and *Vail Lake, CA* (1988)

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Vail Dam Seismic and Hydrologic Remediation Project

Project Location and Vicinity



LEGEND

Project Location
Plant Survey Area
Spillway Crest (1472.6' NAVD88)

Plant Survey Results
Nevin's Barberry
Chaparral Sand Verbena
White Rabbit-tobacco

Plant Survey Results
Long-spined Spineflower
Chaparral Sand Verbena
White Rabbit-tobacco

0 400 800
FEET

SOURCE: Google Maps (2022); LSA UAV Imagery (2/2020 and 3/2020)

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FIGURE 2
Sheet 1 of 3

Vail Dam Seismic and Hydrologic Remediation Project

Plant Survey Results

Temecula Creek

Vail Lake

Wilson Creek

LEGEND

Project Location

Plant Survey Area

Spillway Crest (1472.6' NAVD88)

Plant Survey Results

Nevin's Barberry

Chaparral Sand Verbena

White Rabbit-tobacco

Plant Survey Results

Long-spined Spineflower

Chaparral Sand Verbena

White Rabbit-tobacco

N

0 400 800

FEET

SOURCE: Google Maps (2022); LSA UAV Imagery (2/2020 and 3/2020)

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FIGURE 2

Sheet 2 of 3

Vail Dam Seismic and Hydrologic Remediation Project

Plant Survey Results



LEGEND

- Project Location
- Plant Survey Area
- Spillway Crest (1472.6' NAVD88)

Plant Survey Results

- Nevin's Barberry
- Chaparral Sand Verbena
- White Rabbit-tobacco

Plant Survey Results

- Long-spined Spineflower
- Chaparral Sand Verbena
- White Rabbit-tobacco

N

0 400 800
FEET

SOURCE: Google Maps (2022); LSA UAV Imagery (2/2020 and 3/2020)

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FIGURE 2
Sheet 3 of 3

Vail Dam Seismic and Hydrologic Remediation Project

Plant Survey Results

APPENDIX G

ARROYO TOAD SURVEY RESULTS

CARLSBAD
FRESNO
IRVINE
LOS ANGELES
PALM SPRINGS
POINT RICHMOND
RIVERSIDE
ROSEVILLE
SAN LUIS OBISPO

September 24, 2020

Sally Brown
United States Fish and Wildlife Service
2177 Salk Avenue
Carlsbad, CA 92008

Subject: Results of Protocol Surveys for the Arroyo Toad (April – June, 2020)
Vail Dam Seismic and Hydrologic Remediation Project, Riverside County, California
(LSA Project No. RCW1902)

Dear Ms. Brown:

This letter report presents the results of focused surveys for the federally listed as endangered arroyo toad (*Anaxyrus californicus*; ARTO) within the Western Riverside County Multiple Species Habitat Conservation Plan (WR-MSHCP) amphibian species survey areas in the Vail Dam Seismic and Hydrologic Remediation Project (project) area. LSA conducted surveys at four areas upstream and downstream of Vail Lake. The survey areas include Temecula Creek upstream and downstream of Vail Lake, Arroyo Seco Creek upstream of Vail Lake, and four unnamed drainages on the north side of Vail Lake as shown on Figures 1 and 2 (attached; references are provided in Attachment A and figures are provided in Attachment B).

ARTO were found within and adjacent to Temecula Creek and Arroyo Seco Creek upstream of Vail Lake, but not in Temecula Creek downstream of the lake or in the four unnamed drainages on the north side of the lake.

STUDY AREAS

The project study area is in an unincorporated part of Riverside County, California, and consists of four separate ARTO survey areas where the WR-MSHCP amphibian species survey areas overlap with areas subject to inundation from fluctuating water levels in the reservoir, with the exception of the study area downstream of the lake, which extends westward beyond the WR-MSHCP amphibian species survey area and includes additional suitable habitat with the potential to support ARTO. The project area is approximately 9 miles east of Temecula and 0.5 mile north of State Route 79. Specifically, the project area is in unsectioned lands of the Pauba Land Grant and lies within the *Vail Lake, California* United States Geological Survey (USGS) 7.5-minute topographic quadrangle (see Figure 1).

The existing lake water level at the time of the survey was approximately 1,428 feet (ft) above mean sea level (amsl) according to the North American Datum of 1988 (NAVD88). The WR-MSHCP amphibian species survey areas are shown in Figures 1 and 2. ARTO surveys within Temecula Creek and the adjacent floodplain upstream of Vail Lake extended approximately 1 mile southeast of the lake with elevations ranging between approximately 1,428 and 1,470 ft amsl. ARTO surveys within the Arroyo Seco Creek drainage channel extended from the lake approximately 0.5 mile at

elevations between approximately 1,428 and 1,466 ft amsl. ARTO surveys within Temecula Creek and the adjacent floodplain downstream of Vail Lake extended approximately 1.5 miles west of the dam at elevations between approximately 1,299 and 1,446 ft amsl. ARTO surveys at the four small unnamed drainages along the northern edge of Vail Lake ranged in elevation from approximately 1,428 to 1,467 ft amsl. All ARTO survey areas were within the spillway crest water level of approximately 1,473 ft amsl (i.e., the level at which water will begin to flow past the dam spillway), which represents the maximum inundation area surrounding Vail Lake.

The project study area is mostly undeveloped. Upstream of the lake, Temecula Creek and Arroyo Seco Creek are dominated by southern cottonwood-willow riparian forest and nonvegetated floodplain or channel. Vegetation associated with Temecula Creek downstream of Vail Lake is dominated by willow scrub within the drainage and coastal sage scrub along the adjacent floodplain. The unnamed drainages surveyed on the north side of the lake are dominated by the nonnative species saltcedar (*Tamarix ramosissima*) and willow scrub.

ARROYO TOAD BACKGROUND

This rather uniformly warty, stocky toad has a light-colored stripe across the head between and including the eyelids. The parotid glands are oval-shaped, widely separated, and pale toward the front. The underside of the ARTO is usually buff-colored and unspotted, and the cranial crests are absent or weak.

ARTO become active and begin to forage on stream terraces and in channel margins with breeding usually beginning in late March. Male calling peaks in early to mid-April and extends through late May and sometimes even into late June and July. ARTO breed and deposit egg masses in shallow, sandy pools, which are usually bordered by sand and gravel flood terraces. Adult and sub-adult ARTO seek shelter during the day and other periods of inactivity by burrowing into old flood channel terraces and often into the soils below the canopy edge of arroyo willow (*Salix lasiolepis*) or Fremont cottonwood (*Populus fremontii*). ARTO typically burrow into dry or slightly damp fine sand substrate. ARTO move between the stream and upland foraging sites as well as up and down the stream corridor to find suitable breeding pools, spending much of their lives in riparian habitats adjacent to breeding locations.

Outside of the breeding season, ARTO are essentially terrestrial. They mostly use riparian habitats, sand bars, alluvial terraces, and streamside benches that lack vegetation or have low to moderate vegetative cover composed predominantly of western sycamore (*Platanus racemosa*), coast live oak (*Quercus agrifolia*), mule fat (*Baccharis salicifolia*), Fremont cottonwood, and willows (*Salix* spp.). Upland habitats used by ARTO for foraging and burrowing during both the breeding and nonbreeding seasons include alluvial scrub, coastal sage scrub, chaparral, grassland, and oak woodland.

ARTO generally frequent third-order washes, streams, and arroyos in semiarid parts of the southwest (Griffin et al. 1999; Ramirez 2000, 2001, 2002a, 2002b, 2002c). Stream substrates range from sands to small cobble, with sandy banks supporting mule fat, willow, Fremont cottonwood, and western sycamore. ARTO breed in both streams and small backwater pools that form along the stream margins, usually in relatively shallow water (up to 4 inches). ARTO move in both up and

downstream directions to find breeding pools. They are known to move into upland habitats after completing individual breeding activity.

ARTO were listed as federally endangered by the United States Fish and Wildlife Service (USFWS) on December 16, 1994, and are considered a California Species of Special Concern (USFWS 1994). On February 7, 2001, the USFWS published a final rule designating 182,360 acres of land in Monterey, Santa Barbara, Ventura, Los Angeles, San Bernardino, Riverside, Orange, and San Diego Counties in California as critical habitat for ARTO. Following the designation of critical habitat, several lawsuits were filed challenging various aspects of the designation. In response to these lawsuits, the critical habitat designation was vacated and the USFWS was instructed by the court to re-evaluate its previous position.

In its final critical habitat designation, the USFWS reduced the acreage from 182,360 to 11,695 acres in February 2001. On April 13, 2005, the USFWS published a final rule designating 11,695 acres of critical habitat for the ARTO in portions of Santa Barbara, Ventura, Los Angeles, Riverside, and San Bernardino counties in California (USFWS 2005). The final critical habitat designation reflects the exclusion of 13 units totaling 67,584 acres based solely on economic considerations. These units are in Santa Barbara, Ventura, Los Angeles, Orange, Riverside, San Bernardino, and San Diego Counties. Portions of two additional units in Orange and San Diego Counties were excluded from critical habitat based on economic considerations and a combination of other factors. All proposed critical habitat in Monterey, Orange, and San Diego Counties was excluded in the final rule.

Following a challenge of the 2005 critical habitat designation by the Centers for Biological Diversity on December 19, 2007, a settlement agreement was reached in which the USFWS was to reconsider the designation and submit a proposed revised critical habitat rule for the ARTO to the Federal Register by October 1, 2009.

The most recent final rule took place on February 9, 2011, in which the USFWS designated 98,366 acres of critical habitat for ARTO in Santa Barbara, Ventura, Los Angeles, Orange, Riverside, San Bernardino, and San Diego counties, an increase of 86,671 acres from the 2005 designation of critical habitat (USFWS 2011).

On June 4, 2012, ARTO was part of a 90-day status review by the USFWS to determine if reclassifying ARTO from endangered to threatened was warranted (USFWS 2012). After the status review, the USFWS withdrew a proposed rule to reclassify the ARTO listing from endangered to threatened under the Federal Endangered Species Act. New information gathered through a scientific, peer-review process showed that ARTO populations have not stabilized, have declined in some areas, and still face the threat of extinction.

DISCUSSION

Arroyo Toad Habitat Suitability Assessment

The daytime ARTO habitat suitability assessments for each of the four ARTO survey areas were conducted by LSA Biologists Leo Simone and Lonnie Rodriguez as follows: Temecula Creek upstream of Vail Lake on April 13, 2020; Temecula Creek downstream of Vail Lake on April 14, 2020; Arroyo Seco Creek upstream of Vail Lake on April 15, 2020; and unnamed tributaries on the north side of

Vail Lake on April 16, 2020. The four ARTO survey areas identified above as well as approximately 200 meters (656 ft) upstream and downstream were assessed for potential ARTO habitat suitability. The habitat suitability assessment was conducted by walking the areas along the project boundary to confirm habitat and areas that may support ARTO. The biologists used caution to avoid crushing ARTO potentially burrowed into the substrate (sand, gravel, or soil). Because ARTO may use trails and roads up to several hundred meters from breeding sites while foraging, the biologists took care not to disturb, injure, or kill ARTO when using these roads and trails. All wildlife observed or detected on or adjacent to the study area was documented (see Attachment C).

Suitable ARTO habitat and its sign were detected during the habitat suitability assessment within the ARTO survey areas of Temecula Creek and Arroyo Seco Creek upstream of Vail Lake. Habitat within the ARTO survey areas of Temecula Creek downstream of Vail Lake is of low quality with a lack of scouring due to the periodic controlled releases of water from Vail Dam. The ARTO survey areas within the unnamed tributaries on the north side of Vail Lake are highly degraded and inundated with saltcedar, and are not suitable for ARTO reproduction. Marginal ARTO foraging habitat is present in the WR-MSHCP amphibian species survey areas ARTO survey areas of Temecula Creek downstream of Vail Lake and in the unnamed tributaries on the north side of Vail Lake.

Nighttime Arroyo Toad Protocol Surveys

LSA Biologists Leo Simone, Lonnie Rodriguez, and/or Richard Erickson conducted nighttime ARTO protocol surveys as follows: two nighttime surveys within the ARTO survey areas of Temecula Creek upstream of Vail Lake on April 20 and 22, 2020; one nighttime survey within the ARTO survey areas of Arroyo Seco Creek upstream of Vail Lake on April 15, 2020; six nighttime surveys within the ARTO survey areas of Temecula Creek downstream of Vail Lake on April 14, 21, May 5, 21, June 9, and 24, 2020; and five nighttime surveys within the ARTO survey areas in the unnamed tributaries on the north side of Vail Lake on April 16, 2020.

Visual and auditory surveys were conducted in suitable estivation and/or foraging habitat by walking slowly and methodically in survey areas with suitable habitat. Surveys focused on the detection of ARTO by visual identification and listening for calling adult males. All wildlife observed or detected on the project site was documented (Attachment C).

Surveys were conducted on nights with appropriate environmental conditions conducive to the activity patterns for this species. Generally, these conditions are nighttime temperatures in excess of 50 degrees Fahrenheit, with low winds (less than 16 kilometers per hour 10 miles per hour), and generally avoiding nights with a full or nearly full moon. These surveys began approximately 1 hour before sunset and continued until approximately 1 hour after sunset. Biologists scanned for foraging individuals in the riparian and upland areas surveyed. Surveys were conducted under suitable weather conditions. Survey dates, times, and weather data are shown in Tables A, B, C, and D below.

Table A: Summary of Arroyo Toad Protocol Survey Conditions – Temecula Creek Upstream of Vail Lake

Survey Date	Air Temperature (°F) Start	End	Wind and Sky (mile/hour) Start	End	Time and Conditions (Time: start -end)
ARTO Habitat Suitability Assessment - L. Simone/L. Rodriguez					
April 13, 2020	57	57	Calm, cloudy	Calm, cloudy	1545–1900
Nighttime Survey 1 - L. Simone					
April 20, 2020	84	59	Calm, clear	Calm, clear	1800–2055
Nighttime Survey 2 - L. Rodriguez					
April 22, 2020	78	61	Calm, clear	Calm, clear	1905–2100

Time is in military time based on a 24-hour clock.
ARTO = arroyo toad
°F = degrees Fahrenheit

Table B: Summary of Arroyo Toad Protocol Survey Conditions – Arroyo Seco Creek Upstream of Vail Lake

Survey Date	Air Temperature (°F) Start	End	Wind and Sky (mile/hour) Start	End	Time and Conditions (Time: start; end)
ARTO Habitat Suitability Assessment/Nighttime Survey 1- L. Simone/L. Rodriguez					
April 15, 2020	84	59	Calm, clear	Calm, clear	1805–2100

ARTO = arroyo toad
°F = degrees Fahrenheit

Table C: Summary of Arroyo Toad Protocol Survey Conditions – Temecula Creek Downstream of Vail Lake

Survey Date	Air Temperature (°F) Start	End	Wind and Sky (mile/hour) Start	End	Time and Conditions (Time: start; end)
ARTO Habitat Suitability Assessment/Nighttime Survey 1 - L. Simone/L. Rodriguez					
April 14, 2020	73	55	Calm, clear	Calm, clear	1830–2040
Survey 2 - L. Simone/R. Erickson					
April 21, 2020	67	56	Calm, clear	Calm, clear	1830–2020
Survey 3 - L. Simone/L. Rodriguez					
May 5, 2020	86	75	Calm, clear	Calm, clear	1910–2110
Survey 4 - L. Simone					
May 21, 2019	84	72	Breezy, partially cloudy	Calm, partially cloudy	1845–2045
Survey 5 - L. Simone					
June 9, 2020	95	90	Calm, smoky	Calm, smoky	1900–2100
Survey 6 - L. Simone					
June 24, 2020	72	65	Calm, clear	Calm, clear	1900–2100

ARTO = arroyo toad
°F = degrees Fahrenheit

Table D: Summary of Arroyo Toad Protocol Survey Conditions – Unnamed Tributaries North Side of Vail Lake

Survey Date	Air Temperature (°F)		Wind and Sky (mile/hour)		Time and Conditions (Time: start; end)
	Start	End	Start	End	
ARTO Survey 1 - L. Simone/L. Rodriguez					
April 16, 2020	73	55	Calm, clear	Calm, clear	1830–2040
Survey 2 - L. Simone/R. Erickson					
April 22, 2020	67	56	Calm, clear	Calm, clear	1830–2020
Survey 3 - L. Simone/L. Rodriguez					
May 5, 2020	86	75	Calm, clear	Calm, clear	1910–2110
Survey 4 - L. Simone					
May 22, 2019	84	72	Breezy, partially cloudy	Calm, partially cloudy	1850–2050
Survey 5 - L. Simone					
June 10, 2020	95	90	Calm, smoky	Calm, smoky	1900–2100

ARTO = arroyo toad
°F = degrees Fahrenheit

SURVEY RESULTS

At least five ARTO individuals were identified during the 2020 protocol ARTO surveys within the ARTO survey areas of Temecula Creek upstream of Vail Lake. They were identified either through direct observation and/or calling males. Within the ARTO survey areas of Arroyo Seco Creek during the 2020 protocol ARTO surveys, three ARTO individuals were observed (see Table E and Attachment B, Figure 2, for ARTO observed locations).

Table E: Summary of Arroyo Toad Observation Locations

Date	Latitude	Longitude	Elevation (feet amsl NAVD 88)	Surveyor
Temecula Creek Upstream of Vail Lake				
April 22, 2020	33.479043 33.476417 33.473983 33.479962 33.475695	-116.958455 -116.957448 -116.949359 -116.959216 -116.956315	1,418 1,444 1,479 1,434 1,424	L. Simone/L. Rodriguez
Arroyo Seco Creek Upstream of Vail Lake				
April 15, 2020	33.483093 33.483113 33.483448	-116.981204 -116.980478 -116.979193	1,412 1,406 1,415	L. Simone/L. Rodriguez

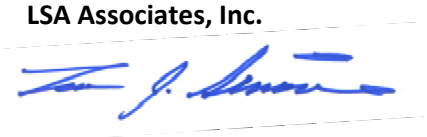
amsl = above mean sea level
NAVD 88 = North American Datum of 1988

The 2020 protocol surveys did not reveal any positive ARTO evidence (e.g., calling males, amplexing [mating] toads, egg strings, or tadpoles) within the ARTO survey areas of Temecula Creek downstream of Vail Lake or in the unnamed tributaries on the north side of Vail Lake.

Please contact Mr. Simone at (949) 553-0666 or leo.simone@lsa.net if you have any questions or comments about this report.

Sincerely,

LSA Associates, Inc.



Leo Simone
Associate Biologist

Attachments: A: References
B: Figures 1 and 2
C: Animal Species Detected

ATTACHMENT A

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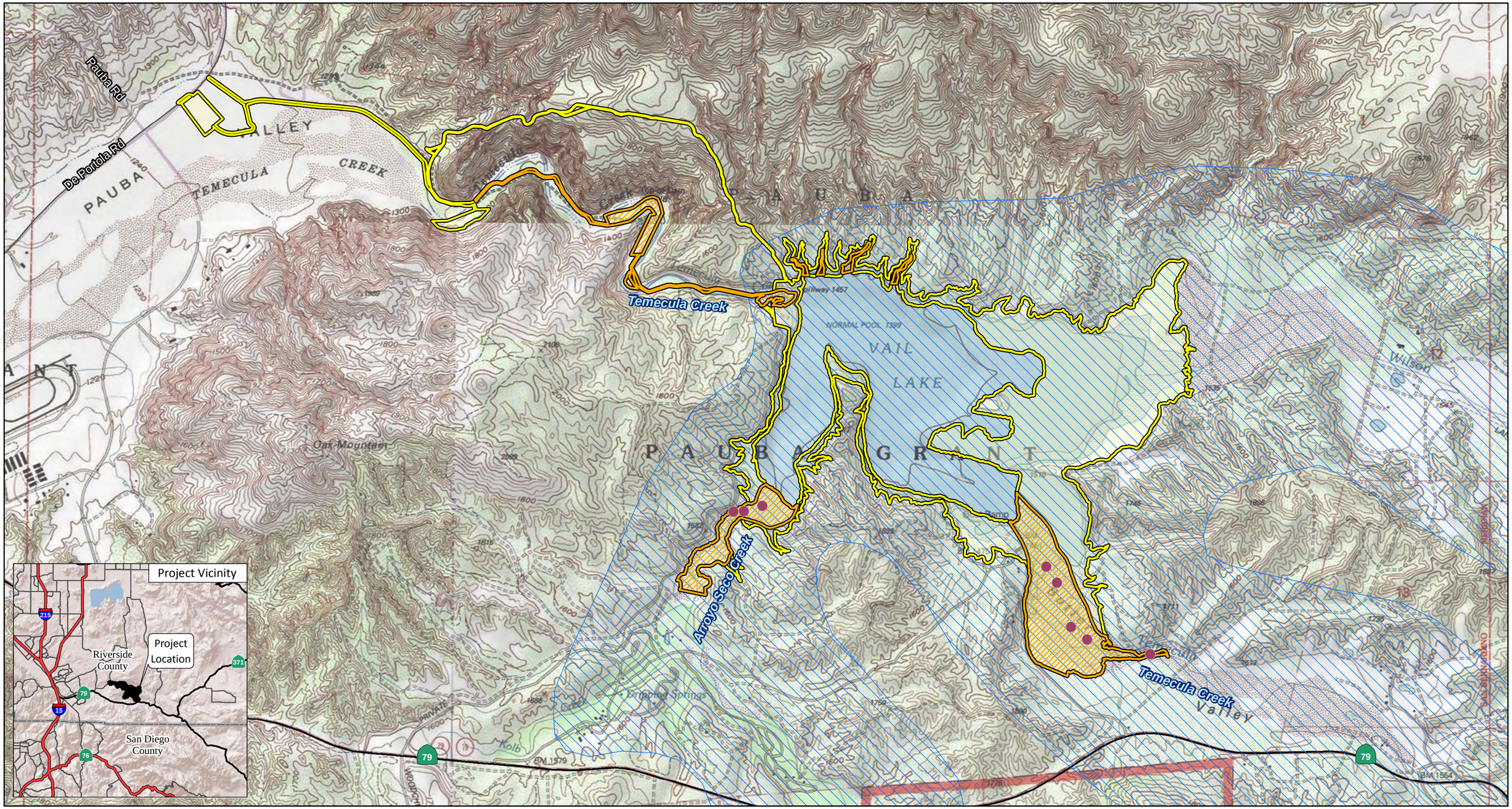
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ATTACHMENT B

FIGURES



LSA

LEGEND

- Project Location
- Arroyo Toad Survey Area
- Arroyo Toad Field Sighting
- Riverside County MSHCP
- Amphibian Survey Area

0 1000 2000
FEET

FIGURE 1

Vail Dam Seismic and Hydrologic Remediation Project

Project Location and Vicinity

SOURCE: USGS 7.5' Quad - *Bachelor Mtn, CA* (1978), *Pechanga, CA* (1988), *Sage, CA* (1954), and *Vail Lake, CA* (1988); Riverside County (2016)

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LSA

LEGEND

Project Location

Arroyo Toad Survey Area

Temecula Creek Downstream of Vail Lake

Arroyo Toad Field Sighting

Spillway Crest (1472.6' NAVD88)

Current Water Level (1428.2' NAVD88)

Riverside County MSHCP

Amphibian Survey Area

N

0 375 750

FEET

FIGURE 2

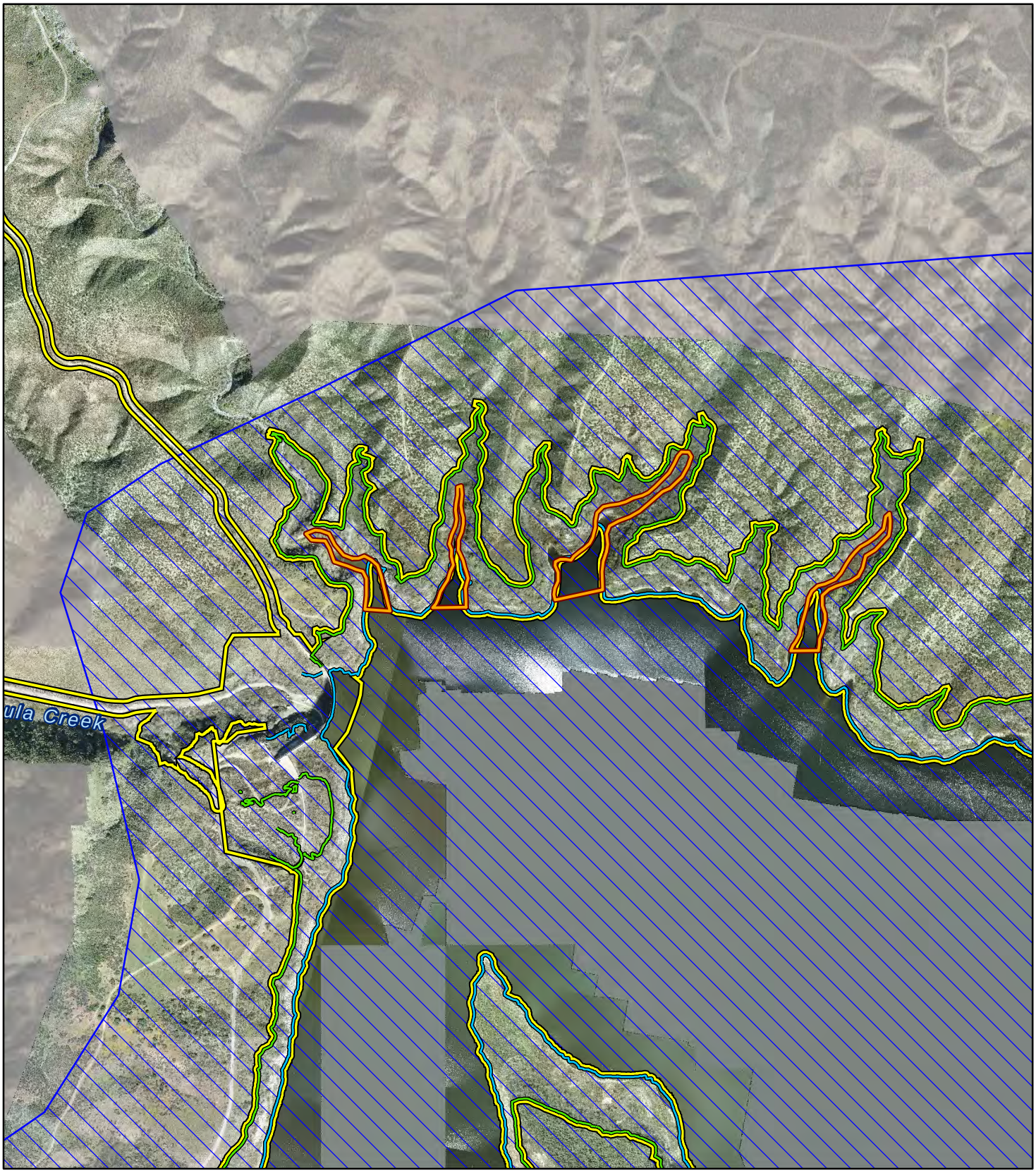
Sheet 1 of 4

Vail Dam Seismic and Hydrologic Remediation Project

Arroyo Toad Survey Area

SOURCE: Google Maps (2019); LSA UAV Imagery (2/2020 and 3/2020)

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LSA

LEGEND

Project Location

Arroyo Toad Survey Area

Unnamed Drainages within the RCMSHCP Amphibian Survey Area

Arroyo Toad Field Sighting

Spillway Crest (1472.6' NAVD88)

Current Water Level (1428.2' NAVD88)

Riverside County MSHCP

Amphibian Survey Area

N

0 300 600

FEET

SOURCE: Google Maps (2019); LSA UAV Imagery (2/2020 and 3/2020)

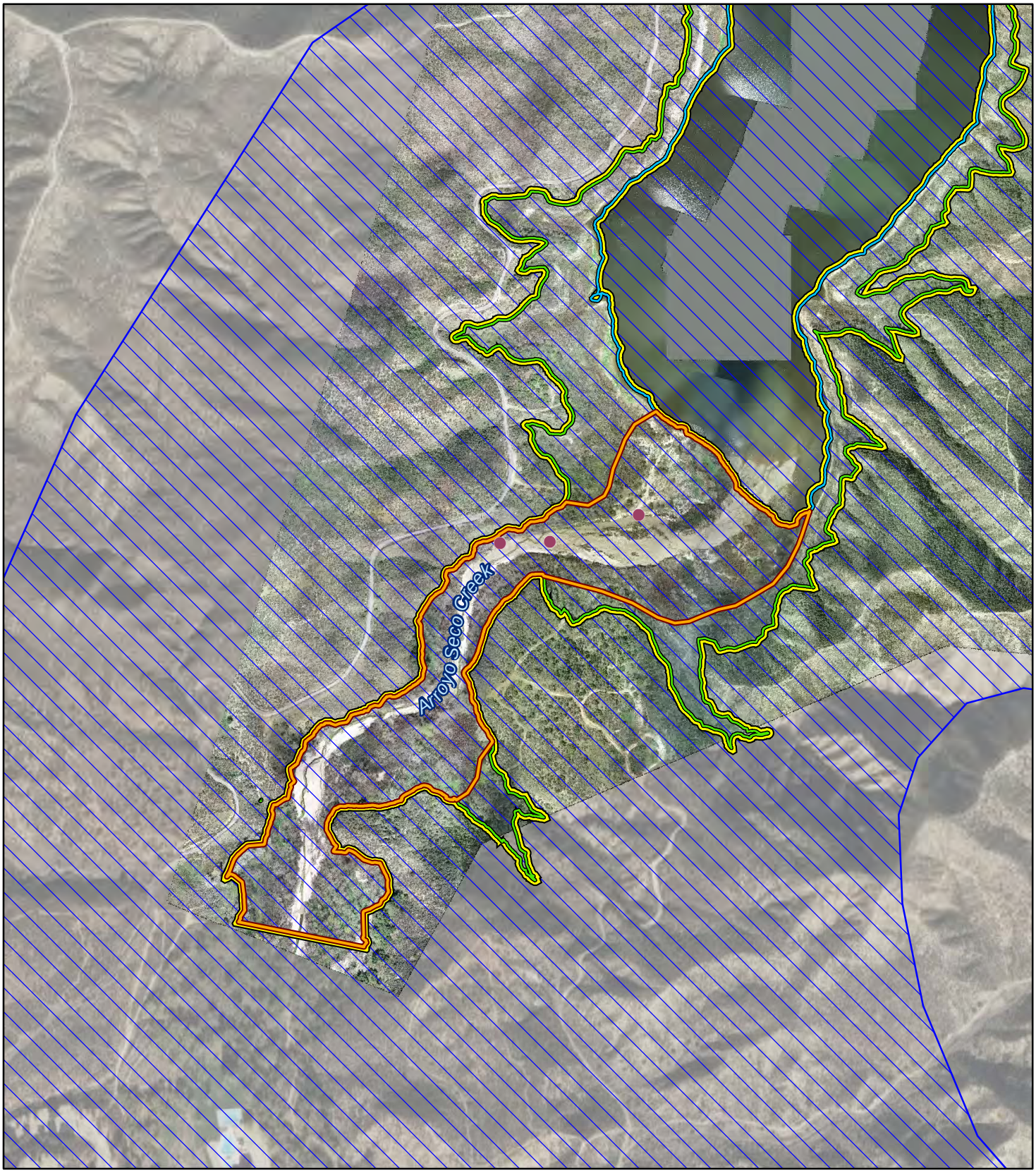
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FIGURE 2

Sheet 2 of 4

Vail Dam Seismic and Hydrologic Remediation Project

Arroyo Toad Survey Area



LSA

LEGEND

Project Location

Arroyo Toad Survey Area

Arroyo Seco Creek Upstream of Vail Lake

Arroyo Toad Field Sighting

Spillway Crest (1472.6' NAVD88)

Current Water Level (1428.2' NAVD88)

Riverside County MSHCP

Amphibian Survey Area

N

0 300 600

FEET

FIGURE 2

Sheet 3 of 4

Vail Dam Seismic and Hydrologic Remediation Project

Arroyo Toad Survey Area

SOURCE: Google Maps (2019); LSA UAV Imagery (2/2020 and 3/2020)

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LSA

LEGEND

Project Location

Arroyo Toad Survey Area

Temecula Creek Upstream of Vail Lake

Arroyo Toad Field Sighting

Spillway Crest (1472.6' NAVD88)

Current Water Level (1428.2' NAVD88)

Riverside County MSHCP

Amphibian Survey Area

N

0 300 600

FEET

FIGURE 2

Sheet 4 of 4

Vail Dam Seismic and Hydrologic Remediation Project

Arroyo Toad Survey Area

SOURCE: Google Maps (2019); LSA UAV Imagery (2/2020 and 3/2020)

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ATTACHMENT C

ANIMAL SPECIES DETECTED

ANIMAL SPECIES DETECTED

This is a list of the conspicuous aerial insects (i.e., damselflies, dragonflies, and butterflies), bony fishes, amphibians, reptiles, birds, and mammals noted in the study area during day- and nighttime fieldwork by LSA biologists from April 2019 through June 2019. Presence may be noted if a species is seen or heard, or identified by the presence of tracks, scat, or other signs.

* Species not native to the study area

LEPIDOPTERA	**BUTTERFLIES**
Nymphalidae	**Brush-Footed Butterflies**
Vanessa cardu	Painted lady
Hesperiidae	**Skippers**
Erynnis funeralis	Funereal duskywing
OSTEICHTHEYS	**BONY FISHES**
Poeciliidae	**Livebearers**
* *Gambusia affinis*	Western mosquitofish
AMPHIBIA	**AMPHIBIANS**
Bufonidae	**True Toads**
Anaxyrus boreas	Western toad
Anaxyrus californicus	Arroyo toad
Hylidae	**Treefrogs and Relatives**
Pseudacris hypochondriaca	Baja California treefrog
Ranidae	**True Frogs**
* *Lithobates catesbeianus*	American bullfrog
REPTILIA	**REPTILES**
Phrynosomatidae	**Phrynosomatid Lizards**
Sceloporus occidentalis	Western fence lizard
Viperidae	**Vipers**
Crotalus ruber	Red-diamond rattlesnake
Emydidae	**Pond Turtles**
* *Trachemys scripta*	Pond slider

AVES	BIRDS
Anatidae	**Ducks, Geese, and Swans**
Anas platyrhynchos	Mallard
Bucephala albeola	Bufflehead
Oxyura jamaicensis	Ruddy duck
Podicipedidae	**Grebes**
Podilymbus podiceps	Pied-billed grebe
Podiceps nigricollis	Eared grebe
Aechmophorus occidentalis	Western grebe
Aechmophorus clarkii	Clark's grebe
Scolopacidae	**Sandpipers**
Gallinago delicata	Wilson's snipe
Laridae	**Gulls, Terns, and Skimmers**
Sterna forsteri	Forster's tern
Columbidae	**Pigeons and Doves**
Zenaida macroura	Mourning dove
Caprimulgidae	**Nightjars**
Phalaenoptilus nuttallii	Common poorwill
Cuculidae	**Cuckoos, Roadrunners, and Anis**
Geococcyx californianus	Greater roadrunner
Apodidae	**Swifts**
Aeronautes saxatilis	White-throated swift
Rallidae	**Rails, Gallinules, and Coots**
Porzana carolina	Sora
Phalacrocoracidae	**Cormorants**
Phalacrocorax auritus	Double-crested cormorant
Pelecanidae	**Pelicans**
Pelecanus erythrorhynchos	American white pelican
Ardeidae	**Herons, Bitterns, and Allies**
Ardea herodias	Great blue heron
Ardea alba	Great egret
Egretta thula	Snowy egret
Accipitridae	**Hawks, Kites, Eagles, and Allies**
Haliaeetus leucocephalus	Bald eagle
Tytonidae	**Barn Owls**
Tyto alba	Barn owl
Strigidae	**Typical Owls**
Bubo virginianus	Great horned owl

Alcedinidae
Megaceryle alcyon

Odontophoridae
Callipepla californica

Falconidae
Falco sparverius

Vireonidae
Vireo gilvus

Trochilidae
Calypte anna

Picidae
Picoides nuttallii
Colaptes auratus

Tyrannidae
Sayornis nigricans

Corvidae
Aphelocoma californica
Corvus brachyrhynchos

Hirundinidae
Stelgidopteryx serripennis
Petrochelidon pyrrhonota

Turdidae
Sialia mexicana

Aegithalidae
Psaltriparus minimus

Regulidae
Regulus calendula

Sylviidae
Chamaea fasciata

Polioptilidae
Polioptila californica californica

Mimidae
Toxostoma redivivum

Parulidae
Geothlypis trichas
Cardellina pusilla

Kingfishers
Belted kingfisher

New World Quail
California quail

Caracaras and Falcons
American kestrel

Vireos
Warbling vireo

Hummingbirds
Anna's hummingbird

Woodpeckers and Allies
Nuttall's woodpecker
Northern flicker

Tyrant Flycatchers
Black phoebe

Crows and Jays
California scrub-jay
American crow

Swallows
Northern rough-winged swallow
Cliff swallow

Thrushes
Western bluebird

Long-Tailed Tits and Bushtits
Bushtit

Kinglets
Ruby-crowned kinglet

Sylviid Warblers
Wrentit

Gnatcatchers and Gnatwrens
Coastal California gnatcatcher

Mockingbirds and Thrashers
California thrasher

Wood Warblers
Common yellowthroat
Wilson's warbler

Emberizidae	**Emberizids**
Pipilo maculatus	Spotted towhee
Melozone crissalis	California towhee
Icteridae	**Blackbirds**
Agelaius phoeniceus	Red-winged blackbird
Fringillidae	**Fringilline and Cardueline Finches and Allies**
Spinus psaltria	Lesser goldfinch
Carpodacus mexicanus	House finch
Passerellidae	**New World Sparrows**
Junco hyemalis	Dark-eyed junco
Melospiza melodia	Song sparrow
Zonotrichia atricapilla	Golden-crowned sparrow
Melozone crissalis	California towhee
Cardinalidae	**Cardinals and Allies**
Piranga ludoviciana	Western tanager
Pheucticus melanocephalus	Black-headed grosbeak
MAMMALIA	**MAMMALS**
Leporidae	**Hares and Rabbits**
Lepus californicus	Black-tailed jackrabbit
Sylvilagus audubonii	Audubon's cottontail
Sylvilagus bachmani	Brush rabbit
Molossidae	**Free-Tailed Bats**
Eumops perotis californicus	Western mastiff bat
Nyctinomops femorosaccus	Pocketed free-tailed bat
Tadarida brasiliensis	Brazilian free-tailed bat
Vespertilionidae	**Evening Bats**
Antrozous pallidus	Pallid bat
Eptesicus fuscus	Big brown bat
Lasiurus blossevillii	Western red bat
Lasiurus cinereus	Hoary bat
Myotis californicus	California myotis
Myotis yumanensis	Yuma myotis
Parastrellus hesperus	Canyon bat
Geomyidae	**Pocket Gophers**
Thomomys bottae	Botta's pocket gopher
Cricetidae	**Hamsters, Voles, Lemmings, and New World Rats and Mice**
Peromyscus californicus	California deermouse
Peromyscus fraterculus	Northern Baja California deermouse
Peromyscus maniculatus	North American deermouse

Heteromyidae *Chaetodipus fallax*	**Pocket Mice and Kangaroo Rats** Northwestern San Diego pocket mouse
Canidae *Canis latrans*	**Foxes, Wolves, and Allies** Coyote
Mephitidae *Mephitis mephitis*	**Skunks** Striped skunk
Cervidae *Odocoileus hemionus*	**Deer, Elk, and Allies** Mule deer

Taxonomy and nomenclature are based on the following:

- **Butterflies:** North American Butterfly Association (2001, NABA Checklist and English Names of North American Butterflies, Second Edition, North American Butterfly Association, Morristown, New Jersey, 2003 update in *American Butterflies* 11: 24-27; see http://www.naba.org/pubs/checklst.html).
- **Fishes:** Page, L. M. et al. (2013, Common and Scientific Names of Fishes from the United States, Canada, and Mexico. Seventh Edition. American Fisheries Society Special Publication 34).
- **Amphibians and Reptiles:** Crother, B.I. ed. (2017, Scientific and Standard English Names of Amphibians and Reptiles of North America North of Mexico, with Comments Regarding Confidence in our Understanding. Eighth Edition. *Herpetological Circular* 43.) for species taxonomy and nomenclature; AmphibiaWeb (https://amphibiaweb.org/) and The Reptile Database (www.reptile-database.org/) for higher order taxonomy; see also California Herps (http://www.californiaherps.com/index.html).
- **Birds:** American Ornithological Society (1998, The A.O.U. Checklist of North American Birds, Seventh Edition, American Ornithologists' Union, Washington, D.C.; and supplements; see http://checklist.aou.org/taxa).
- **Mammals:** Bradley, R. D. et al. (2014, Revised Checklist of North American Mammals North of Mexico, 2014. Museum of Texas Tech University Occasional Papers No. 327).

APPENDIX H

BURROWING OWL HABITAT ASSESSMENT AND SURVEY RESULTS

CARLSBAD
FRESNO
IRVINE
LOS ANGELES
PALM SPRINGS
POINT RICHMOND
RIVERSIDE
ROSEVILLE
SAN LUIS OBISPO

October 13, 2020

Jake Wiley
Rancho California Water District
42135 Winchester Road
Temecula, CA 92590

Subject: Results of Burrowing Owl Habitat Assessment and Survey for Vail Dam Seismic and Hydrologic Remediation Project, Riverside County, California (LSA Project No. RCW1902)

Dear Mr. Wiley:

This report documents the results of a habitat assessment and survey for western burrowing owl (*Athene cunicularia*) for the Vail Dam Seismic and Hydrologic Remediation Project (project), in Riverside County, California. The survey area consists of suitable habitat for burrowing owl within the overall project area (including a 150-meter survey buffer) that overlaps with the Western Riverside County Multiple Species Habitat Conservation Plan (WR-MSHCP) Burrowing Owl Survey Area, and includes adjacent and contiguous suitable burrowing owl habitat outside of the WR-MSHCP Burrowing Owl Survey Area. For the study area around the lake, the elevations ranged from approximately 1,433 to 1,465 feet above mean sea level. The project burrowing owl survey area is in the United States Geological Survey (USGS) 7.5-minute series *Vail Lake* and *Bachelor Mountain, California* quadrangles (Figure 1; all figures attached).

The purpose of the survey was to determine the presence or absence of burrowing owl under the current land use conditions. Burrowing owls are found in open, dry grasslands; agricultural and range lands; desert habitats; and grass, forb, and shrub stages of pinyon and ponderosa pine habitats. They nest in abandoned burrows of ground squirrels or other animals; in pipes, rock, and debris piles; and in other similar features.

No burrowing owls or suitable burrows were detected during the survey sessions.

METHODS

LSA biologist Dr. Stan Spencer performed a burrowing owl habitat assessment in the northwestern portion of the WR-MSHCP Burrowing Owl Survey Area along Temecula Creek (western portion of the project area - Figure 2, Sheet 1) on April 17, 2020, from 7:35 a.m. to 11:30 a.m., and in the southeastern portion of the WR-MSHCP Burrowing Owl Survey Area along Arroyo Seco Creek (eastern portion of the project area - Figure 2, Sheet 2) on April 27, 2020, from 12:00 p.m. to 5:20 p.m. Most of the vegetation in the project area consists of riparian woodland, riparian scrub, or Riversidian alluvial fan sage scrub, which is not suitable to support burrowing owl due to the density of vegetation and presence of trees or large shrubs that provide cover for predators. Areas suitable for burrowing owl include areas mapped as disturbed, non-native grassland, and bare ground (Figure 2). Areas mapped as disturbed are dominated by non-native grasses and other non-native ruderal species, and areas mapped as non-native grassland are dominated by native and non-native herbaceous species.

Burrowing owl surveys were conducted in the survey areas near Temecula Creek (Figure 2, Sheet 1) by Dr. Spencer and LSA biologist Denise Woodard. Table A lists survey dates, times, and weather conditions for surveys in this area.

Table A: Survey Dates, Times, and Weather Conditions for the 2020 Burrowing Owl Survey near Temecula Creek

Survey	Date	Surveyor	Time (24-hour) (start/finish)	Temp. (°F) (start/finish)	Wind	Sky
Burrowing Owl Survey	April 28, 2020	DW, SS	0626/0945	58˚/63˚	Calm	Clear
Burrowing Owl Survey	May 12, 2020	DW, SS	0530/0745	54˚/58˚	Calm	Partly Cloudy
Burrowing Owl Survey	May 26, 2020	DW, SS	0545/0800	57˚/66˚	Calm	Clear
Burrowing Owl Survey	June 11, 2020	DW, SS	0500/0730	61˚/70˚	Moderate (3–5 mph)	Clear

Surveyors: DW=Denise Woodard, SS=Stan Spencer
°F = degrees Fahrenheit
mph = miles per hour

Burrowing owl surveys were conducted in the survey area near Arroyo Seco Creek (Figure 2, Sheet 2) by LSA biologists Leo Simone, Lonnie Rodriguez, and Richard Erickson. Table B lists survey dates, times, and weather conditions for surveys in this area.

Table B: Survey Dates, Times, and Weather Conditions for the 2020 Burrowing Owl Survey near Arroyo Seco Creek

Survey	Date	Surveyor	Time (24-hour) (start/finish)	Temp. (°F) (start/finish)	Wind	Sky
Burrowing Owl Survey 1	April 16, 2020	LR, LS	1830/1940	64˚/54˚	Calm	Cloudy
Burrowing Owl Survey 2	April 27, 2020	LR, LS	1830/2000	66˚/57˚	Calm	Clear
Burrowing Owl Survey 3	May 7, 2020	RE, LS	1840/2015	68˚/60˚	Calm	Clear
Burrowing Owl Survey 4	May 26, 2020	LR, LS	1900/2030	74˚/58˚	Calm	Clear

Surveyors: LR=Lonnie Rodriguez, LS=Leo Simone, RE=Richard Erickson
°F = degrees Fahrenheit

The surveys were conducted in accordance with the 2006 Western Riverside County MSHCP Burrowing Owl Survey Guidelines[1] and the most current accepted burrowing owl protocol survey methodology presented in the California Department of Fish and Game *Staff Report on Burrowing Owl Mitigation* (March 2012).[2] The surveys were conducted by walking approximately 20-meter transects throughout areas of suitable habitat to look for burrowing owls, potential burrows

[1] California Burrowing Owl Consortium. 2006. *Burrowing Owl Survey Instructions for Western Riverside Multiple Species Habitat Conservation Plan.* March 26.

[2] California Department of Fish and Game. 2012. *Staff Report on Burrowing Owl Mitigation*. March 7.

(burrows greater than 11 centimeters (cm) in diameter and 150 cm in depth), and burrowing owl sign. The surveys were conducted during weather conducive to observing burrowing owl activity. No rain had fallen within 5 days prior to the site visits.

RESULTS

A list of wildlife species observed during the surveys is attached. No burrowing owls, burrowing owl sign (e.g., whitewash, pellets, scat, tracks, prey remnants, and feathers), or burrows or similar features suitable for burrowing owl occupation were identified in the survey areas. However, because habitat suitable for burrowing owl is present, and because burrowing owl could occupy the site prior to construction, a pre-construction burrowing owl survey will be required no more than 30 days prior to ground disturbance. Figure 3 displays site photographs taken during the focused survey visits (photograph locations and directions are displayed on Figure 2).

If you have any questions about the results of this survey, please contact me at (951) 781-9310 or stan.spencer@lsa.net.

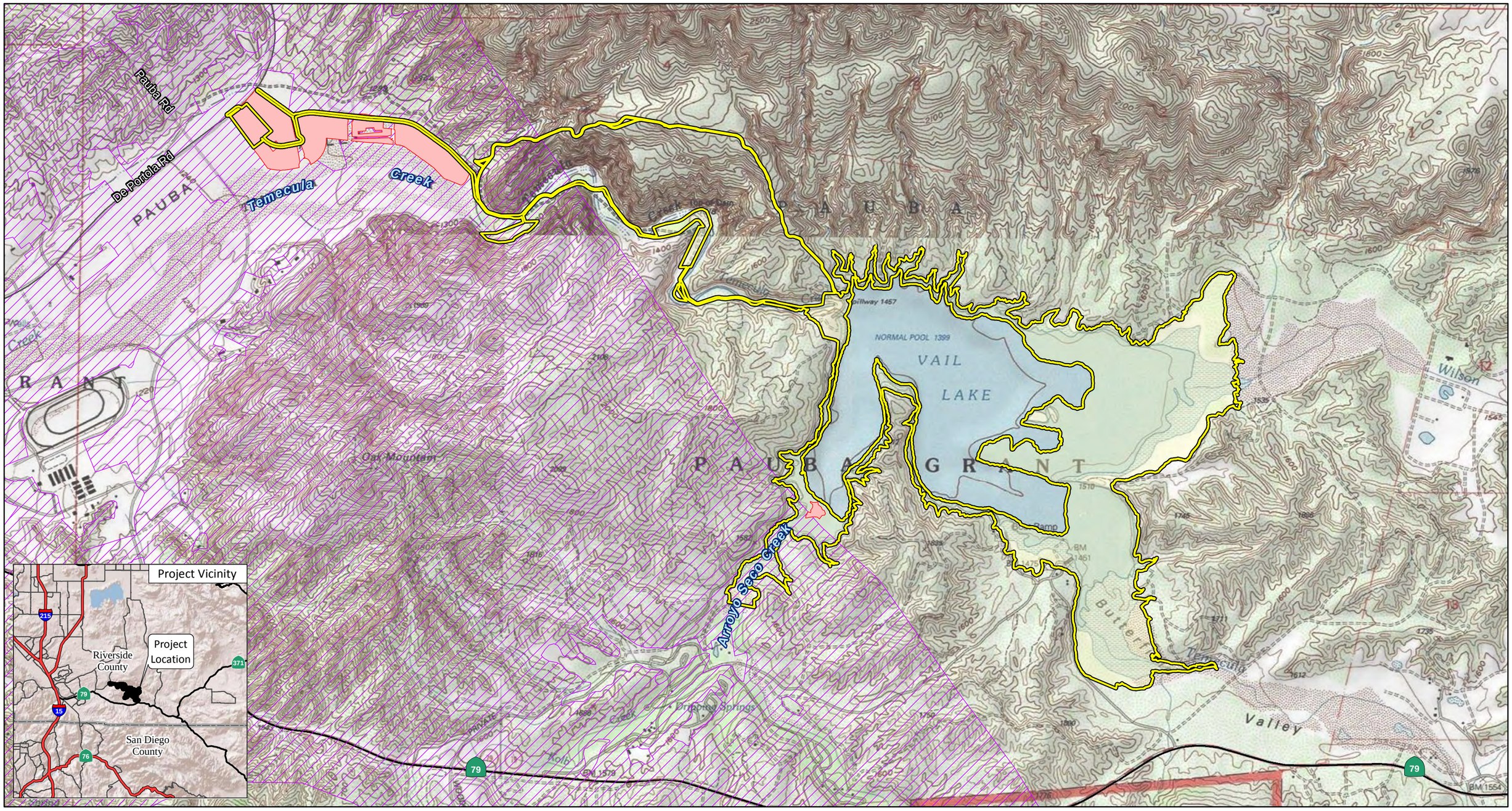
Sincerely,

LSA ASSOCIATES, INC.



Stanley C. Spencer, Ph.D.
Associate/Biologist

Attachments: Figure 1—Burrowing Owl Survey Location
Figure 2—Burrowing Owl Survey Area
Figure 3—Site Photographs
Vertebrate Species Observed



LSA

LEGEND

- Project Location
- Project Burrowing Owl Survey Area
- MSHCP Burrowing Owl Survey Area

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FEET

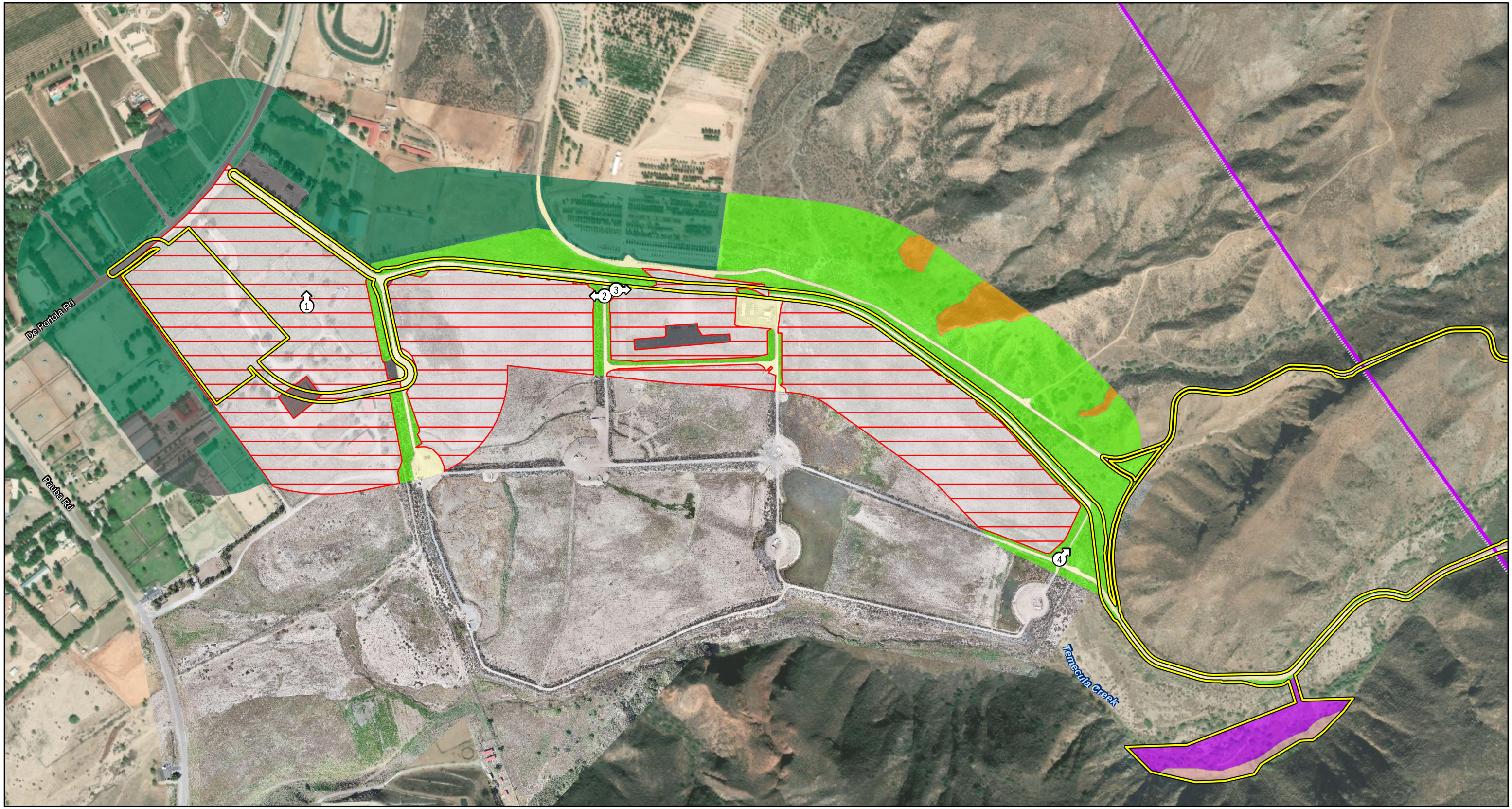
SOURCE: USGS 7.5' Quad - *Bachelor Mtn, CA* (1978), *Pechanga, CA* (1988), *Sage, CA* (1954), and *Vail Lake, CA* (1988); Riverside County (2016)

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FIGURE 1

Vail Dam Seismic and Hydrologic Remediation Project

Burrowing Owl Survey Location



LSA

LEGEND

- Project Location
- Project Burrowing Owl Survey Area (20-m transects)
- MSHCP Burrowing Owl Survey Area
- Photo Locations

Vegetation

- Agriculture
- Alluvial Fan Sage Scrub
- Bare Ground
- Chaparral
- Developed
- Disturbed
- Riparian Scrub
- Riversidian Sage Scrub

N

0 250 500
FEET

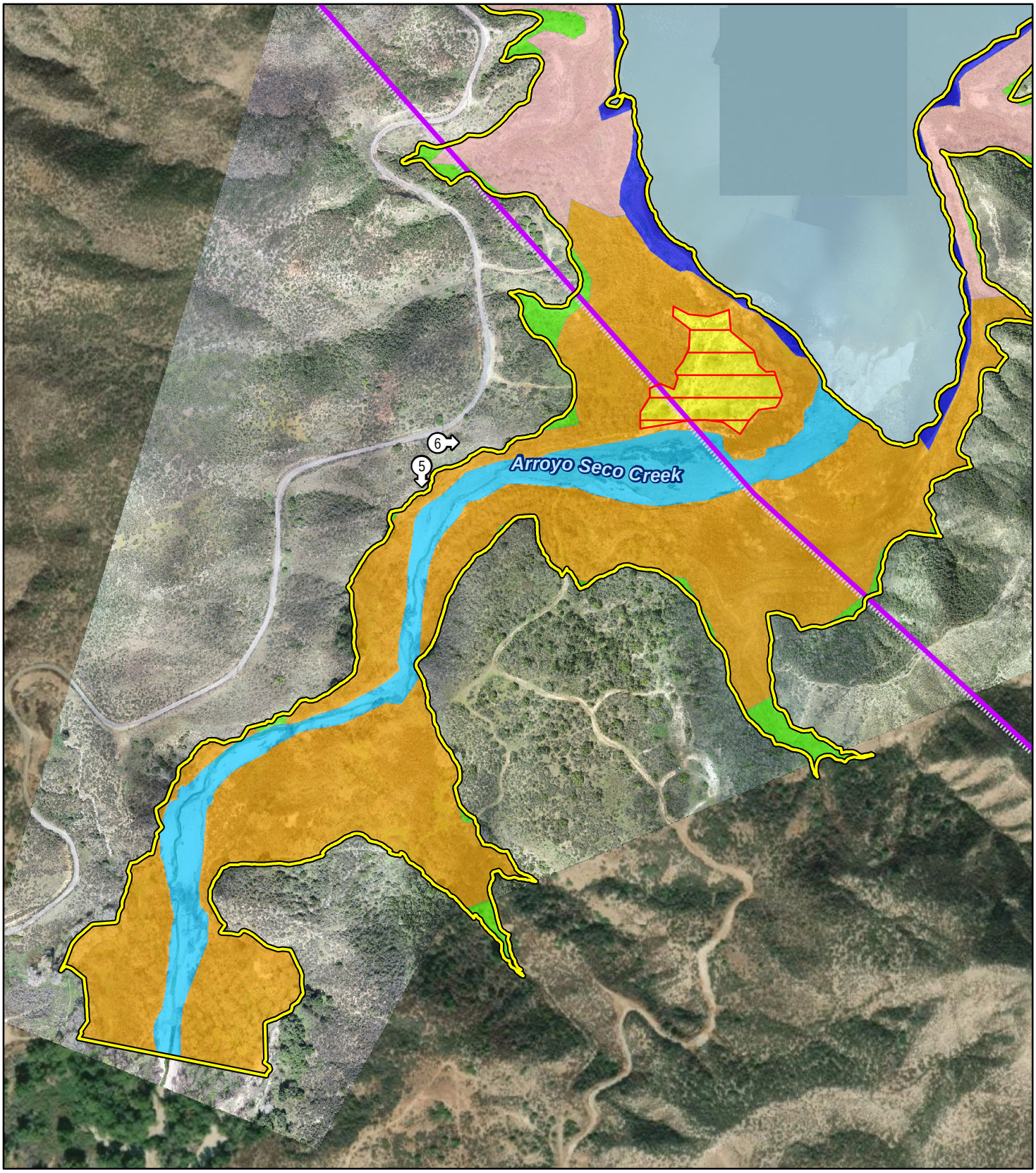
SOURCE: LSA UAV Imagery (3/2020); Google Maps (2019)

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FIGURE 2
SHEET 1 OF 2

Vail Dam Seismic and Hydrologic Remediation Project

Burrowing Owl Survey Area



LSA

LEGEND

Project Location

Project Burrowing Owl Survey Area (20-m transects)

MSHCP Burrowing Owl Survey Area

Photo Locations

Vegetation

Lakeshore

Non-native Grassland

Open Water

Riparian Forest

Riparian Scrub

Riversidian Sage Scrub

Streambed

N

0 200 400

FEET

SOURCE: LSA UAV Imagery (3/2020); Google Maps (2019)

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FIGURE 2

Sheet 2 of 2

Vail Dam Seismic and Hydrologic Remediation Project

Burrowing Owl Survey Area



Photo 1. View of disturbed area adjacent to project site, looking north.



Photo 2. View of Riversidian sage scrub on project site and disturbed area adjacent to project site, looking west.



Photo 3. View of Riversidian sage scrub and disturbed area adjacent to project site, looking east.



Photo 4. View of Riversidian sage scrub on project site and adjacent hillside, looking northeast.

LSA

FIGURE 3

Vail Dam Seismic and Hydrologic Remediation Project

Site Photographs



Photo 5. View of riparian woodland and streambed at project site, looking south.



Photo 6. View of riparian woodland, streambed, and non-native grassland at project site, looking east.

LSA

FIGURE 3

Vail Dam Seismic and Hydrologic Remediation Project
Site Photographs

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VERTEBRATE SPECIES OBSERVED

Scientific Name	Common Name
BIRDS	
Anatidae	**Swans, Geese, and Ducks**
Anas platyrhynchos	Mallard
Odontophoridae	**New World Quail**
Callipepla californica	California quail
Columbidae	**Pigeons and Doves**
Zenaida macroura	Mourning dove
*Streptopelia decaocto**	Eurasian collared dove
Cuculidae	**Cuckoos and Roadrunners**
Geococcyx californianus	Greater roadrunner
Caprimulgidae	**Goatsuckers**
Chordeiles acutipennis	Lesser nighthawk
Trochilidae	**Hummingbirds**
Calypte anna	Anna's hummingbird
Charadriidae	**Plovers and Lapwings**
Charadrius vociferus	Killdeer
Ardeidae	**Herons, Egrets, and Bitterns**
Ardea alba	Great egret
Accipitridae	**Kites, Hawks, and Eagles**
Accipiter striatus	Sharp-shinned hawk
Accipiter cooperii	Cooper's hawk
Buteo jamaicensis	Red-tailed hawk
Aquila chrysaetos	Golden eagle
Picidae	**Woodpeckers**
Melanerpes formicivorus	Acorn woodpecker
Colaptes auratus	Northern flicker
Tyrannidae	**Tyrant Flycatchers**
Sayornis nigricans	Black phoebe
Tyrannus vociferans	Cassin's kingbird
Tyrannus verticalis	Western kingbird
Corvidae	**Crows and Ravens**
Aphelocoma californica	California scrub-jay
Corvus brachyrhynchos	American crow
Corvus corax	Common raven
Alaudidae	**Larks**
Eremophila alpestris	Horned lark

VERTEBRATE SPECIES OBSERVED

Scientific Name	Common Name
Hirundinidae	**Swallows**
Stelgidopteryx serripennis	Northern rough-winged swallow
Aegithalidae	**Bushtits**
Psaltriparus minimus	Bushtit
Troglodytidae	**Wrens**
Thryomanes bewickii	Bewick's wren
Turdidae	**Thrushes**
Sialia mexicana	Western bluebird
Turdus migratorius	American robin
Mimidae	**Mockingbirds and Thrashers**
Mimus polyglottos	Northern mockingbird
Toxostoma redivivum	California thrasher
Sturnidae	**Starlings**
*Sturnus vulgaris**	European starling
Fringillidae	**Finches**
Haemorhous mexicanus	House finch
Spinus psaltria	Lesser goldfinch
Passerellidae	**New World Sparrows**
Pipilo maculatus	Spotted towhee
Melozone crissalis	California towhee
Melospiza melodia	Song sparrow
Icteriidae	**Yellow-Breasted Chats**
Icteria virens	Yellow-breasted chat
Icteridae	**Blackbirds, Orioles and Allies**
Icterus cucullatus	Hooded oriole
Icterus bullockii	Bullock's oriole
Agelaius phoeniceus	Red-winged blackbird
Euphagus cyanocephalus	Brewer's blackbird
Quiscalus mexicanus	Great-tailed grackle
Parulidae	**Wood Warblers**
Geothlypis trichas	Common yellowthroat
Cardinalidae	**Cardinals, Grosbeaks, and Allies**
Pheucticus melanocephalus	Black-headed grosbeak
REPTILES	
Colubridae	**Colubrid Snakes**
Thamnophis hammondii	Two-striped gartersnake

VERTEBRATE SPECIES OBSERVED

Scientific Name	Common Name
MAMMALS	
Sciuridae	**Squirrels**
Spermophilus beecheyi	California ground squirrel
Geomyidae	**Pocket Gophers**
Thomomys bottae	Botta's pocket gopher
Leporidae	**Rabbits and Hares**
Sylvilagus audubonii	Desert cottontail
Canidae	**Foxes, Wolves and Dogs**
Canis latrans	Coyote
Cervidae	**Deer**
Odocoileus hemionus	Mule deer

APPENDIX I

LOS ANGELES POCKET MOUSE AND AGUANGA KANGAROO RAT SURVEY RESULTS

CARLSBAD
FRESNO
IRVINE
LOS ANGELES
PALM SPRINGS
POINT RICHMOND
RIVERSIDE
ROSEVILLE
SAN LUIS OBISPO

August 7, 2020

Scott Osborn, Ph.D.
California Department of Fish and Wildlife
Wildlife Branch, Nongame Wildlife Program
1812 Ninth Street
Sacramento, CA 95811

Claire Ingel
California Department of Fish and Wildlife
Inland Deserts Region
3602 Inland Empire Boulevard, Suite C-220
Ontario, CA 91764

Subject: Los Angeles Pocket Mouse and Aguanga Kangaroo Rat Survey Results: Vail Dam Seismic and Hydrologic Remediation Project, Vail Lake Area, Unincorporated Riverside County, California; May–June 2020 (LSA Project No. RCW1902)

Dear Dr. Osborn and Ms. Ingel:

This letter report documents the results of protocol presence/absence surveys conducted by LSA for the Los Angeles pocket mouse (*Perognathus longimembris brevinasus*) and Aguanga kangaroo rat (*Dipodomys merriami collinus*), two California Species of Special Concern. LSA conducted surveys in three areas potentially subject to inundation from the proposed Vail Dam Seismic and Hydrologic Remediation Project (project) in unincorporated Riverside County. Surveys for the Los Angeles pocket mouse and Aguanga kangaroo rat were conducted where suitable habitat is present within the mammal species survey areas as identified in the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP), in compliance with the project review process for public and private projects. No Los Angeles pocket mice or Aguanga kangaroo rats were captured.

Study Areas

The project study area consists of three separate areas where the MSHCP mammal species survey areas overlap with areas subject to inundation from fluctuating water levels in the reservoir. The existing lake water level at the time of survey was approximately 1,428.2 according to the North American Datum of 1988 (NAVD 88). These areas, identified as Traplines 1, 2, and 3, are shown in Attachment A, Figures 1 and 2. Trapline 1 was within the Temecula Creek floodplain, approximately 1 mile southeast of Vail Lake and 0.5 mile north of State Route 79 (SR-79) at an elevation of between approximately 1,464 and 1,470 feet NAVD88. Trapline 2 was within the Arroyo Seco Creek drainage channel approximately 1,000 feet southwest of Vail Lake and 1.5 miles north of SR-79 at an elevation of between approximately 1,446 and 1,466 feet NAVD 88. Trapline 3 was within an area identified as Butterfield Valley, approximately 1,000 feet south-southeast of Vail Lake and 1.5 miles north of SR-79 at an elevation of between approximately 1,444 and 1,454 feet NAVD 88. All traplines were within the spillway crest water level of approximately 1,472.6 feet NAVD 88 (i.e., the level at which water will begin to flow past the dam spillway) which represents the maximum inundation area surrounding Vail Lake. The project area is in an unincorporated part of Riverside County, California (Figure 1).

The surveys were conducted within the project limits in those areas included in the Los Angeles pocket mouse and Aguanga kangaroo rat survey areas identified by the Western Riverside County MSHCP. The project study area is mostly undeveloped, with Traplines 1 and 2 dominated by southern cottonwood-willow riparian forest and nonvegetated floodplain or channel and Trapline 3 dominated by nonnative grassland and disturbed habitat.

Methods

LSA biologists Leo Simone and Richard Erickson conducted three protocol trapping sessions, each consisting of 5 nights of trapping, pursuant to LSA's California Department of Fish and Wildlife attachment to Scientific Collecting Permit No. SC-000777 providing Conditions for Research on Listed Mammals (June 18, 2018–December 31, 2021). Mr. Simone and/or Mr. Erickson were present and responsible during the entire trapping effort; LSA biologists Lonnie Rodriguez, Jill Carpenter, and Jessica Lieuw also provided assistance under the direct supervision of Mr. Simone and/or Mr. Erickson.

The first session, conducted from May 3 through May 8, 2020, consisted of 100 traps set in one continuous line. The second session, conducted from June 7 through June 12, 2020, also consisted of 100 traps set in one continuous line. The final trapping session, conducted from June 23 through June 28, 2020, consisted of 70 traps set in one continuous line. Traps were baited with birdseed and wild oats. Trap checks took place near midnight and at dawn. All animals were identified and released, unharmed, at their capture sites, as shown on Figure 2.

Results

No Los Angeles pocket mice or Aguanga kangaroo rats were captured. During Session 1, there were 161 rodent captures involving five species. Session 2 included 351 rodent captures involving 10 species. Session 3 had 180 rodent captures involving seven species. The North American deermouse (*Peromyscus maniculatus*) was by far the most common species captured. Complete capture results are shown in Tables A through C (Attachment B).

California Native Species Field Survey Forms are provided in Attachment C.

If you have any questions or comments, please contact me at (949) 553-0666 or at leo.simone@lsa.net.

Sincerely,

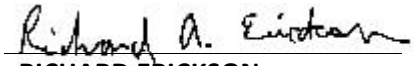
LSA Associates, Inc.



Leo Simone, Associate/Biologist

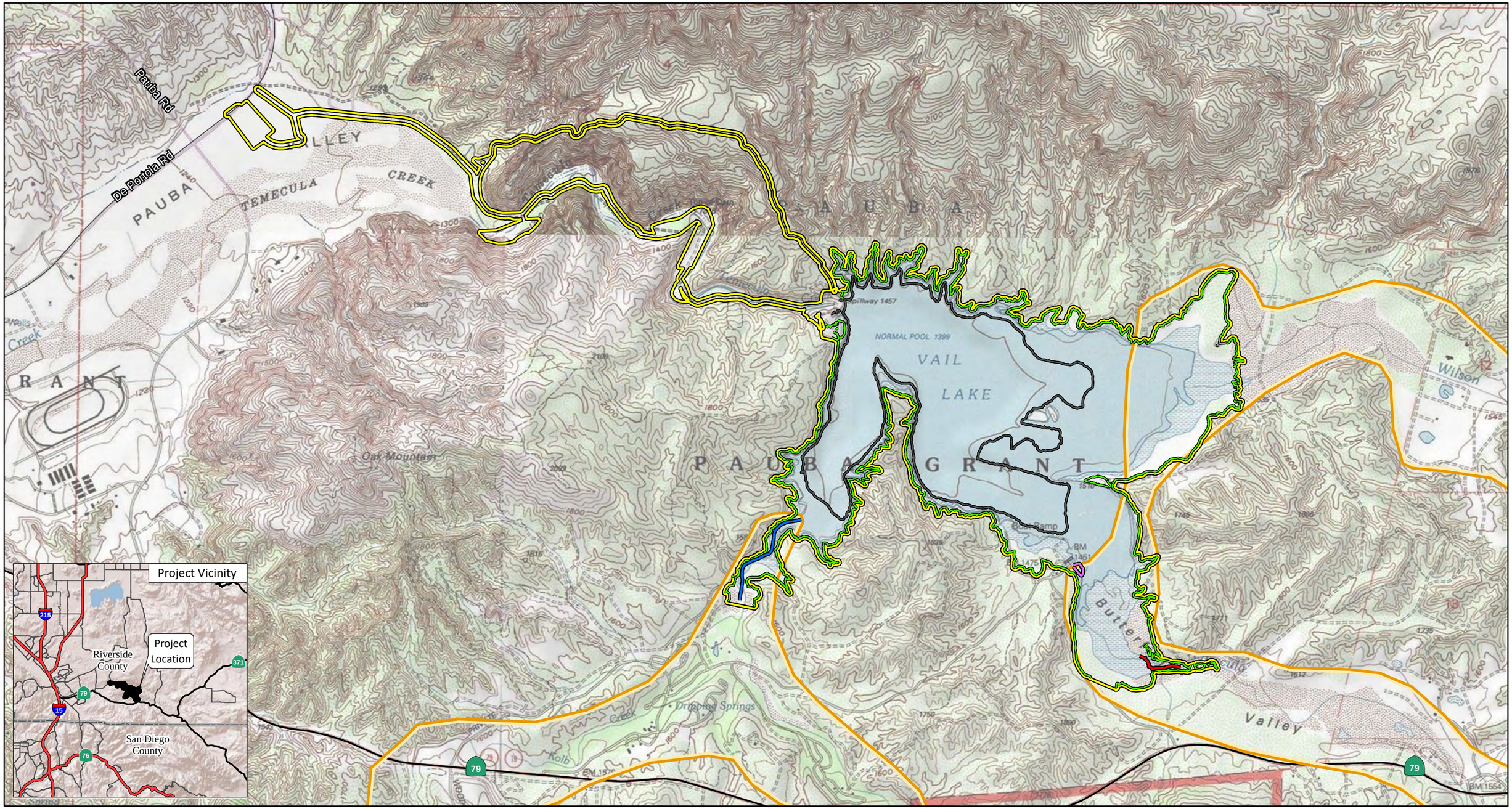
Attachments:
- A: Figure 1: Project Location and Vicinity
  Figure 2: Traplines
- B: Table A: Session 1 Trapping Results
  Table B: Session 2 Trapping Results
  Table C: Session 3 Trapping Results
- C: California Native Species Field Survey Forms

I CERTIFY THAT THE INFORMATION IN THIS SURVEY REPORT AND ATTACHED EXHIBITS FULLY AND ACCURATELY REPRESENT MY WORK:

SURVEYOR:	PERMIT NUMBER:	DATE:
	SC-5243	AUGUST 7, 2020
LEO SIMONE		
	SC-000777	AUGUST 7, 2020
RICHARD ERICKSON		

ATTACHMENT A

FIGURES



LSA

LEGEND

- Project Location
- Trapline 1 (1,464'-1,470' NAVD88)
- Trapline 2 (1,446'-1,466' NAVD88)
- Trapline 3 (1,444'-1,454' NAVD88)
- Spillway Crest (1472.6' NAVD88)
- Current Water Level (1428.2' NAVD88)

Riverside County MSHCP

- Mammal Survey Area

N

0 1000 2000
FEET

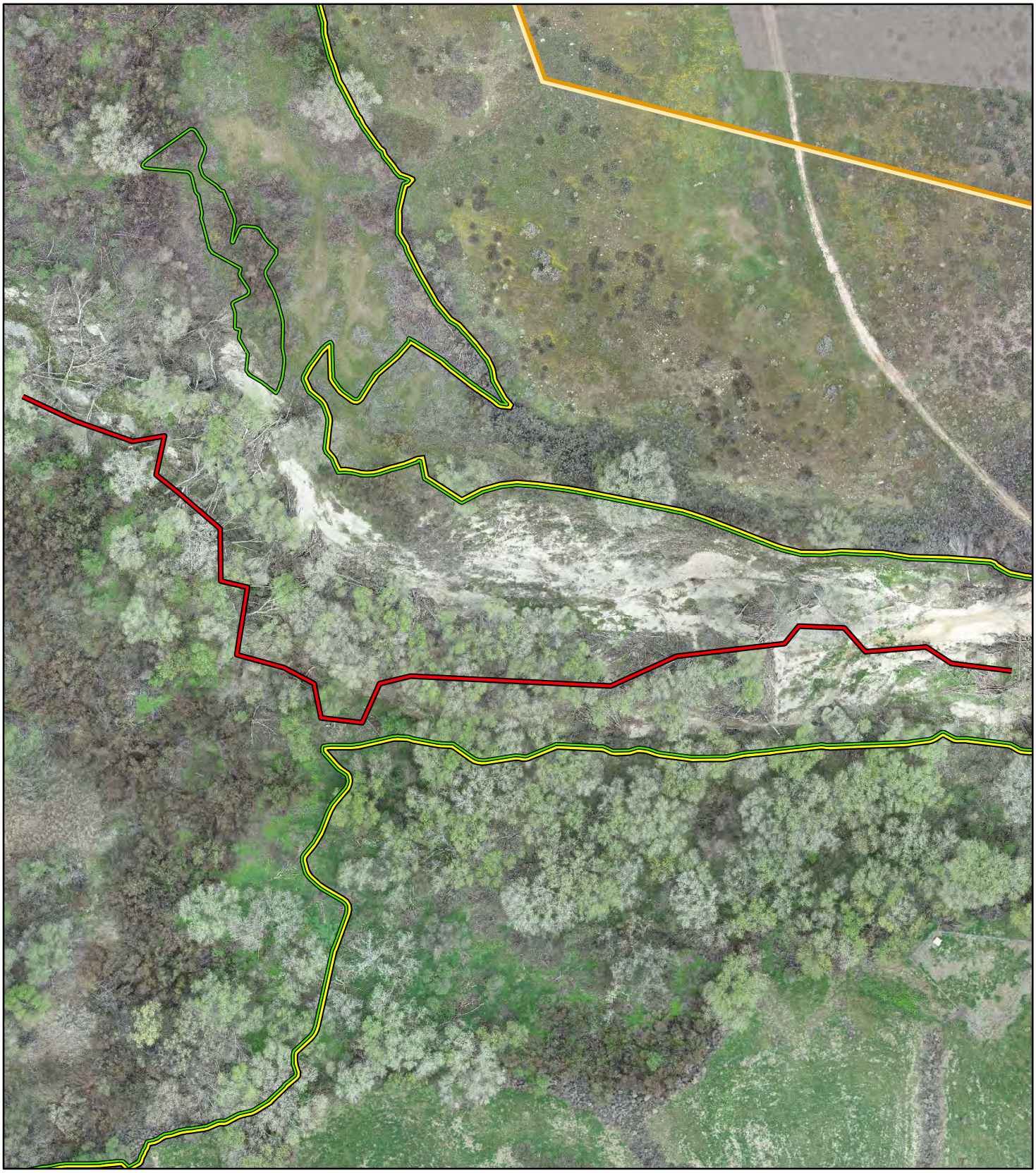
FIGURE 1

Vail Dam Seismic and Hydrologic Remediation Project

Project Location and Vicinity

SOURCE: USGS 7.5' Quad - *Bachelor Mtn, CA* (1978), *Pechanga, CA* (1988), *Sage, CA* (1954), and *Vail Lake, CA* (1988); Riverside County (2016)

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LSA

LEGEND

Project Location

Trapline 1 (1,464'-1,470' NAVD88)

Riverside County MSHCP

Mammal Survey Area

Spillway Crest (1472.6' NAVD88)

N

0 60 120

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FIGURE 2

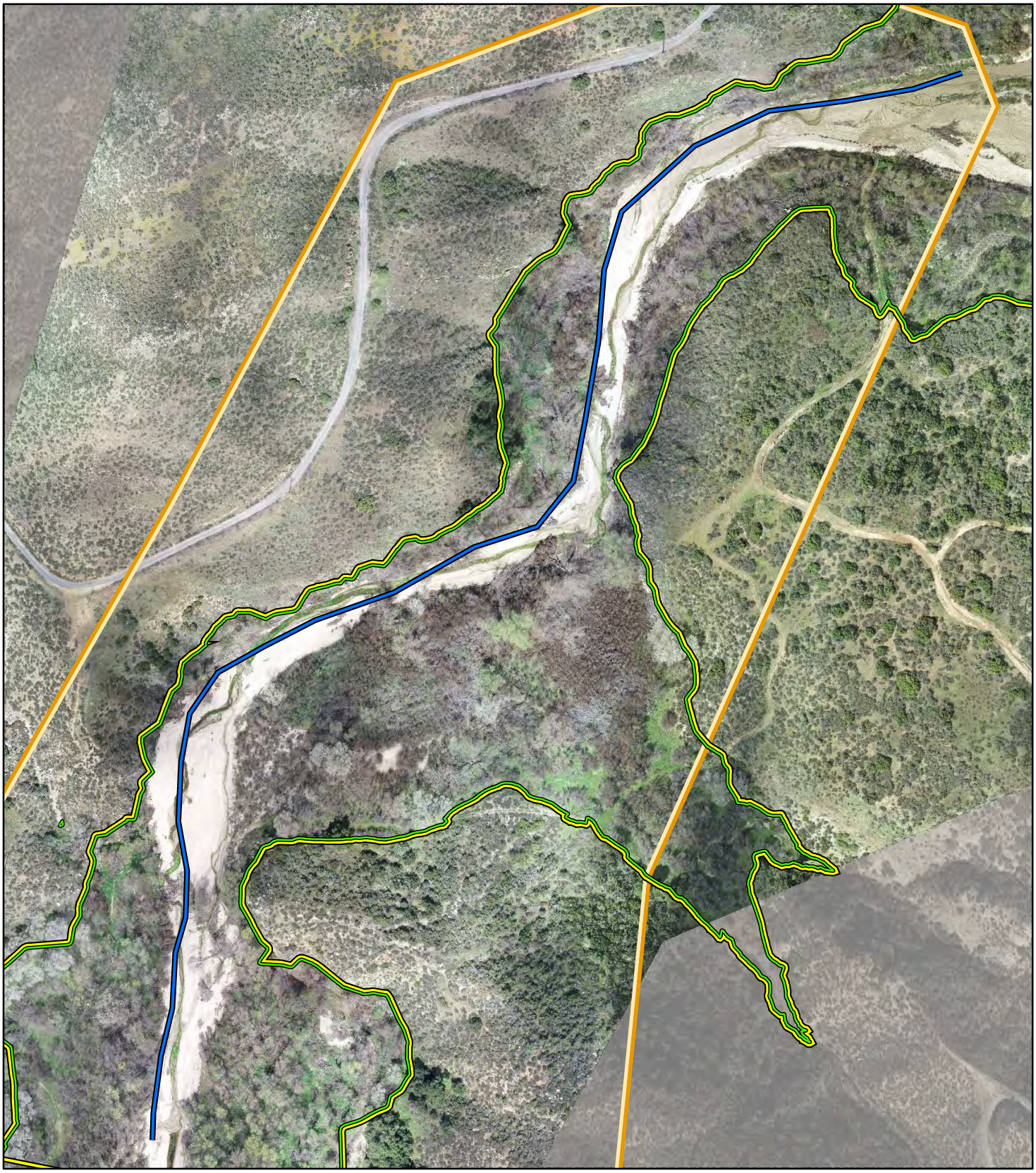
Sheet 1 of 3

Vail Dam Seismic and Hydrologic Remediation Project

Traplines

SOURCE: Google Maps (2019); LSA UAV Imagery (2/2020 and 3/2020)

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LSA

LEGEND

Project Location

Spillway Crest (1472.6' NAVD88)

Trapline 2 (1,446'-1,466' NAVD88)

Riverside County MSHCP

Mammal Survey Area

N

0 110 220

FEET

FIGURE 2

Sheet 2 of 3

Vail Dam Seismic and Hydrologic Remediation Project

Traplines

SOURCE: Google Maps (2019); LSA UAV Imagery (2/2020 and 3/2020)

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LSA

LEGEND

Project Location

Spillway Crest (1472.6' NAVD88)

Trapline 3 (1,444'-1,454' NAVD88)

Riverside County MSHCP

Mammal Survey Area

N

0 50 100

FEET

FIGURE 2

Sheet 3 of 3

Vail Dam Seismic and Hydrologic Remediation Project

Traplines

SOURCE: Google Maps (2019); LSA UAV Imagery (2/2020 and 3/2020)

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ATTACHMENT B

TABLES

Table A: Vail Dam Seismic and Hydrologic Remediation Project, Session 1 Trapping Summary, May 2020

Trapping Results											
Date and Time	**May 3 2300**	**May 4 0600**	**May 4 2300**	**May 5 0600**	**May 5 2300**	**May 6 0600**	**May 6 2300**	**May 7 0600**	**May 7 2300**	**May 8 0600**	**Total**
Number of Traps	**100**		**100**		**100**		**100**		**100**		**500**
Species											
Northwestern San Diego pocket mouse *Chaetodipus fallax fallax*						1		1	1	1	**4**
North American deermouse *Peromyscus maniculatus*	1	7	4	16	9	19	14	21	16	23	**130**
California deermouse *Peromyscus californicus*				3	2	2	4	5	2	4	**22**
Western harvest mouse *Reithrodontomys megalotis*		1		1							**2**
San Diego desert woodrat *Neotoma lepida intermedia*					1			1		1	**3**
Total Rodent Captures	**1**	**8**	**4**	**20**	**12**	**22**	**18**	**28**	**19**	**29**	**161**

Table B: Vail Dam Seismic and Hydrologic Remediation Project, Session 2 Trapping Summary, June 2020

Trapping Results											
Date and Time	**June 7 2300**	**June 8 0600**	**June 8 2300**	**June 9 0600**	**June 9 2300**	**June 10 0600**	**June 10 2300**	**June 11 0600**	**June 11 2300**	**June 12 0600**	**Total**
Number of Traps	**100**		**100**		**100**		**100**		**100**		**500**
Species											
California vole *Microtus californicus*	1	2	5	7	4	10	6	6	10	7	**58**
Northwestern San Diego pocket mouse *Chaetodipus fallax*		3	4	5	3	2	4		2	1	**24**
North American deermouse *Peromyscus maniculatus*	8	11	6	12	7	15	12	16	5	9	**101**
Northern Baja deermouse *Peromyscus fraterculus*		1	1		4	9	2	3	6	3	**29**
California deermouse *Peromyscus californicus*			1	1	1	1	3		3	4	**14**
Brush deermouse *Peromyscus boylii*			2	5	1	1	5	6	3	11	**34**
Western harvest mouse *Reithrodontomys megalotis*		3	1	5	1	3	2	4	1	2	**22**
San Diego desert woodrat *Neotoma lepida intermedia*	1	4		4	2	4	3	7		4	**29**
Big-eared woodrat *Neotoma macrotis*			2	1	3	3		2		5	**16**
House mouse *Mus musculus*		6		4	1	4	1	4	1	3	**24**
Total Rodent Captures	**10**	**30**	**22**	**44**	**27**	**52**	**38**	**48**	**31**	**49**	**351**

Table C: Vail Dam Seismic and Hydrologic Remediation Project, Session 2 Trapping Summary, June 2020

	Trapping Results										
Date and Time	**June 23 2300**	**June 24 0600**	**June 24 2300**	**June 25 0600**	**June 25 2300**	**June 26 0600**	**June 26 2300**	**June 27 0600**	**June 27 2300**	**June 28 0600**	**Total**
Number of Traps	**70**		**70**		**70**		**70**		**70**		**350**
Species											
Dulzura/agile kangaroo rat *Dipodomys simulans/agilis*		2		4	1	3	1	3	1	4	**19**
Northwestern San Diego pocket mouse *Chaetodipus fallax*		2	2	2				1		1	**8**
California vole *Microtus californicus*	1					1			1		**3**
North American deermouse *Peromyscus maniculatus*		9	9	15	8	18	9	24	17	24	**133**
Northern Baja deermouse *Peromyscus fraterculus*	1					4					**5**
Western harvest mouse *Reithrodontomys megalotis*								1	1		**2**
House mouse *Mus musculus*			1	1	1	2		2	2	1	**10**
Total Rodent Captures	**2**	**13**	**12**	**22**	**10**	**28**	**10**	**31**	**22**	**30**	**180**

ATTACHMENT C

CALIFORNIA NATIVE SPECIES FIELD SURVEY FORMS

Mail to:
California Natural Diversity Database
California Dept. of Fish & Wildlife
P.O. Box 944209
Sacramento, CA 94244-2090
CNDDB@wildlife.ca.gov

Date of Field Work (mm/dd/yyyy): 06/28/2020

For Office Use Only
Source Code: _____ Quad Code: _____
Elm Code: _____ Occ No.: _____
EO Index: _____ Map Index: _____

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: *Chaetodipus fallax fallax*

Common Name: Northwestern San Diego pocket mouse

Species Found? (●) Yes ( ) No _____ If not found, why?

Total No. Individuals: 36 Subsequent Visit? ( ) Yes ( ) No

Is this an existing NDDB occurrence? _____ Yes, Occ. # ☐ No ☒ Unk.

Collection? If yes: _____ Number _____ Museum / Herbarium

Reporter: Leo Simone
Address: 20 Executive Park, Suite 200
Irvine, CA 92614
E-mail Address: leo.simone@lsa.net
Phone: (949) 553-0666

Plant Information

Phenology:

_____ % vegetative _____ % flowering _____ % fruiting

Animal Information

_____ # adults _____ # juveniles _____ # larvae _____ # egg masses _____ # unknown

☐ wintering ☐ breeding ☐ nesting ☐ rookery ☐ burrow site ☐ lek ☐ other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

Vail Lake

County: Riverside Landowner / Mgr: Rancho California Water District

Quad Name: Vail Lake, Sage, Bachelor Mtn, Pechanga Elevation: 1,800 ft

T____ R____ Sec____, ____¼ of ____ ¼, Meridian: H ( ) M ( ) S ( ) Source of Coordinates (GPS, topo. map & type): _____

T____ R____ Sec____, ____¼ of ____ ¼, Meridian: H ( ) M ( ) S ( ) GPS Make & Model: _____

DATUM: **NAD27** ( ) **NAD83** ( ) **WGS84** ( ) Horizontal Accuracy: _____ meters/feet

Coordinate System: UTM Zone 10 ( ) UTM Zone 11 ( ) ***OR*** Geographic (Latitude & Longitude) ( )

Coordinates:

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

Southern cottonwood-willow riparian forest and non-vegetated floodplain or channel, nonnative grassland, and disturbed habitat.

Please fill out separate form for other rare taxa seen at this site.

Site Information

Overall site/occurrence quality/viability (site + population): ( ) Excellent (●) Good ( ) Fair ( ) Poor

Immediate AND surrounding land use: mostly undeveloped,

Visible disturbances: ORV use,

Threats: development, inundation

Comments:

Determination: *(check one or more, and fill in blanks)*

☐ Keyed (cite reference): _____
☐ Compared with specimen housed at: _____
☐ Compared with photo / drawing in: _____
☐ By another person (name): _____
☐ Other: _____

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	☐	☐	☐
Habitat	☐	☐	☐
Diagnostic feature	☐	☐	☐

May we obtain duplicates at our expense? ( ) yes ( ) no

Mail to:
California Natural Diversity Database
California Dept. of Fish & Wildlife
P.O. Box 944209
Sacramento, CA 94244-2090
CNDDB@wildlife.ca.gov

For Office Use Only
Source Code: _____ Quad Code: _____
Elm Code: _____ Occ No.: _____
EO Index: _____ Map Index: _____

Date of Field Work (mm/dd/yyyy): 06/28/2020

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: *Dipodomys merriami collinus*

Common Name: Aguanga kangaroo rat

Species Found? ○ Yes ◉ No — not trapped (If not found, why?)

Total No. Individuals: _____ Subsequent Visit? ○ Yes ○ No

Is this an existing NDDB occurrence? _____ (Yes, Occ. #) ☐ No ☒ Unk.

Collection? If yes: _____ (Number) _____ (Museum / Herbarium)

Reporter: Leo Simone
Address: 20 Executive Park, Suite 200
Irvine, CA 92614
E-mail Address: leo.simone@lsa.net
Phone: (949) 553-0666

Plant Information

Phenology:

_____ % vegetative _____ % flowering _____ % fruiting

Animal Information

_____ # adults _____ # juveniles _____ # larvae _____ # egg masses _____ # unknown

☐ wintering ☐ breeding ☐ nesting ☐ rookery ☐ burrow site ☐ lek ☐ other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

Vail Lake

County: Riverside Landowner / Mgr: Rancho California Water District

Quad Name: Vail Lake, Sage, Bachelor Mtn, Pechanga Elevation: 1,800 ft

T____ R____ Sec____, ____¼ of ____ ¼, Meridian: H○ M○ S○ Source of Coordinates (GPS, topo. map & type): _____

T____ R____ Sec____, ____¼ of ____ ¼, Meridian: H○ M○ S○ GPS Make & Model: _____

DATUM: NAD27 ○ NAD83 ○ WGS84 ○ Horizontal Accuracy: _____ meters/feet

Coordinate System: UTM Zone 10 ○ UTM Zone 11 ○ ***OR*** Geographic (Latitude & Longitude) ○

Coordinates:

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

Southern cottonwood-willow riparian forest and non-vegetated floodplain or channel, nonnative grassland, and disturbed habitat.

Please fill out separate form for other rare taxa seen at this site.

Site Information

Overall site/occurrence quality/viability (site + population): ○ Excellent ◉ Good ○ Fair ○ Poor

Immediate AND surrounding land use: mostly undeveloped,

Visible disturbances: ORV use,

Threats: development, inundation

Comments:

Determination: *(check one or more, and fill in blanks)*

☐ Keyed (cite reference): _____
☐ Compared with specimen housed at: _____
☐ Compared with photo / drawing in: _____
☐ By another person (name): _____
☐ Other: _____

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	☐	☐	☐
Habitat	☐	☐	☐
Diagnostic feature	☐	☐	☐

May we obtain duplicates at our expense? ○ yes ○ no

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California Natural Diversity Database
California Dept. of Fish & Wildlife
P.O. Box 944209
Sacramento, CA 94244-2090
CNDDB@wildlife.ca.gov

For Office Use Only
Source Code: _____ Quad Code: _____
Elm Code: _____ Occ No.: _____
EO Index: _____ Map Index: _____

Date of Field Work (mm/dd/yyyy): 06/28/2020

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: *Neotoma lepida intermedia*

Common Name: San Diego desert woodrat

Species Found? (●) Yes ( ) No _____ If not found, why?

Total No. Individuals: 32 Subsequent Visit? ( ) Yes ( ) No

Is this an existing NDDB occurrence? _____ Yes, Occ. # [ ] No [X] Unk.

Collection? If yes: _____ Number _____ Museum / Herbarium

Reporter: Leo Simone
Address: 20 Executive Park, Suite 200
Irvine, CA 92614
E-mail Address: leo.simone@lsa.net
Phone: (949) 553-0666

Plant Information

Phenology:

_____ % vegetative _____ % flowering _____ % fruiting

Animal Information

_____ # adults _____ # juveniles _____ # larvae _____ # egg masses _____ # unknown

[ ] wintering [ ] breeding [ ] nesting [ ] rookery [ ] burrow site [ ] lek [ ] other

Location Description (please attach map AND/OR fill out your choice of coordinates, below)

Vail Lake

County: Riverside Landowner / Mgr: Rancho California Water District

Quad Name: Vail Lake, Sage, Bachelor Mtn, Pechanga Elevation: 1,800 ft

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T____ R____ Sec____, ____¼ of ____ ¼, Meridian: H( ) M( ) S( ) GPS Make & Model: _____

DATUM: **NAD27** ( ) **NAD83** ( ) **WGS84** ( ) Horizontal Accuracy: _____ meters/feet

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Coordinates:

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
Animal Behavior *(Describe observed behavior, such as territoriality, foraging, singing, calling, copulating, perching, roosting, etc., especially for avifauna):*

Southern cottonwood-willow riparian forest and non-vegetated floodplain or channel, nonnative grassland, and disturbed habitat.

Please fill out separate form for other rare taxa seen at this site.

Site Information

Overall site/occurrence quality/viability (site + population): ( ) Excellent (●) Good ( ) Fair ( ) Poor

Immediate AND surrounding land use: mostly undeveloped,

Visible disturbances: ORV use,

Threats: development, inundation

Comments:

Determination: *(check one or more, and fill in blanks)*

[ ] Keyed (cite reference): _____
[ ] Compared with specimen housed at: _____
[ ] Compared with photo / drawing in: _____
[ ] By another person (name): _____
[ ] Other: _____

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	[ ]	[ ]	[ ]
Habitat	[ ]	[ ]	[ ]
Diagnostic feature	[ ]	[ ]	[ ]

May we obtain duplicates at our expense? ( ) yes ( ) no

Mail to:
California Natural Diversity Database
California Dept. of Fish & Wildlife
P.O. Box 944209
Sacramento, CA 94244-2090
CNDDB@wildlife.ca.gov

For Office Use Only
Source Code: _____ Quad Code: _____
Elm Code: _____ Occ No.: _____
EO Index: _____ Map Index: _____

Date of Field Work (mm/dd/yyyy): 06/28/2020

Clear Form

California Native Species Field Survey Form

Print Form

Scientific Name: *Perognathus longimembris brevinasus*

Common Name: Los Angeles pocket mouse

Species Found? ○ Yes ◉ No — not trapped (If not found, why?)

Total No. Individuals: _____ Subsequent Visit? ○ Yes ○ No

Is this an existing NDDB occurrence? _____ (Yes, Occ. #) ☐ No ☒ Unk.

Collection? If yes: _____ (Number) _____ (Museum / Herbarium)

Reporter: Leo Simone
Address: 20 Executive Park, Suite 200
Irvine, CA 92614
E-mail Address: leo.simone@lsa.net
Phone: (949) 553-0666

Plant Information
Phenology:
_____ % vegetative _____ % flowering _____ % fruiting

Animal Information
_____ # adults _____ # juveniles _____ # larvae _____ # egg masses _____ # unknown
☐ wintering ☐ breeding ☐ nesting ☐ rookery ☐ burrow site ☐ lek ☐ other

Location Description ***(please attach map AND/OR fill out your choice of coordinates, below)***
Vail Lake

County: Riverside Landowner / Mgr: Rancho California Water District
Quad Name: Vail Lake, Sage, Bachelor Mtn, Pechanga Elevation: 1,800 ft
T____ R____ Sec____, ____¼ of ____ ¼, Meridian: H○ M○ S○ Source of Coordinates (GPS, topo. map & type): _____
T____ R____ Sec____, ____¼ of ____ ¼, Meridian: H○ M○ S○ GPS Make & Model: _____
DATUM: **NAD27** ○ **NAD83** ○ **WGS84** ○ Horizontal Accuracy: _____ meters/feet
Coordinate System: UTM Zone 10 ○ UTM Zone 11 ○ ***OR*** Geographic (Latitude & Longitude) ○
Coordinates:

Habitat Description (plants & animals) *plant communities, dominants, associates, substrates/soils, aspects/slope:*
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Southern cottonwood-willow riparian forest and non-vegetated floodplain or channel, nonnative grassland, and disturbed habitat.

Please fill out separate form for other rare taxa seen at this site.

Site Information Overall site/occurrence quality/viability (site + population): ○ Excellent ◉ Good ○ Fair ○ Poor
Immediate AND surrounding land use: mostly undeveloped,
Visible disturbances: ORV use,
Threats: development, inundation
Comments:

Determination: *(check one or more, and fill in blanks)*
☐ Keyed (cite reference): _____
☐ Compared with specimen housed at: _____
☐ Compared with photo / drawing in: _____
☐ By another person (name): _____
☐ Other: _____

Photographs: *(check one or more)*

	Slide	Print	Digital
Plant / animal	☐	☐	☐
Habitat	☐	☐	☐
Diagnostic feature	☐	☐	☐

May we obtain duplicates at our expense? ○ yes ○ no

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APPENDIX D

CULTURAL RESOURCES REPORT

(This report is on file at RCWD)

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PHASE I CULTURAL RESOURCES ASSESSMENT

VAIL DAM SEISMIC AND HYDROLOGIC REMEDIATION PROJECT

RIVERSIDE COUNTY, CALIFORNIA

CONFIDENTIAL—NOT FOR REPRODUCTION

This report contains confidential cultural resources location information; report distribution should be restricted to those with a need to know. The legal authority to restrict cultural resources information is in Section 304 of the National Historic Preservation Act of 1966, as amended, and California Government Section Code 6254.10 exempts archaeological sites from the California Public Records Act, which requires that public records be open to public inspection.

LSA

October 2022

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APPENDIX E

GEOTECHNICAL DATA REPORT

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Geotechnical Data Report Vail Dam Seismic and Hydrologic Remediation Project

(Volume 1 of 2)

Prepared for:
Rancho California Water District
42135 Winchester Road
Temecula, California
RCWD Project No. D1911

Prepared by:
AECOM Technical Services, Inc.
Orange, California
AECOM Project No. 60580537

December 12, 2021

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AECOM
999 Town and Country Road
Orange, CA 92868
www.aecom.com

714-567-2400 tel
714-567-2594 fax

December 12, 2021

Mr. Jacob Wiley, P.E.
Rancho California Water District
42135 Winchester Road
Temecula, California 92390

Subject: **Geotechnical Data Report**
Vail Dam Seismic and Hydrologic Remediation Project
Riverside County, California
AECOM Project No. 60580537
District Project No. D1911

Dear Mr. Wiley:

This letter transmits the Geotechnical Data Report (GDR) for the Vail Dam Seismic and Hydrologic Remediation Geotechnical Investigation. This investigation was completed in accordance with the Rancho California Water District (District) agreement dated March 27, 2017. The test pits performed in 2021 were completed in accordance with Amendment No. 4 of the District's agreement dated June 20, 2018.

The investigations that are summarized in this report were performed to support the design of the proposed new dam downstream of the existing dam. The geotechnical data presented herein provides the necessary geologic/geotechnical information for design of the Roller Compacted Concrete (RCC) dam that is proposed for the project. The investigations included a proposed borrow area for the RCC aggregates. This proposed borrow area, which was investigated in an earlier phase of the project, is no longer being considered as an aggregate source for the RCC. The investigations also characterized the geologic materials at the spillway of the dam. The field and laboratory data presented in this GDR provides information needed for the Geotechnical Basis of Design Report (GBDR) which will provide geotechnical recommendations for design of the new dam and the borrow area.

We appreciate the opportunity to be part of this project. If you have any questions, please contact us.

Sincerely,

AECOM Technical Services, Inc.

REGISTERED PROFESSIONAL ENGINEER
LEO DAVID HANDFELT
GE373
Expires 12/31/2022
GEOTECHNICAL
STATE OF CALIFORNIA

Leo D. Handfelt, RGE 373
Senior Principal Engineer

CERTIFIED ENGINEERING GEOLOGIST
CHRISTOPHER W. GOETZ
No.EG 1833
Exp. 1-31-23
STATE OF CALIFORNIA

Christopher W. Goetz, CEG 1833
Principal Geologist

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Volume 2 of 2

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Acronyms

AECOM	AECOM Technical Services, Inc.
ASTM	American Society for Testing and Materials (now ASTM International)
ATV	Acoustic Televiewer
bgs	below ground surface
CatEx	Categorical Exemption
CEG	State of California Certified Engineering Geologist
CEQA	California Environmental Quality Act
Dig Alert	Underground Service Alert
District	Rancho California Water District
DSOD	California Department of Water Resources Division of Safety of Dams
fps	feet per second
ft	feet
GDR	Geotechnical Data Report
GBDR	Geotechnical Basis of Design Report
GEOVision	GEOVision Geophysical Services
GPS	Global Positioning System
KJm1	Gneiss
KJm2	Migmatitic Gneiss
Kt	Cretaceous Tonalite
MSL	Mean Sea Level (National Geodetic Vertical Datum of 1929)
NAVD 88	North American Vertical Datum of 1988
NOE	Notice of Exemption
MPa	Megapascal
PG	State of California Registered Professional Geologist
Pmax	baseline pressure
P-S	Primary and shear
psf	pounds per square foot
psi	pounds per square inch
P-Wave	Primary wave
Qal	Alluvium
Qf	Fill
Qt	Quaternary age terrace deposits
RCC	Roller Compacted Concrete
RQD	Rock Quality Designation
SH	horizontal shear
TP	Test Pit
V_p	p-wave velocity
V_s	shear wave velocity

Executive Summary

Geotechnical studies for the Vail Dam Seismic and Hydrologic Remediation Project (Project) were conducted by AECOM. This report constitutes the Geotechnical Data Report (GDR), which presents the factual findings of these investigations. This GDR will be a contractual document for bidding of the construction of the project.

The field and laboratory data presented in this GDR will be interpreted and recommendations for design of the project will be presented in a Geotechnical Basis of Design Report (GBDR). The GBDR will include characterization of the geologic materials that are anticipated to be encountered during construction (i.e., groundwater levels, rock weathering, strength, and elastic modulus values for the rock units)

The Project includes construction of a new dam immediately downstream of the existing dam as its primary feature. The design of the new dam is a straight axis gravity dam that utilizes the existing concrete gravity blocks of the arch dam as abutments. The new dam would be constructed of Roller Compacted Concrete (RCC). The new dam would be constructed higher than the existing dam such that the Probable Maximum Flood (PMF) would be routed through the existing spillway system. It had been planned to excavate rock for the RCC aggregates from a borrow area located downstream of the proposed dam. However, development of the on-site borrow area was found to have significant environmental constraints; therefore, the alternative of importing the aggregates from a commercial quarry is currently planned.

The scope of the investigation included:

- Review of existing geotechnical data and reports
- Updated topographic mapping;
- Geologic mapping of the dam, spillway and borrow area;
- Three (3) test pits at the right abutment of the new dam;
- Six (6) geophysical surveys at the dam, spillway and borrow area;
- Nine (9) core borings in the proposed dam footprint and borrow area;
- Thirty one (31) packer permeability tests in selected dam borings;
- Six (6) Downhole acoustic televiewer surveys in selected dam borings
- Two (2) seismic velocity test (surveys) in selected dam borings;
- Installations of two (2) piezometers in selected dam borings; and
- Laboratory testing on the recovered rock cores

The following is a summary of the key geotechnical/geologic findings of these investigations.

Regional Geologic Setting

The upland terrain in the vicinity of Vail Dam is underlain by regionally metamorphosed rocks, plutonic (intrusive igneous) and alluvial deposits. The metamorphic rock at the dam site and underlying the spillways is gneiss that has a well-developed metamorphic layering (foliation) that strikes northwesterly and dips steeply to both the northeast and southwest. Alluvium, consisting of fluvial channel deposits, overlies bedrock in the bottom of canyon that was incised by

Temecula Creek. In the vicinity of the proposed borrow area the metamorphic rock consists of gneiss, migmatitic gneiss and granitic rock (tonalite).

Geotechnical Characterization of the Borrow Area

It is currently planned to import RCC aggregates from a commercial quarry. However, the information developed for the previously proposed borrow area for the RCC aggregates is included in this report for completeness. The proposed borrow area is a north trending bedrock ridge located along the south side of Temecula Creek that is approximately 0.9 miles west of Vail Dam. The borrow area was initially recognized as a potential site for an aggregate borrow area based on a prominent exposure of strong rock at the nose of the ridge and based on the width of the valley adjacent to the site which would provide suitable areas for a rock crushing and RCC mixing plants.

The geotechnical investigation indicates the borrow area is comprised of three primary rock types which include gneiss, migmatitic gneiss, and tonalite (a granitic rock). These rocks are pervasively fractured by a system of joints that extend for at least several tens of feet below the surface, to the maximum depth explored in the borings. The borrow area appears to have a typical weathering profile for a bedrock ridge developed in metamorphic and igneous rock. Both slightly weathered to fresh rock and highly to completely weathered rock occur near the surface and with increased depth the slightly weathered to fresh rock becomes more prevalent, and the highly weathered rock becomes limited to narrow bands along shears (if present) and a few primary joint sets. The fracturing (jointing) of the rock also decreases with increased depth from the surface.

Laboratory testing was performed on rock cores that were obtained from the proposed borrow area to assess the suitability of the rock for aggregate. Rock core from the borings in the proposed borrow area were composited into similar rock types and then crushed to provide samples for the testing.

The data acquired from the geotechnical investigations had been considered to evaluate the suitability (quality) and quantity of the rock that would be available for aggregate, the required excavation methods for various depths below the surface (ripping versus use of blasting), and the stability of permanent excavation slopes.

Geotechnical Characterization of the Dam Foundation Area

Vail Dam is situated in a narrow and steep of section of Temecula Creek canyon. The existing dam is founded on and abuts in metamorphic (gneissic) bedrock. The new dam will be downstream of and abut up to the gravity abutments of the existing dam. It is anticipated that the new dam will be founded on slightly weathered and fresh gneissic rocks. Undocumented fill and alluvium exist in the bottom of Temecula Creek in the area of the proposed new dam and will need to be removed. Fill also overlies bedrock at the left abutment of the existing dam.

The bedrock of the existing dam and proposed new dam area is gneiss. It is exposed on the canyon (abutment) walls and it was encountered in all the borings in the area of the new dam footprint. The gneiss, which is similar to that found in the borrow area, exhibits gneissic layering (foliation) and is pervasively fractured by a system of joints that extend for at least several tens of feet below the surface, to the maximum depth explored in borings. Orientation measurements of the jointing were obtained by geologic mapping of outcrops in and around the abutments, and through downhole acoustic televiewer surveys. Based on these measurements it is evident that the dominant joint set is parallel to the foliation. These joints exhibit a northwest trend (~350º azimuth) and dip nearly vertical.

The relative strength and weathering of the bedrock was determined by multiple methods: observation/examination of rock core samples from the borings, seismic refraction surveys, downhole seismic velocity surveys and laboratory testing. The weathering of the bedrock in the borings demonstrated that it generally lessens with depth and that this decrease in weathering is associated with an increase in rock strength and a decrease of fracturing. The top of rock encountered was slightly weathered in all the borings drilled in the bottom of Temecula Canyon and moderately weathered rock was encountered in the upper 10 feet and 16 feet of the borings drilled at the left and right abutments respectively. The remainder of the rock recovered from all the borings was slightly weathered to fresh.

The seismic (P-wave) velocities of the rock were estimated by performing 3 seismic refraction lines in the area of the proposed dam footprint. The typical velocity of the rock ranged from 12,000 to 15,000 feet per second (fps) which is consistent with slightly weathered to fresh rock. The bedrock weathering profile was also revealed in the downhole seismic velocity surveys which were completed in two borings that were along the proposed dam axis. In general, these surveys revealed that lower velocities were encountered in more highly weathered and fractured rock nearer the surface and higher velocities are characteristic of deeper, less weathered, and less fractured rock at depth.

Laboratory testing was performed on rock cores that were obtained from the dam foundation borings to assess the unconfined compressive strength and modulus of elasticity. The unconfined compressive strength on the samples tested ranged from 3,400 to 13,900 psi with a weakly developed trend of increasing strength with greater depth.

Packer (water pressure) permeability testing was performed in four of the borings that were drilled along the proposed dam axis to provide estimates of in-situ hydraulic conductivity. The resulting Lugeon values (the loss of water in liters per minute and per meter of borehole at an over-pressure of 1 MPa) provide an estimate of the hydraulic conductivity of the rock in the depth interval tested. About 61% of the tests resulted in Lugeon values between 1 and 5, suggesting low conductivity for a majority of the bedrock. About 23% of the tests resulted in Lugeon values between 5 and 15, suggesting moderate conductivity. About 13% of the tests resulted in Lugeon values between 15 and 50, suggesting medium conductivity and about 3% (1 test) resulted in a Lugeon value > 50 suggesting high conductivity. The higher Lugeon values were typically found higher in the borings near the top of the rock.

Vibrating wire pressure transducers (piezometers) installed in two of the borings measured the piezometric surface (groundwater level) in the valley bottom at an approximate elevation of 1360 feet NAVD88, indicating that the alluvium and the lower part of the fill in the valley bottom are saturated.

The data acquired from the geotechnical investigations at the proposed dam site will be considered in the GBDR to evaluate the depth of foundation excavations; grouting and drainage requirements; dewatering, and dam excavation stability.

Geotechnical Characterization of the Spillway System

The geologic mapping was completed at the spillways to support an erodibility evaluation of the underlying bedrock. The erodibility evaluation was requested by the California Department of Water Resources, Division of Safety of Dams (DSOD) to assess the dependability of the Vail Dam Spillway under Probable Maximum Flood (PMF) conditions. The results of the erodibility evaluation are presented in the GBDR.

The geologic mapping in the spillway area documented the location of bedrock outcrops and focused on collecting rock strength, weathering, and discontinuity data (joint orientation,

spacing, roughness, and alteration, and an assessment of the size of near surface rock blocks) from these outcroppings. The objective of this mapping was to collect data needed to calculate an “erodibility index” which is a value necessary to assess the potential for rock mass erodibility in accordance with a methodology established by U.S. Bureau of Reclamation (Best Practices Chapter IV-1 by the U.S. Bureau of Reclamation).

1.0 Introduction

This Geotechnical Data Report (GDR) provides information to support design and construction of the proposed new gravity dam for Vail Dam. AECOM Technical Services, Inc. (AECOM) prepared the GDR on behalf of the Rancho California Water District (District).

1.1 Project Description

Vail Dam, which is located east of Temecula, California (see Figure 1) was constructed in 1948 and 1949 by the Vail Company for the purpose of irrigation and water supply. The dam was acquired by the District in 1978 and has been used since that time for water supply and replenishment of the District's groundwater basins.

The reservoir (Vail Lake) can impound up to 42,680 acre-feet of water with the reservoir at the spillway crest. The reservoir has a 318 square mile drainage area, which rapidly fills the reservoir in wet years. The reservoir is also used for recreational purposes. The reservoir levels have been restricted as part of an Interim Operation Restriction Plan (URS, 2014b) as part of the mitigation of the seismic and hydrologic deficiencies of Vail Dam.

The spillway is located beyond the left abutment and connects to the left abutment gravity block at a right angle. The spillway crest is at elevation 1,472.6 feet NAVD88. The spillway is comprised of a 119-foot-long ogee weir, a 343-foot long flat-crested weir, and a 65-foot long concrete overpour weir. A concrete pier separates the flat-crested weir from the overpour weir. The flat-crested weir includes a 5-foot-wide concrete sill along its length. The concrete overpour weir is about 25 feet high and was constructed across a saddle in the ridge line. The higher new dam would route the flood waters through the existing spillway system (see Figure 2).

The results of hydrologic (URS, 2013) and seismic (URS, 2016) evaluations of the existing dam indicate that the dam's spillways are insufficient to pass the Probable Maximum Flood (PMF) without overtopping the dam and that the existing concrete arch dam would not resist the stresses induced by the Maximum Credible Earthquake (MCE). The hydrologic (URS, 2013) evaluation also indicated that the outlet works do not have the capacity to lower the maximum storage depth of the reservoir by ten percent within seven days to meet the requirements for emergency reservoir drawdown.

Various options to remediate the seismic and hydrologic deficiencies were evaluated (URS, 2014a and 2016), including expanding the spillways, strengthening the existing dam, and building a new dam immediately downstream of the existing dam. The District's staff has recommended, and the District Board has approved, that the existing arch dam be replaced with a gravity concrete dam immediately downstream of the existing arch dam. The conceptual design for the new dam is a straight axis gravity dam that utilizes the existing concrete gravity blocks of the arch dam as abutments. The new dam would be constructed of Roller Compacted Concrete (RCC). The plan and maximum section of the conceptual design for the new dam are presented in Figures 3 and 4.

The phase of work described herein entails the geotechnical investigation, which is the subject of this Geotechnical Data Report. The data acquired from this investigation provides the necessary geotechnical information for design of the new dam.

1.2 Existing Vail Dam and Reservoir

Vail Dam was constructed in 1948 and 1949; as-built drawings of the dam are included in Appendix A. Since completion of construction, modifications to Vail Dam have included:

- In the 1980s, the training wall near the left (looking downstream) abutment gravity section was extended and raised to mitigate erosion concerns.
- In 1987 modifications to the outlet works to prevent cavitation in the outlet pipe were completed. As-built drawings for these modifications are included in Appendix A.
- In 2007, a rehabilitation of the outlet works was undertaken. The repairs included replacement of the intake gates and associated trashracks, including the gate operators, stems, and stem guides. The rehabilitation also included replacement of portions of the conduit from Intake No. 8 pipe, and replacement of the 24-inch discharge conduits downstream of the dam, as well as replacement of several conduit connections. Design drawings for this rehabilitation are included in Appendix A.
- In 2009, a new transmission main pipe was constructed that connects Vail Dam to the aquifer recharge well field (Upper Valle De Los Caballos) downstream of the dam.

Pertinent information about Vail Dam and Reservoir is presented in Table 1.

Table 1. Summary of Pertinent Data for Vail Dam and Reservoir

Feature		Pertinent Data	
Dam:			
Crest Elevation		1,479.1 ft MSL	1,481.7 ft NAVD88
Top of Parapet Wall		1,482.6 ft MSL	1,485.2 ft NAVD88
Dam Crest Width		4.5 feet	
Maximum Width at Base		15.0 feet	
Dam Maximum Height (from		152 feet	
Crest Length of Arch		379 feet	
Crest Length of Right Gravity		199 feet	
Crest Length of Left Gravity Thrust		212 feet	
Upstream Slope of Gravity Thrust		0.6H:1V	
Downstream Slope of Gravity		0.13H:1V	
Outlet Works:			
Intake No. 1	Gate Size (width x height)	24 in x 24 in	
	Gate Centerline Elevation	1,460 ft MSL	1,462.6 ft NAVD88
Intake No. 2	Gate Size (width x height)	24 in x 24 in	
	Gate Centerline Elevation	1,450 ft MSL	1,452.6 ft NAVD88
Intake No. 3	Gate Size (width x height)	24 in x 24 in	
	Gate Centerline Elevation	1,440 ft MSL	1,442.6 ft NAVD88
Intake No. 4	Gate Size (width x height)	24 in x 24 in	
	Gate Centerline Elevation	1,430 ft MSL	1,432.6 ft NAVD88

Feature		Pertinent Data	
Intake No. 5	Gate Size (width x height)	24 in x 24 in	
	Gate Centerline Elevation	1,420 ft MSL	1,422.6 ft NAVD88
Intake No. 6	Gate Size (width x height)	24 in x 24 in	
	Gate Centerline Elevation	1,410 ft MSL	1,412.6 ft NAVD88
Intake No. 7	Gate Size (width x height)	24 in x 24 in	
	Gate Centerline Elevation	1,397.5 ft MSL	1,400.1 ft NAVD88
Intake No. 8	Low-Level Invert Elevation	1,352.5 ft MSL	1,356.1 ft NAVD88
Spillway:			
Crest Elevation		1,470.0 ft MSL	1,472.6 ft NAVD88
Ogee Section Length		119 feet	
Flat Crested Weir Length		343 feet	
Concrete Overpour Weir Length		65 feet	
Reservoir:			
Maximum Reservoir Storage Capacity (at Top of Parapet)		56,180 ac-ft	
Reservoir Capacity (at Spillway		42,680 ac-ft	
Drainage Area		318.1 square miles	

1.2.1 Vail Dam

The existing Vail Dam is a variable radius, double curvature (curved in both plan and elevation), concrete arch structure spanning between concrete and rock abutments. The dam crest is at elevation 1,481.7 feet North American Vertical Datum of 1988 (NAVD88) and has a 3.5-foot-high concrete parapet wall extending above the upstream dam crest to elevation 1,485.2 feet NAVD88. The original design drawings for the dam indicate a vertical datum of Mean Sea Level (MSL); the conversion between the original datum and NAVD88 is +2.59 feet. For consistency, most elevations reported in the text use the NAVD88 datum. The dam has a maximum height of 152 feet from the dam crest to the lowest point in the foundation.

The arch dam consists of eight cantilever monoliths that are separated by vertical contraction joints that have trapezoidal shear keys between each monolith and the adjoining concrete abutment. The right and left (looking downstream) concrete gravity abutments each contain 4 blocks. The joints between adjacent gravity sections are not keyed. The arch dam thickness varies from a maximum of 15 feet at and below elevation 1,382.6 feet NAVD88 to a minimum of 4.5 feet at and above elevation 1,472.6 feet NAVD88. The arch crest and the right and left abutment concrete gravity blocks are 379, 199 and 212 feet in length, respectively, for a total dam crest length of 790 feet. The concrete gravity abutments have a crest width of 4.5 feet consisting of a 4.0-foot-wide walkway and the 0.5-foot-wide parapet wall on the upstream side. The gravity abutments have an upstream batter (inclination) of 0.13H:1V (horizontal:vertical) and downstream inclination of 0.6H:1V.

The dam's outlet works consist of eight outlets, including a low-level outlet. An at-grade meter vault is located approximately 100 feet downstream of the dam crest.

The spillway is located beyond the left abutment and connects to the left abutment gravity block at a right angle. The spillway crest is at elevation 1,472.6 feet NAVD88. The spillway is comprised of a 119-foot-long ogee weir, a 343-foot long flat-crested weir, and a 65-foot long concrete overpour weir. A concrete pier separates the flat-crested weir from the overpour weir. The flat-crested weir includes a 5-foot-wide concrete sill along its length. The concrete overpour weir is about 25 feet high and was constructed across a saddle in the ridge line.

1.2.2 Reservoir

Based on bathymetry obtained in 2013, Vail Lake impounds 42,680 acre-feet of water with the reservoir at the spillway crest (1,472.6 feet NAVD88). The reservoir is currently used primarily for water supply and recreation. Water released from Vail Lake is re-stored in the Pauba Valley groundwater basin. The Interim Operation Restriction Plan (URS, 2014b) restricts the maximum reservoir elevation to 1,457.6 feet NAVD88 until the hydraulic and seismic deficiencies are remediated.

1.3 Purpose and Scope of Geotechnical Investigation

The purpose and scope of the geotechnical investigation was presented in two work plans (AECOM, 2017a, 2021) that have been reviewed by the California Department of Water Resources, Division of Safety of Dams (DSOD). The purpose of the geotechnical investigation was to provide the necessary data and information to support design and construction of the new dam. The investigation was also to provide geotechnical information at the previously proposed on-site borrow area for the RCC aggregate, and for the spillway area. The scope of the investigation included:

- Updated topographic mapping;
- Geologic mapping of the dam, spillway and borrow area;
- Geophysical surveys at the dam and borrow areas;
- Test pits in the right abutment area;
- Core borings in the dam and borrow areas;
- Packer permeability testing in the dam borings;
- Downhole geophysical testing in the dam borings;
- Piezometer installations in the dam area; and
- Laboratory testing on the recovered rock cores.

2.0 GEOTECHNICAL INVESTIGATION

This section describes the geotechnical and geological explorations and testing performed for the Vail Dam Seismic and Hydrologic Remediation Project. The field explorations and testing expanded upon previous geotechnical investigations at the site. The previous investigations are summarized below in Section 2.1 and the methodology of the current investigation is summarized below in Sections 2.2 through 2.4.

2.1 Previous Geologic/Geotechnical Investigations

Two previous geologic/geotechnical investigations were performed at the existing dam site. These include the original geologic exploration that was completed during the design of the dam (Buwalda, 1946, 1947) and investigations performed by Converse Davis Dixon Associates (Converse) to support their analysis of the safety of the dam (Converse, 1975). The key findings of these previous investigations are summarized below in Sections 2.1.1 and 2.1.2, and the available reports from these investigations are provided in Appendix B.

2.1.1 Original Dam Geologic Investigations

During design of the original dam the Vail Company retained Dr. John P. Buwalda, Professor of Geology at California Institute of Technology, as a consulting geologist to characterize the geologic conditions at the site and to make recommendations regarding stripping depths for the proposed concrete arch dam. The geologic characterization and recommendations of Dr. Buwalda are documented in two letter reports written by Dr. Buwalda to Mr. A.L. Sonderegger, who was a consulting engineer for the project.

In his letter dated September 7, 1946, Dr. Buwalda provided a general characterization of the dam site including the topography of the canyon, the lithologic descriptions of the rock, the orientation of the metamorphic layering, and the strength, weathering and fracturing of the rock. It was noted that while the rock at the dam site is strong it was fractured, especially at the proposed right abutment, where nearly vertical fractures spaced from 10 to 40 feet apart cut the rock into a series of nearly vertical slices. Some of the fractures were described as open fissures especially near the surface, where weathering had widened them considerably. These surface fractures were considered as unfavorable structures in that they would not be able to withstand without yielding to the horizontal thrust of the ends of a concrete arch dam.

In his letter dated January 6, 1947, Dr. Buwalda provided his observations regarding the condition of the rock at the proposed right abutment where, under his recommendation, an excavation had been completed for the purpose of stripping all loose and broken material and exposing the rock at depths below the original ground. Observations at the right abutment excavation were that at the surface rock was extensively jointed and rather badly broken up but at depths of about 25 feet the rock the rock is only sparsely jointed and was made up of mainly large solid masses. Dr. Buwalda concluded that the open fissures seen on the original surface were primary joints that were weathered near the surface, but which become closed near the back of the excavation. The rock at the back of the excavation was described as fresh and hard with great bearing strength. Consequently, Dr. Buwalda concluded that rock exposed in the excavation was of adequate quality for the abutments of an arch dam.

2.1.2 1975 Geotechnical Investigation

Converse Davis Dixon Associates performed a geotechnical investigation in 1975 to support a seismic evaluation of the dam (Converse, 1975). The field investigation included geologic mapping of the dam site and the drilling of three exploratory borings in the vicinity of the dam.

The Converse geologic map provided the first detailed geologic mapping of the dam site. The geologic mapping documented the location of the bedrock and the surficial (overburden) soils at the site and recorded structural elements (foliation, jointing, faulting) in the bedrock. Surficial geologic units recognized at or near the dam site included fill, alluvium, terrace deposits, slope wash, and bedrock consisting of the Bedford Canyon Formation[1] and the Temecula Arkose.

Converse drilled three borings (designated DH-1, DH-2, DH-3) downstream of the existing dam. The locations of these borings are shown on Figure 3. Boring DH-3 was drilled on the left abutment, and the other two borings (DH-1 and DH-2) were drilled in the valley bottom. The borings were drilled to depths between 51.9 and 69 feet below ground surface (bgs) using continuous NX-size coring methods, which produces core of approximately 2.16 inches in diameter. A ten-foot NX core barrel was used to drill and sample the rock. According to the Converse (1975) boring logs, the core recovered from the borings was biotite schist that was slightly to very weathered and slightly to intensely fractured. Overburden soils consisting of fill, talus, and slopewash were reported to exist to varying depths in the dam site area. The overburden soils are described as silt, sand, gravel, cobbles, and boulders up to 3 feet in diameter. The overburden soils were 11.5 feet thick in DH-3, 21 feet thick in DH-2 and 40.8 feet thick in DH-1. The overburden encountered in Borings DH-1 and DH-2 was believed to be mostly spoils from the foundation excavation for the existing dam and alluvium below the spoils. The overburden soils at DH-3 are likely fills that were used to construct a temporary load-out platform during construction of the original dam.

2.2 Topographic Mapping

Updated aerial topographic mapping of two areas was obtained for this investigation 1) near the existing dam/spillway and new dam site and 2) at the potential borrow area site. Topographic mapping was compiled from aerial photogrammetry for plotting at a scale of 1”=40’ with one foot contour intervals. The new topography was used as the base maps for the geologic maps.

2.3 Current Field Explorations and Testing

The methodology used for the field explorations and testing are provided below in Sections 2.3.1 to 2.3.8

2.3.1 Environmental, Health and Safety

Prior to initiation of the explorations, the proposed boring locations, proposed access routes, and proposed work pads were surveyed to identify potential biological and cultural resources present in these areas (LSA, 2017a and 2017b). Appropriate avoidance, mitigation, and minimization measures were implemented based on the resources present within or in the vicinity of the exploration areas. On-site environmental awareness training was provided to all workers prior to commencement of vegetation clearing and access path establishment. A qualified archaeologist trained in paleontology also assessed boring cuttings for the presence of cultural/paleontological resources.

[1] The Bedford Canyon Formation is synonymous with what is referred to in this GDR as Gneiss Bedrock (KJm_1).

Environmental documentation in support of a Categorical Exemption (CatEx) under the California Environmental Quality Act (CEQA) was prepared for the geotechnical investigation program. The environmental documentation consisted of a technical memorandum and a completed CEQA Notice of Exemption (NOE) form for the proposed investigation program. The geotechnical program was eligible for a Class 6 – Information Collection CatEx, as described within the CEQA Guidelines Section 15306. The NOE form was filed with the Riverside County Clerk.

A project-specific Health & Safety Plan was prepared prior to the start of field activities. The Health & Safety Plan identified potential hazards and presented a means for the project team to recognize, evaluate and control potential hazards that may confront the team in the field. The plan included an emergency response protocol and list of emergency contacts.

2.3.2 Geologic Mapping

Existing sources of information regarding the geology of the site were compiled onto the new topographic/aerial photo base map. Additional field mapping was performed at the proposed aggregate borrow site, at the proposed dam site, and at the spillway to confirm or modify geologic mapping previously completed. Field mapping included acquisition of data with regard to rock types, degree of weathering, orientation, and character of rock mass discontinuities (fractures).

Stereonets of discontinuity (fracture) orientation data at the new dam and borrow area were completed. These data will be used to evaluate:

- Grouting and drainage requirements of the dam foundation;
- Dam foundation excavation cut slopes and dam foundation stability; and
- Temporary and permanent cut slope stability at the borrow area.

In addition to the characterization of the bedrock, there is a large amount of spoils from the original dam foundation excavation that was disposed of within the new dam's footprint. The geologic mapping also focused on delineating the extent of these spoils at the surface. This information, along with information regarding the thickness of the spoils, gathered from borings and seismic refraction lines, will characterize the volume of material that will need to be removed for construction of the new dam.

Geologic mapping was also performed to support an erodibility assessment of the Vail Dam spillway system. Geologic mapping documented the location of bedrock outcrops within the spillway area and focused on collecting rock strength, weathering, and discontinuity data from these outcroppings to assess the resisting physical properties of the rock mass to erosion. The spillway mapping included field assessments of rock strength and weathering and collection of discontinuity data including, joint orientation, spacing, roughness, and alteration, and an assessment of the size of near surface rock blocks. These data are presented in the Geotechnical Basis of Design Report (GDBR).

2.3.3 Seismic Refraction Surveys

Three seismic refraction surveys were performed at the new dam, two at the borrow area, and one in the spillway area using a multi-channel seismograph with a sledgehammer as a seismic source. The locations of the seismic refraction surveys are shown on Figures 5, 6, and 7. The seismic data was processed to provide primary wave (P-wave) velocity information to assess rock subsurface conditions and seismic velocities within the proposed dam foundation and

borrow area excavations. These data were used to evaluate depth of foundation excavations for the proposed dam and methods of excavation for the proposed borrow area. The seismic refraction survey data are provided in Appendix C.

2.3.4 Test Pits

During the 60% design phase it was decided to shift the new right abutment from the downstream side to the upstream side of the existing abutment due to stability concerns of the steep slope on the right side of the new dam. The 60% design plans used the as-built excavations for the existing right gravity abutment to depict the planned foundation excavation. Three test pits were excavated and logged at the upstream side of the right abutment to confirm those depths were suitable for founding the new dam. The locations of the test pits are shown on Figure 6.

The test pits were excavated by Innovative Service Group (ISG) using a Case CX145D SR excavator, equipped with a 3-foot-wide bucket, to depths ranging from 7.5 feet to 13.0 feet. Excavator refusal was reached at the total depths reported for each test pit. Test Pit TP-1 was benched, and test pits TP-2 and TP-3 were shored to ensure safe entry by field staff for logging. The floor and walls of the test pits were cleaned with hand tools, leaf blowers and vacuums to produce a clean exposure suitable for logging. The test pit logs were field reviewed by a State of California Certified Engineering Geologist (CEG) to perform a quality assurance check of the field interpretations. Following completion of the logging, the excavations were backfilled with the trench spoils which were placed in 8-inch loose lifts, compacted (tamped) with the excavator bucket, and returned to pre-excavations grade.

Test Pit Logs are presented in Appendix D and field photographs of the test pits are presented in Appendix I.

2.3.5 Rock Core Borings

Nine exploratory core borings were performed under AECOM's supervision by Ruen Drilling, Inc. at the locations shown on Figures 5 and 6 to obtain rock samples, to perform in-situ testing, to install piezometers, and to characterize the subsurface conditions at the new dam site and the proposed borrow area. The drilling equipment was mobilized to Borings B-101, B-104, B201, and B-202 with the assistance of a helicopter; the other borings were on existing access roads. Figures 8 and 9 present photographs of a typical drill rig setup at the borrow and dam site locations, respectively. Table 2 summarizes the location/purpose, depths and the field tests that were performed for each of these borings.

Table 2. Summary of Core Borings

Boring Number	Location/Purpose	Depth (feet)	Field Tests
B-101	Left Abutment/ Foundation/Seepage	150	Packer, Down-hole Televiewer
B-102	Dam & Outlet Tower/ Foundation/Seepage	200	Packer, Down-hole Seismic and Televiewer
B-103	Dam & Outlet Tower/ Foundation/Seepage	200	Packer, Down-hole Seismic and Televiewer, Piezometer
B-104	Right Abutment/ Foundation/Seepage	150	Packer, Down-hole Televiewer

Boring Number	Location/Purpose	Depth (feet)	Field Tests
B-105	Left Dam Toe/ Foundation	100	Down-hole Televiewer, Piezometer
B-106	Right Dam Toe/ Foundation	100	Down-hole Televiewer
B107	Foundation	100	
B-201	Borrow area/ Characterization	103	
B-202	Borrow area/ Characterization	99	

The rock coring was performed in general accordance with applicable ASTM standards (primarily ASTM D2113). Coring bits and barrels were HQ-3-size triple tube operated by wire-line. Core barrels had a split inner tube and were 5 feet in length. All borings were logged by a State of California Professional Geologist (PG) under the direct supervision of a CEG. Data recorded on boring logs included standard descriptions of soil, rock type, weathering, strength, and detailed descriptions of rock discontinuities (fractures, joints, and shears) as well as percent recovery, fracture frequency, and rock quality designation (RQD).

All recovered cores from the dam site were placed in sturdy wooden boxes, appropriately marked, and photographed. The core boxes were transported to an on-site core storage building located at the Vail Lake Resort. The recovered cores from the proposed borrow area were placed in plastic boxes, appropriately marked, and photographed. Most of the core from the borrow area was taken for laboratory testing. The laboratory testing that was performed involved crushing of the core specimens for aggregate testing. Three of the 17 boxes of the core from the borrow area were not tested and are at the core storage building at Vail Lake Resort.

The field logs were reviewed by a CEG to perform a quality assurance check of the field interpretations, provide more detailed logging, and to select samples for laboratory testing. Boring Logs are presented in Appendix D and core box photographs are presented in Appendix E.

2.3.6 Packer Permeability Testing

Packer permeability testing was performed in selected core borings, to provide estimates of in-situ hydraulic conductivity. The test procedures were completed in general accordance with the methods described in the U.S. Bureau of Reclamation's Earth Manual Procedure No. 73 10 (USBR, 1998).

Prior to packer testing, the boreholes were flushed with clear water until the returning fluid was clear. The test procedure involved lowering the packer assembly on a wire-line through the drill rods. One packer was inflated within the bottom of the drill string, just above the drill bit, and another packer was inflated against the borehole wall just below the drill bit. The top of the drill rod was capped and sealed at the ground surface. Water was then injected into the top of the drill rods with a water pump. This allowed the pressure within the open interval of the borehole to be increased above the estimated “baseline” pressure resulting from the column of water at the depth of the hole, and the effective weight of the rock at the depth of the test interval. The single (not straddle) packer tests were performed in intervals not exceeding 20 feet in length as the boring was advanced. The sequence of applying hydraulic pressures were staged using an

increasing then decreasing format. The packer test zone pressures were selected to increase up to the estimated baseline pressure, depending on the borehole depth. The packer test data are presented in Appendix F

2.3.7 Borehole Televiewer

Acoustic televiewer surveys were performed in Borings B-101, B-102, B-103, B-104, B-105 and B-106 by GEOVision Geophysical Services (GEOVision). These surveys provide information relative to in-situ orientation of rock fracture, joints, and other rock mass features. Boring deviation data and acoustic images of the boring's walls were collected using a High Resolution Acoustic Televiewer probe (ATV) manufactured by Robertson Geologging, Ltd. Further details on the televiewer survey procedures, the televiewer images (logs), and the televiewer data are presented in GEOVision's report which is provided in Appendix G.

2.3.8 Seismic Velocity Testing

Downhole seismic velocity testing was performed in Borings B-102 and B-103 by GEOVision. Primary and shear (P-S) wave velocity data were obtained with the suspension PS logging system, manufactured by OYO Corporation, and their subsidiary, Robertson Geologging. The OYO system was used to obtain in-situ horizontal shear (S_H) and compressional (P) wave velocity measurements at 1.6-foot intervals. Acquired data were analyzed and a profile of velocity versus depth was produced for both S_H and P waves. Further details on the OYO suspension survey procedures and results (data) are presented in GEOVision's report which is provided in Appendix G.

2.3.9 Piezometer Installations

Vibrating-wire type pressure transducers were installed in Borings B-103 and B-105 to measure groundwater levels over time. The piezometers (pressure transducers) were installed using the fully grouted method; the piezometer was lowered into the hole with a PVC placement pipe to the desired depth near the bottom of the borings (below groundwater) and then the entire borehole was backfilled with a non-shrinking, low permeability cement-bentonite grout. The vibrating-wire transducers were calibrated in the factory and field checked prior to installation by submersing the units a known depth below water and then monitoring their response as the unit was retrieved. Each piezometer was finished at the surface with a flush mounted well box and cover and a concrete apron. The wires from the transducers are bundled up within the well box that is bolted shut. The piezometers have been monitored during the investigation period. The data collected from the piezometers is converted using the calibration data sheet provided by the manufacturer (Geokon) to provide in-situ groundwater levels. The piezometer and groundwater levels are shown on the logs for Borings B-103 and B-105 in Appendix D.

2.4 Laboratory Testing

Laboratory testing was performed on rock cores that were obtained at the site of the proposed new dam and in the proposed borrow area. The testing was performed by Twining, Inc.; the petrographic analyses were performed by Spectrum Petrographics, Inc.

Rock core from the borings in the proposed borrow area were composited and then crushed to provide samples for aggregate quality testing. The composited cores were crushed such that there were no particles larger than 1½ inches. The core was composited in intervals of similar rock type as shown in Table 3.

Table 3. Sample Compositing from Borrow Area Borings

Boring Number	Core Depths (feet)	Rock Type	Sample Designation
B-201	41 to 62 and 80.5 to 99	Gneiss	Gneiss
B-202	0.0 to 63.5	Tonalite	Granite
B-202	63.5 to 99	Gneiss + Tonalite	Gneiss + Granite

The testing included unconfined compression and elastic modulus testing performed in accordance with ASTM D7012. Aggregate quality tests were performed on the crushed composited cores from the proposed borrow area. Table 4 provides a summary of the lab testing that was performed. Detailed results are provided in Appendix H.

Table 4. Summary of Laboratory Testing

Test Name	Test Method	Quantity
Compressive Strength and Elastic Moduli of Intact Rock Core Specimens	ASTM D7012	15
Sieve Analysis	ASTM C136	3
Specific Gravity and Absorption	ASTM C127 and C128	6
Los Angeles Abrasion	ASTM C131	6
Flat or Elongated Particles	ASTM D4791	6
Sulfate Soundness	ASTM C88	6
Potential Alkali Reactivity	ASTM C1260	6
Alkali-Silica Reactivity	ASTM C289	6
Ethylene Glycol Soak	CRD-C148	6
Petrographic Analysis	ASTM C295	2

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3.0 SITE CONDITIONS

Knowledge of the site conditions is based on regional published geologic information, previous investigations and the information obtained during this investigation. This section summarizes the regional geologic setting, and the local geology of the proposed borrow area, the proposed dam area, and the existing spillway area.

3.1 Regional Geologic Setting

Vail Dam is located within the Peninsular Ranges Province, which is a 500-mile-long mountain range in southern California and Baja California that is formed by a continuous belt of Cretaceous gabbroic through granitic plutonic rocks that intruded late Paleozoic and Mesozoic metamorphic host rock. Vail Dam spans Temecula Creek, a northwesterly draining tributary of the Santa Margarita River that drains the north side of Palomar Mountain. As shown on Figure 10, Vail Lake inundates a portion of Butterfield Valley and a portion of the adjacent Lancaster Valley. Vail Lake, Butterfield Valley and Lancaster Valley are surrounded by highland areas to the north (Oak Mountain), to the South (Wild Horse Peak/Palomar Mountain), and to the east (Cahuilla Mountain, Thomas Mountain). Collectively, these physiographic features comprise a rugged highland terrain that is dissected by Wilson Creek, Temecula Creek, and their tributaries.

The terrain in the vicinity of Vail Dam is underlain by regionally metamorphosed rocks of Jurassic to Cretaceous age, plutonic (intrusive igneous) rocks of Cretaceous age, the Pliocene Temecula Arkose, and Holocene to Pleistocene age alluvial deposits. The dam is founded on metamorphic rock (KJm on Figure 10) that is described as undifferentiated meta-volcanic and metasedimentary rocks of Cretaceous and Jurassic age consisting of schist, gneiss and quartzite that is commonly mixed with meta-granitic rock (Kennedy, 2003). In the vicinity of the dam site the metamorphic rock is entirely gneiss that has a well-developed metamorphic layering (foliation) that strikes northwesterly and dips steeply to both the northeast and southwest. Alluvium, consisting of fluvial channel deposits, overlies bedrock in the bottom of canyon that was incised by Temecula Creek. In the vicinity of the proposed borrow area (Figure 5) the metamorphic rock consists of gneiss and migmatitic gneiss that is mixed with granitic rock (tonalite).

3.2 Geotechnical Characterization of the Borrow Area

During pre-design investigations a proposed onsite borrow area was considered as a potential source of concrete aggregate. Since completion of the investigation of that borrow area, a decision was made to obtain the aggregate for the RCC from an offsite commercial quarry. Thus, the following information regarding the geotechnical characterization of the proposed onsite borrow area is no longer relevant to the project. However, it is presented herein for completeness.

The previously considered borrow area is a north trending bedrock ridge located along the south side of Temecula Creek that is located approximately 0.9 miles west of Vail Dam (see Figure 2). The borrow area was previously considered a potential site for an aggregate borrow area based on a prominent exposure of strong rock at the nose of the ridge and based on the size of the

valley adjacent to the site which would provide area for a rock crushing and RCC mixing plants. The base of the proposed borrow area is at about elevation 1310 feet NAVD88 and the top of the proposed borrow area rises to elevations of 1430 to 1450 feet NAVD88 along the ridgeline.

The borrow area was investigated with geologic mapping, seismic refraction surveys, and two core borings (Borings B-201 and B-202). Based on the geologic mapping it is evident that the borrow area is comprised of three primary rock types which include Gneiss (map symbol KJm_1), Migmatitic Gneiss (KJm_2), and Tonalite (Kt) as shown on Figure 5. A geologic cross section though the borrow area is shown in Figure 11; the location of the section is shown in Figure 5. The following subsections describe the characteristics of these three rock types; the structural fabric and discontinuities of the rock mass, and the weathering profile.

3.2.1 Gneiss (KJm_1)

The Gneiss (KJm_1) occurs along the eastern side of the borrow area. It is typically exposed in discontinuous outcrops as a moderately weathered rock that exhibits a moderately well-developed metamorphic layering (foliation) that strikes northwesterly and dips steeply to either the southwest or the northeast. The gneissic layering, which is produced by a metamorphic segregation of light and dark colored minerals, is typically less than ¼ to ½ inch thick. Infrequent layers of quartzite were occasionally observed as mixed within the Gneiss in both outcrops and in Boring B-201. Field photographs of exposures of the Gneiss are provided in Appendix I as Figures I-1 and I-2.

The Gneiss was encountered in Boring B-201 from a depth of 58 feet to the bottom of the boring at 103 feet and in Boring B-202 from a depth of 51.5 feet to the bottom of the boring at 99 feet (see boring logs in Appendix D and Core Box Photographs E-2 through E-5, E-8, and E-9 in Appendix E).

Petrographic analysis of a thin section taken from a core sample from a depth of 67 feet in Boring B-201 was performed. That analysis described the rock as a Plagioclase-Mica-Quartz Granofels[2] that is comprised of 42% quartz, 20% biotite, 20% plagioclase, 10% muscovite, 7 % opaques and 1% tourmaline.

3.2.2 Migmatitic Gneiss (KJm_2)

The Migmatitic Gneiss (KJm_2)[3] occurs along the northwestern side of the borrow area and in a narrow strip along the contact between the Gneiss and the Tonalite at the southern edge of the borrow area. The Migmatitic Gneiss appears to form an irregular shaped to roughly tabular body of rock that occurs along the contact between the Tonalite (Kt) and the Gneiss (KJm_1). Presumably it was formed by partial melting of the gneiss during intrusion of the Tonalite. The Migmatitic Gneiss appears in discontinuous outcropping as pervasively intermingled granitic and metamorphic rock. Like the Gneiss it exhibits a metamorphic layering (foliation) that generally strikes northwesterly and dips steeply to either the southwest or the northeast. Field photographs of the Migmatitic Gneiss exposures are provided in Appendix I as Figures I-3 and I-4.

[2] Granofels is a rarely used petrographic term to describe a metamorphic rock that has a granoblastic texture without or with only indistinct foliation. The Gneiss (Kjm_1) exhibits a distinctive foliation in the field at outcrop scale so this rock name was not adopted for use in this investigation.
[3] Migmatitic Gneiss is a mixture of metamorphic rock and igneous rock that is created when a metamorphic rock such as gneiss partially melts, and then recrystallizes into an igneous rock, creating a mixture of the unmelted metamorphic part with the recrystallized igneous part.

The Migmatitic Gneiss was encountered in Boring B-201 from a the top of the boring to a depth of 58 feet and in Boring B-202 from a depth of 51.5 feet to 81 feet (see boring logs in Appendix D and Core Box Photographs E-1, E-2, E-7, and E-8 in Appendix E). In Boring B-202 the Migmatitic Gneiss was encountered between the Tonalite above and the Gneiss below.

3.2.3 Tonalite (Kt)

Tonalite (Kt) occurs along the southwestern side of the borrow area. Tonalite is a granitic rock with the same texture as granite but slightly different composition. The discontinuous exposure of the Tonalite in the borrow area suggests the development of weathered zone that is characterized by slightly weathered to fresh rounded boulders (corestones) set in a matrix of more highly weathered rock. This is a typical weathering pattern for granitic rock. The Tonalite has a granoblastic texture (no foliation). Field photographs of exposures of Tonalite are provided in Appendix I as Figure I-5.

The Tonalite was encountered in Boring B-202 from the top of the boring to a depth of 51.5 feet (see boring logs in Appendix D and Core Box Photographs E-6 and E-7 in Appendix E). There was no recovery in the upper 9 feet of Boring B-202, and presumably the tonalitic rock was highly to completely weathered to that depth. Petrographic analysis of a thin section taken from a core sample from a depth of 43 feet depth in Boring B-202 was performed. That analysis described the rock as a fine to medium grained Tonalite that is comprised of 65% plagioclase, 20% quartz, 10% biotite, 3% actinolite, 1% chlorite, and <1% of leocoxene, apatite, zircon, tourmaline, and potassium feldspar.

3.2.4 Structural Fabric of the Rock Mass

The rock mass in the proposed borrow area is pervasively fractured by a system of joints that extend for at least several tens of feet below the surface, to the maximum depth explored. Based on geologic mapping data, the joints at the surface include a systematic set of joints that are a parallel to the foliation in the Gneiss and Migmatitic Gneiss and joints that are irregular in orientation and cannot readily be grouped into a set. Field Photographs of jointing in the borrow area are provided in Appendix I as Figure I-6. A stereonet of the mapped joints is presented in Figure 12.

The foliation in the Gneiss and the Migmatitic Gneiss strikes northwesterly and dips steeply to either the northeast or southwest. The foliation is not apparent in the Tonalite which has a granoblastic (not foliated) texture. At the ground surface the primary joint set in the Gneiss and Migmatitic Gneiss is controlled by (is parallel to) the foliation. As shown on Figure 12, the average foliation fracture strikes 332 degrees and dips 80 degrees to the northeast. In addition to this primary joint set, most outcrops of the Gneiss and Migmatitic Gneiss exhibit other randomly oriented joints. Based on inspection of the core from Borings B-201 and B-202, it is apparent that the jointing that is observed at the surface prevails for several tens of feet below the ground surface, to the maximum boring depths explored. It also is evident that the foliation parallel jointing, which is the dominant joint set at the surface, does not predominate below approximately 40 feet surface below the ground surface. That is, approximately 90 percent of the joint surfaces below 40 feet bgs in Borings B-201 and B-202 were relatively random and not parallel to foliation.

Jointing was not readily observed or measured in the Tonalite at the surface during geologic mapping, as the typical outcrop pattern of this igneous rock mass mostly consisted of unfractured core stones separated by areas of no exposure. Nevertheless, the core that was recovered in the Tonalite (from the upper 51.5 feet of Boring B-202) was closely fractured and

therefore it is evident that the Tonalitic bedrock, like the Gneiss and Migmatitic Gneiss, is characterized by a system of joint fractures that have relatively random orientations.

3.2.5 Weathering Profile

The borrow area appears to have a typical weathering profile for a bedrock ridge developed in metamorphic and igneous rock. Both slightly weathered to fresh rock and highly to completely weathered rock occur near the surface and with increased depth the slightly weathered to fresh rock becomes more prevalent, and the highly weathered rock becomes limited to narrow bands along shears (if present) and a few primary joint sets. The fracturing (jointing) of the rock also decreases with increased depth from the surface.

The weathering profile in the borrow area was assessed from the two core borings that were completed in the borrow area. As shown on the log for Boring B-201 and summarized on Cross Section D-D' (Figure 11), the drilling recovered no core in the upper 17.6 feet. This near surface zone of no recovery is inferred to be highly weathered and extremely weak rock. From depths of 17.6 to 24.4 feet in Boring B-201 the rock is highly to moderately weathered and from 24.4 to 41 feet the rock was mixed moderately and slightly weathered. Below a depth of 41 feet the rock was slightly weathered to fresh except for a zone encountered at 50 to 59 feet bgs that was highly to moderately weathered. This zone of highly to moderately weathered rock appears to be associated with a conspicuous high angle (step) joint fracture that was recognized at this depth.

As shown on the log for Boring B-202 and summarized on Cross Section D-D' (Figure 11), the drilling recovered no core in the upper 26.6 feet. This near surface zone of no recovery is inferred to be highly to completely weathered, extremely weak rock. From depths of 26.6 to 36 feet the rock is highly weathered and from depths of 36 feet to 81 feet the rock was mixed moderately and slightly weathered rock. Below 81 feet the rock was slightly weathered.

The weathering of the bedrock in the borrow area is controlled by the concentration of jointing as is typical of most metamorphic/igneous bedrock. Joint fractures in the core borings drilled in the borrow area are closely spaced near the surface and become progressively less frequent with increased depth from the surface. Thus, the weathering of the rock mass decreases as joint fracturing becomes less prevalent. This correlation between weathering and fracturing can be recognized on the logs for Borings B-201 and B-202 by comparing the Rock Quality Designation (RQD) with the weathering designations described for the rock. Rock that is described as highly to completely weathered, typically had RQDs that were less than 25 percent, moderately weathered rock had RQD values that that averaged about 50 percent, and slightly weathered rock had RQD values that averaged about 90 percent. This relationship between RQD and weathering is also illustrated on Figure 11 which shows weathering and RQD stick logs of Borings B-201 and B-202.

The weathering profile in the borrow area was also evaluated by seismic refraction measurements along two survey lines (RS-4 and RS-5), as shown on Figure 5. The seismic refraction technique is based on the measurement of the time required for a shockwave to travel from a sourcepoint (shotpoint) to one or more co-linear sensors (geophones) that are placed on the ground surface. The seismic refraction data and interpretive profiles are provided in Appendix C. The interpretive profiles represent the rock depths and velocities which would account for the measured travel times. The models are non-unique but appear to be the most reasonable solutions based on the known geology. The interpreted profile for RS-4, show a surficial zone of lower velocity gneissic rock that ranges from 10 to 30 feet thick overlying higher velocity rock (presumably less weathered gneissic bedrock). The interpreted profile for RS-5,

show a surficial zone of lower velocity tonalite that ranges from 10 to 40 feet thick overlying higher velocity rock.

3.3 Geotechnical Characterization of the Dam Foundation Area

Vail Dam is situated in a narrow and steep of section of Temecula Creek canyon. The existing dam is founded on and abuts in metamorphic (gneissic) bedrock (KJm_1). The new dam will be downstream of and abut up to the gravity abutments of the existing dam. It is anticipated that the main part of the new dam will be founded on slightly weathered and fresh gneissic rock; the part of the new dam upstream of the existing right gravity abutment will be founded on moderately weathered rock. Fill and alluvium exist in the bottom of Temecula Creek just in the area of the proposed new dam and will need to be removed. Fill also overlies bedrock at the left abutment of the existing dam and as backfills around the existing gravity abutments.

The mapped geology of the proposed dam site is provided in Figure 6. Three geologic cross sections though the proposed dam area are shown in Figures 13 through 15; the locations of the sections are shown in Figure 6. The encountered materials and groundwater levels are further described in Sections 3.3.1 through 3.3.7.

3.3.1 Fill (Qf)

Fill (Qf), from the excavation of the existing dam foundation, are in the bottom of Temecula Creek in the area of the new dam. These materials are up to 25 feet thick. Fill in the bottom of the canyon with thicknesses greater than 20 feet were encountered in Borings B-102, B-103 and B-107. Borings B-106 and B-105 encountered fill about 14.5 feet and 3.5 feet respectively. The fill encountered in these borings was composed of brown, silty, fine to coarse sand, with varying amounts of fine to coarse gravels. Some larger cobble-size clasts and possibly boulders were encountered in a few of the borings, primarily with increasing depth. More detailed descriptions of the fill are provided in the boring logs in Appendix D.

The fill is thin near the base of the existing dam and slopes upward to Boring B-103 approximately 85 feet downstream where the fill is the thickest. From the high point the fill slopes downstream until it pinches out in the channel bottom of Temecula creek. The estimated thickness of the fill from the base of the existing dam and the downstream channel can be seen in Geologic Sections B-B' and C-C' in Figures 14 and 15.

Fill was also encountered in Boring B-101 near the left abutment of the proposed new dam and next to the left gravity abutment of the existing dam. This fill was placed during the construction of the existing dam and was originally a platform used for the construction of the dam. A photo showing the previous fill and construction platform can be seen in Figure 16. The placed fill varies in thickness but was encountered to a depth of 10.8 feet in Boring B-101. It is composed of brown, silty, mostly fine sand with minor amounts of fine to coarse gravel.

Fill was also encountered in Test Pits TP-1 through TP-3 at the upstream side of the existing dam right abutment. These fills were placed as backfill around the existing gravity abutment. In test pit TP-1 the fill material was about 7 feet thick and consisted of a basal gravel with cobbles and boulders up to 32 inches, overlain by a sand with gravel and cobbles, which was overlain by a thin surficial layer of silty sand with gravel. In test pit TP-2 the fill material, which was about 6.5 to 10 feet thick, consisted of a gravel with cobbles and boulders up to 14 inches. In test pit

TP-3 the fill was about 4 feet thick and consisted of a clayey sand with gravel cobbles and boulders up to 14 inches.

The fill in test pits TP-2 and TP-3 formed relatively stable trench walls that could be shored to allow entry of the geologists for test pit logging; whereas the fill in test pit TP-1 was a more granular soils with less fines that would not form a stable trench wall that could be shored. Therefore, test pit TP-1 had to be sloped and benched to allow safe entry into the trench for geologic logging.

3.3.2 Alluvium (Qal)

Alluvium (Qal) was encountered in Borings B-103, B-106 and B-107 below the fill in the bottom of Temecula Creek. The alluvium encountered in the borings ranged in thickness from about 10 to 20 feet. It is composed primarily of loose sands with some gravels and cobbles. The gravels and cobbles are of granitic and metamorphic origin and are mostly angular, but a few are sub-angular to sub-rounded. The sand is loosely consolidated and tended to washout during the core drilling process.

The extent and thickness of the alluvium is shown on Geologic Sections A-A' through C-C' in Figures 13 through 15.

3.3.3 Gneiss (KJm_1)

The bedrock of the existing dam and proposed new dam area is Gneiss (KJm_1). It is exposed on the canyon (abutment) walls and it was encountered in Borings B-101 through B-107 in the area of the new dam footprint. The Gneiss, which is similar to that found in the borrow area, exhibits gneissic layering (foliation) with the segregation of light and dark colored minerals. The metamorphic and structural fabric of the rock is described in detail in Section 3.3.4 below.

3.3.4 Structural Fabric of the Rock Mass

The rock mass in the dam area is pervasively fractured by a system of joints (discontinuities) that extend for at least several tens of feet below the surface, to the maximum depth explored. Based on geologic mapping data, the joints at the surface include a systematic set of joints that are a parallel to the foliation in the Gneiss and other joints that are irregular in orientation and are not readily grouped into a set.

Discontinuity measurements were obtained by geologic mapping of outcrops in and around the abutments, and through downhole acoustic televiewer surveys. Data were collected in the general area of the dam, but the focus of the data collection was in the area of the left and right abutments (see Figures 1-7 and I-8 in Appendix I). These data were tabulated separately for the left and right abutments and are provided in tables in Appendix J. Representative orientation data from each of these data sets was plotted on the Site Plan and Geologic Map, Figure 6. The tabulated data were plotted on equal area, lower hemisphere stereonet plots for each area, and contoured to identify dominant structural patterns (see Figures 17 and 18). The dominant structural data set are foliation parallel joints. These joints exhibit a northwest trend (~350 degree azimuth) and dip near vertical at about 85 degrees to both the east and west. The other joints plotted did not define a definite structural pattern.

The acoustic televiewer surveys that were performed in Borings B-101, B-102, B-103, B-104, B-105 and B-106 also provide information relative to in-situ orientation of rock fractures (joints and other rock mass discontinuities). The orientations of each fracture were tabulated and

plotted in stereonet plots (see Appendix G). The GEOVision stereonet plots for Borings B-101 (left abutment) and Boring B-104 (right abutment), Figures 5 and 16 of the GEOVision Report, show a concentration of northwest striking fractures with a steep dip of about 73 degrees to the east and west similar to the stereonet plots generated from the field mapping (Figures 17 and 18).

Layer (foliation) parallel shears were mapped in the area of the left abutment of the proposed new dam as shown on Figure 6 (also see Figure I-11 in Appendix I). The mapped shears, which are exposed to the south of the left abutment of the existing dam and downstream from the ogee and overpour weirs, trend northwestward towards the left abutment of the proposed new dam. There is an exposure of one of these shears below the northwestern end of the training wall of the existing dam that coincides with a minor side hill drainage. Topographic evidence (drainages) suggests that there may be other bedrock shears extending into the footprint of the proposed dam, but exposures were not found due to these drainages being obscured by fill or thick vegetation.

Previous geologic mapping was performed for Vail Dam by Converse (see Geologic Map in Appendix B, Converse, 1975). As shown on their map, Converse mapped a fault that strikes approximately 325 degrees and dips 75 degrees west. The fault as mapped by Converse runs from under the flat-crested weir spillway and continues northwest down through the bottom of Temecula Creek and up a small drainage about 500 feet to the west of the right abutment of the existing dam. The fault is queried towards the southeast and projected through the flat-crested weir spillway. The current geologic reconnaissance did not reveal any evidence of the fault in the southern queried area of the spillway. Much of this area was mapped as fill by Converse. The fill previously mapped by Converse has been eroded away by previous reservoir spill events and more Gneiss was exposed which facilitated more detailed mapping in the area. A foliation parallel shear that is about 4 feet wide was mapped in the Gneiss outcrop wall along the access road to the dam (see Figure I-12 in Appendix I). This exposure of the shear is located about 80 feet north of the end of the left abutment training wall (see Figure 6). This shear coincides with the fault mapped by Converse at this location. However, it appears that the shear is not striking 325 degrees as reported by Converse. Orientation measurement of the shear show it to be striking about 020 degrees and dipping about 88 degrees west. This shear does not intersect the existing or proposed dams and it does not intersect the spillway.

3.3.5 Weathering Profile

The relative strength and weathering of the bedrock was determined by multiple methods: observation/examination of rock core samples from the borings and direct observation of test pit walls, seismic refraction surveys, downhole seismic velocity surveys and laboratory testing. The weathering of the bedrock in the borings drilled in the area of the proposed dam generally lessens with depth and is typically correlative to increasing RQD and rock strength. The top of rock encountered was slightly weathered in all the borings drilled in the bottom of Temecula Canyon. Moderately weathered rock was encountered in the upper 10 feet and 16 feet of Borings B-101 and B-104, respectively, which were drilled at the left and right abutments. The remainder of the rock recovered from all the borings was slightly weathered or slightly weathered to fresh. The extent of each grade of weathering is shown on the geologic sections (Figures 13 through 15).

The gneiss exposed in the test pits excavated upstream of the existing right gravity abutment ranged from highly to moderately weathered. In test pits TP-2 and TP-3 a near surface rind of highly weathered rock ranged from 2 to 6 feet thick, below which the rock was moderately weathered. In tests pit TP-1 only moderately rock was encountered at the bottom of the test pit.

The excavator, which was a 32,100 lb. machine equipped with a 3-foot bucket, could only penetrate a few feet (up to 2.5 feet in TP-3) into moderately weathered rock before encountering refusal. Slightly weathered rock was not observed in the test pits and presumably is at a depth of approximately 16 feet below the top of rock, as was observed in nearby core Boring B-104.

The seismic (P-wave) velocities of the rock were estimated by performing 3 seismic refraction lines (RS-1, RS-2, and RS-3) in the area of the proposed dam footprint. The typical velocity of the rock ranged from 12,000 to 15,000 feet per second (fps) which is consistent with slightly weathered to fresh gneissic rock. Seismic profiles with specific velocities with depth are presented in Appendix C and their locations are shown on Figure 6.

The bedrock weathering can also be revealed in the downhole seismic velocity surveys which were completed in Borings B-102 and B-103. In general, lower velocities would be expected in more highly weathered and fractured near surface rock and higher velocities would be characteristic of deeper, less weathered, and less fractured rock. The seismic velocities measured downhole in Boring B-102 generally show this trend with a range in shear wave velocity (V_s) of 6,061 fps to 11,110 fps, and a P-wave velocity (V_p) ranging from10,750 fps and 20,200 fps. In Boring B-103, the seismic velocities increased from 42 feet bgs to about 70 feet bgs. A decrease in the velocities occurred from about 70 feet bgs to about 100 feet bgs corresponding to a highly fractured zone. From 100 feet bgs to the bottom of the hole the velocities generally increased with depth. The velocities in Boring B-103 range in V_s of 5,290 fps to 11,900 fps, and V_p range from 9,390 fps to 22,220 fps.

Likewise, the strength of the bedrock is expected to generally increase with depth below the surface and a decrease in weathering. This trend is tentatively suggested by laboratory strength testing data of core samples taken from the borings performed at the dam site. Laboratory tests for unconfined compressive strength were performed on select samples of the gneissic bedrock. The unconfined compressive strength on those samples tested ranged from 3,400 to 13,900 psi with a weakly developed trend of increasing strength with greater depth (see Table H-1 in Appendix H).

3.3.6 Rock Mass Permeability

As outlined in Section 2.3.4 packer (water pressure) testing was performed in Borings B-101 through B-104, to provide estimates of in-situ hydraulic conductivity. Tabulated data from the packer testing was used to calculate the Lugeon value for each interval. The data tables, calculations and relative plots are presented in Appendix F. The Lugeon values and test intervals are provided in Table 5 below. Lugeon values give an estimate of the hydraulic conductivity and rock discontinuity condition of the rock in the depth interval tested. Low Lugeon values are representative of very tight rock with few or tight discontinuities with a very low hydraulic conductivity. High values are the converse. The packer test sections and relative Lugeon values are plotted on Geologic Section A-A', Figure 13. Lugeon values were typically high in the upper test sections of each boring and decreased with increasing depth.

Table 5. Packer Testing Intervals and Lugeon Values

B-101		B-102		B-103		B-104	
Depth Interval (ft bgs)	Lugeon Value	Depth Interval (ft bgs)	Lugeon Value	Depth Interval (ft bgs)	Lugeon Value	Depth Interval (ft bgs)	Lugeon Value
21.5 to 39.0	8.9	30.0 to 49.0	14.4	47.5 to 67.5	59.0	12.5 to 30.0	23.6
36.5 to 56.0	1.2	49.0 to 69.0	11..4	67.5 to 87.5	16.0	30.0 to 50.0	39.9

B-101		B-102		B-103		B-104	
Depth Interval (ft bgs)	Lugeon Value	Depth Interval (ft bgs)	Lugeon Value	Depth Interval (ft bgs)	Lugeon Value	Depth Interval (ft bgs)	Lugeon Value
56.5 to 76.0	1.1	69.0 to 89.0	25.0	87.5 to 107.5	1.4	50.0 to 70.0	12.3
76.5 to 96.0	0.2	89.0 to 109.0	1.6	107.5 to 127.5	0.2	70.0 to 90.0	1.5
96.5 to 116.0	1.0	109.0 to 129.0	5.6	127.5 to 147.5	1.2	90.0 to 110.0	1.6
116.5 to 136.0	0.3	129.0 to 149.0	4.0	147.5 to 167.5	3.5	110.0 to 130.0	1.0
136.0 to 150.5	0.4	149.0 to 169.0	1.2	167.5 to 187.5	10.0	130.0 to 150.0	1.6
		169.0 to 189.0	1.7	187.5 to 200.0	5.6		
		184.0 to 200.0	1.4				

3.3.7 Groundwater Levels

Boring B-103 has a piezometer placed at approximately 195 feet bgs (1178 feet NAVD88) and Boring B-105 has a piezometer at approximately 95.5 feet bgs (1284.5 NAVD88). Measurements were taken periodically from each of the borings after the transducers were installed until the measured water levels began to stabilize after the grout set up. Table 6 below provides the groundwater level measurements. The piezometer data indicate that the piezometric surface in the valley bottom is at an approximate elevation of 1360 feet NAVD88 at the time of the readings and therefore the alluvium and the lower part of the fill in the valley bottom were saturated.

Table 6. Groundwater Level Measurements

	B-103		B-105	
Date	Depth (feet bgs)	Elevation (feet NAVD88)	Depth (feet bgs)	Elevation (feet NAVD88)
8/23/2017	12.0	1361.0	21.8	1358.2
9/18/2017	Not measured	Not measured	20.0	1360.0

3.4 Geotechnical Characterization of the Spillway System

Geotechnical characterization was undertaken of the spillways to support an erodibility evaluation of that system. The results of the erodibility evaluation are provided in the Geotechnical Basis of Design Report (AECOM, 2017b). The spillway crest is at elevation 1,472.6 feet NAVD88. The spillway system is comprised of a 119-foot-long ogee weir (see photograph in Figure 19), a 343-foot long flat-crested weir (see photograph in Figure 20), and a 65-foot long concrete overpour weir (see photograph in Figure 21). The flat-crested weir includes a 5-foot-wide concrete sill along its length. The concrete overpour weir is about 25 feet high and was constructed across a saddle in the ridge line.

Much of the overburden has been scoured away in previous reservoir spills. The training wall at the left abutment of the dam was added in the 1980s after scouring occurred near the left abutment during a previous reservoir spill. The flat-crested weir was constructed after excavation of the ridgeline that had separated the areas of the ogee weir and the overpour weir and as such includes wide expanses of slightly weathered gneiss upstream and downstream of the concrete sill.

The geology mapped at the spillways is shown in Figure 7. The data collected for this evaluation included detailed geologic mapping, discontinuity measurements and structural surveys described below. To collect data needed to calculate for an erodibility index, linear transects were mapped in detail downstream from the ogee weir spillway and along the outcrop trending northwest downstream from the overpour weir spillway. Transects were aligned parallel and perpendicular to the dominant foliation parallel joints. Measurements of discontinuity spacing, type, joint roughness and alteration, and orientation were collected along each transect. These data and the locations of the transects are presented in the GBDR.

Based on geologic field mapping, the spillway segments are all founded on the same gneissic metamorphic bedrock (KJm_1) as mapped in the new dam footprint. The Gneiss has the same foliation and prominence of foliation parallel jointing, with other random joints. Downstream from the spillways, the gneiss is overlain by lesser amounts of older terrace deposits (Qt), alluvium (Qal), and Fill (Qf) materials. The areal extent of these materials, which are further described below, are shown in Figure 7.

3.4.1 Ogee Weir

Downstream from the ogee weir spillway are exposures of Gneiss. The rock is exposed continuously at the surface as overburden materials have generally been scoured away during previous reservoir spills. Although a few plants and shrubs are present, the rock is generally unobscured and discontinuities are readily apparent on the surface. The discontinuities are predominately steeply dipping, foliation parallel joints, with lesser randomly dipping randomly orientated joints. Orientation data of these joints were collected in the field and tabulated. The geology and representative discontinuity data are shown on Figure 7. Two bedding parallel bedrock shears were also evident within the rock exposures in the area of the ogee weir. One trends northerly into the base of the ogee weir and the other trends into the training wall approximately 55 feet to the west of the other foliation parallel shear. These shears are evident as highly fractured and weathered zones that are approximately 8 to 10 inches wide. Their mapped extents are shown on Figure 7.

The tabulated discontinuity data that was collected from the area of the ogee weir was plotted on an equal area, lower hemisphere stereonet plot and contoured to identify dominant structural patterns (Figure 22). The dominant structural data set are foliation parallel joints. These joints exhibit a strong northwest trend (~360 degrees azimuth) and dip near vertical at about 85 degrees to both the east and west. The other joints plotted did not define a structural pattern.

3.4.2 Flat-Crested Weir

The Gneiss exposed downstream from the flat-crested weir spillway is generally flat for a distance of 100 feet or more. The rocks are intermittently obscured by a veneer of fill from the few dirt access roads, windblown sediment, and shrubs. Discontinuities are apparent on the surface of unobscured outcrops in the area. The discontinuities are predominately steeply dipping, foliation parallel joints, with lesser randomly dipping randomly orientated joints. Orientation data of these joints were collected in the field and tabulated. The geology and representative discontinuity data are shown on Figure 7. The two bedding parallel shears exposed in the area of the ogee weir are not readily visible due to the minor fill and shrubs but are inferred to continue through this area.

The tabulated discontinuity data that was collected from the area of the flat-crested weir was plotted on an equal area, lower hemisphere stereonet plot and contoured to identify dominant structural patterns (Figure 23). The dominant structural data set are foliation parallel joints. These joints exhibit a strong northwest trend (~360 degrees azimuth) and dip near vertical at about 86 degrees to both the east and west. The other joints plotted did not define a structural pattern.

3.4.3 Overpour Weir

Gneiss is exposed at the abutments of the overpour weir spillway as relatively steep outcroppings. The Gneiss at the right abutment continues as a steep out cropping in a northwesterly direction. This linear outcropping defines the northeast wall of a channel that runs from the overpour weir in a northwesterly direction. The channel is bound on the southwest (above anticipated spill flow levels) by a steep wall of Quaternary age terrace deposits (Qt). The terrace deposits are comprised of light brown silty sands, with occasional layers of gravels and cobbles. The bottom of the channel downstream from the overpour weir is lined with alluvium with an occasional outcropping of Gneiss. Discontinuity data were collected from the abutment outcrops and the linear outcrop that defines the northeast side of the channel. Similar to the ogee and flat-crested weirs the discontinuities are predominately steeply dipping, foliation parallel joints, with lesser randomly dipping randomly orientated joints. Orientation data of these joints were collected in the field and tabulated. The geology and representative discontinuity data are shown on Figure 7. Two bedding parallel shears that line up with the shears visible in the area of the ogee weir were also apparent within the outcroppings.

The tabulated discontinuity data that were collected from the area of the Overpour Weir were plotted on an equal area, lower hemisphere stereonet plot and contoured to identify dominant structural patterns (Figure 24). The dominant structural data set are foliation parallel joints. These joints exhibit a slight northeast trend (~003 degrees azimuth) and dip near vertical at about 88 degrees to both the east and west. The other joints plotted did not define a prevalent structural pattern.

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4.0 LIMITATIONS

The geologic and geotechnical data presented in this GDR is based on information obtained from previous studies, site geologic observations, and subsurface explorations. The information presented represents a limited sampling of the subsurface materials and groundwater that may be encountered for the new dam project. Actual subsurface conditions will likely vary from the conditions described in this report.

This report has been prepared for the exclusive use of the District and for the purposes described in the report. Use by other parties or for other purposes is not authorized.

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5.0 REFERENCES

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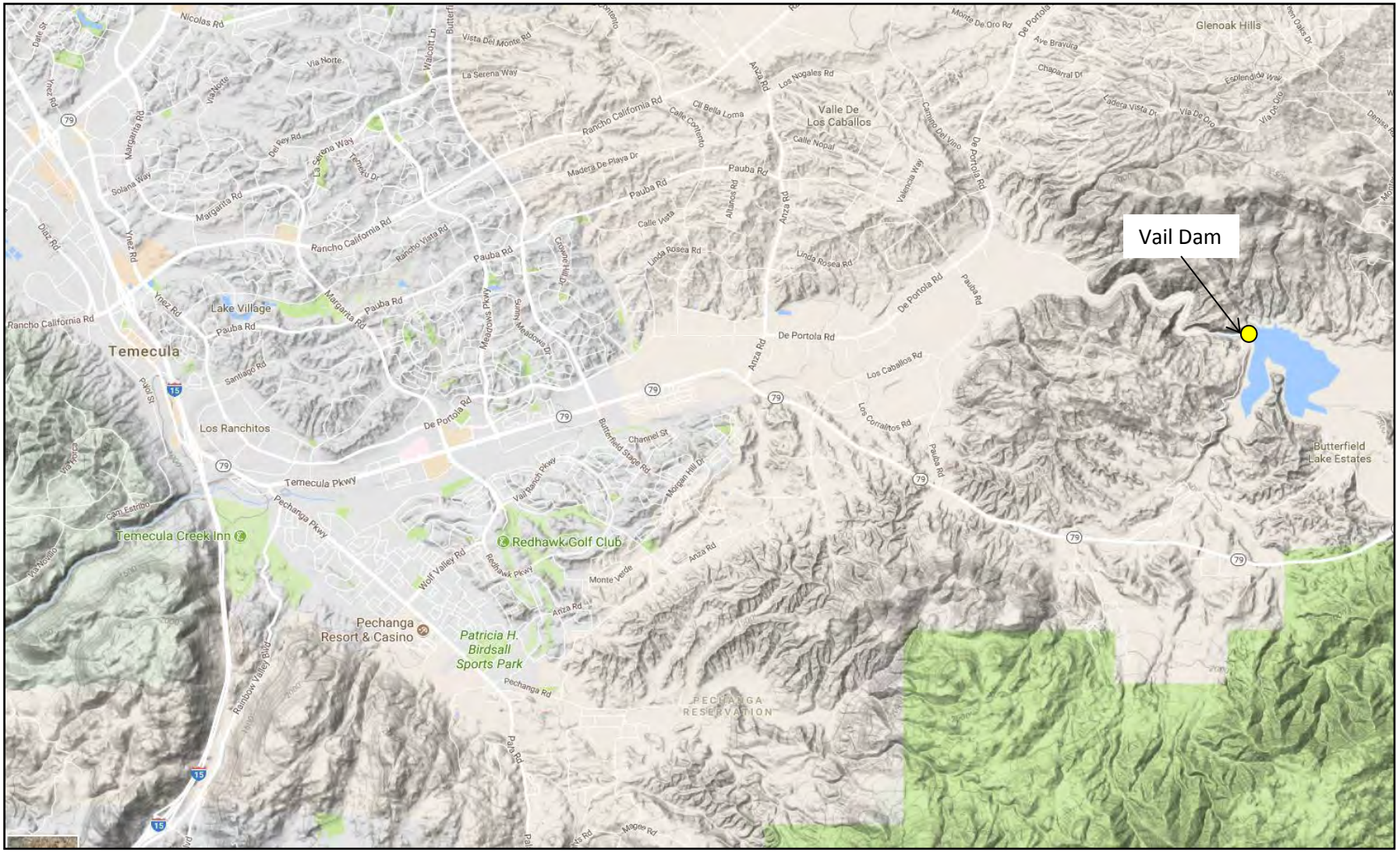
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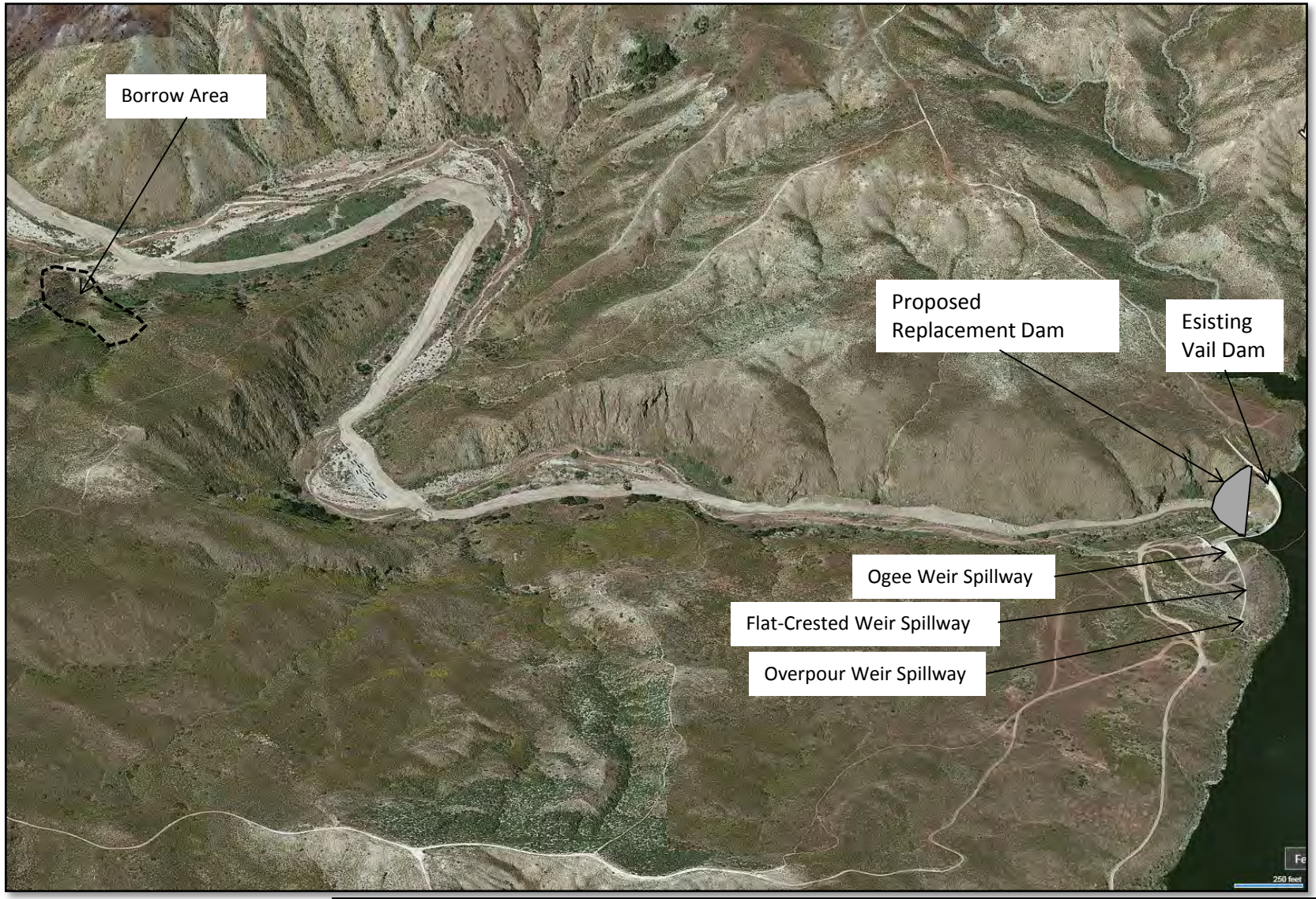
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FIGURES

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Vail Dam
Temecula
Lake Village
Los Ranchitos
Temecula Creek Inn
Redhawk Golf Club
Pechanga Resort & Casino
Patricia H. Birdsall Sports Park
Valle De Los Caballos
Glenoak Hills
Butterfield Lake Estates
PECHANGA RESERVATION
Rancho California Rd
Temecula Pkwy
Pechanga Pkwy
De Portola Rd
Pauba Rd
Anza Rd
Los Caballos Rd
Los Corralitos Rd
Butterfield Stage Rd
Margarita Rd
Ynez Rd
Nicolas Rd
Vista Del Monte Rd
La Serena Way
Via Norte
Del Rey Rd
Solana Way
Diaz Rd
Rancho Vista Rd
Meadows Pkwy
Sutton Meadows Dr
Calle Contento
Cll Bella Loma
Calle Nopal
Madera De Playa Dr
Calle Vista
Linda Rosea Rd
Alliatros Rd
Valencia Way
Camino Del Vino
De Portola Rd
Ave Bravura
Chaparral Dr
Ladera Vista Dr
Via De Oro
Espelendido Way
Monte De Oro Rd
Channel St
Morgan Hill Dr
Vail Ranch Pkwy
Redhawk Pkwy
Monte Verde
Wolf Valley Rd
Rainbow Valley Blvd
Pechanga Rd
Magee Rd
Camp Estrella
Pujol St
Via Norte
Walcott Ln
Butterfield
Date St
Ynez Rd
Margarita Rd
Santiago Rd
Meadows Pkwy
Sutton Meadows Dr
Crowne Hill Dr
Allatros Rd
Anza Rd
Valencia Way
De Portola Rd
Pauba Rd
Los Nogales Rd
Calle Contento
Rancho California Rd
Madera De Playa Dr
Calle Vista
Linda Rosea Rd
Camino Del Vino



Approximate Scale
0 250 500
feet

Rancho California Water District

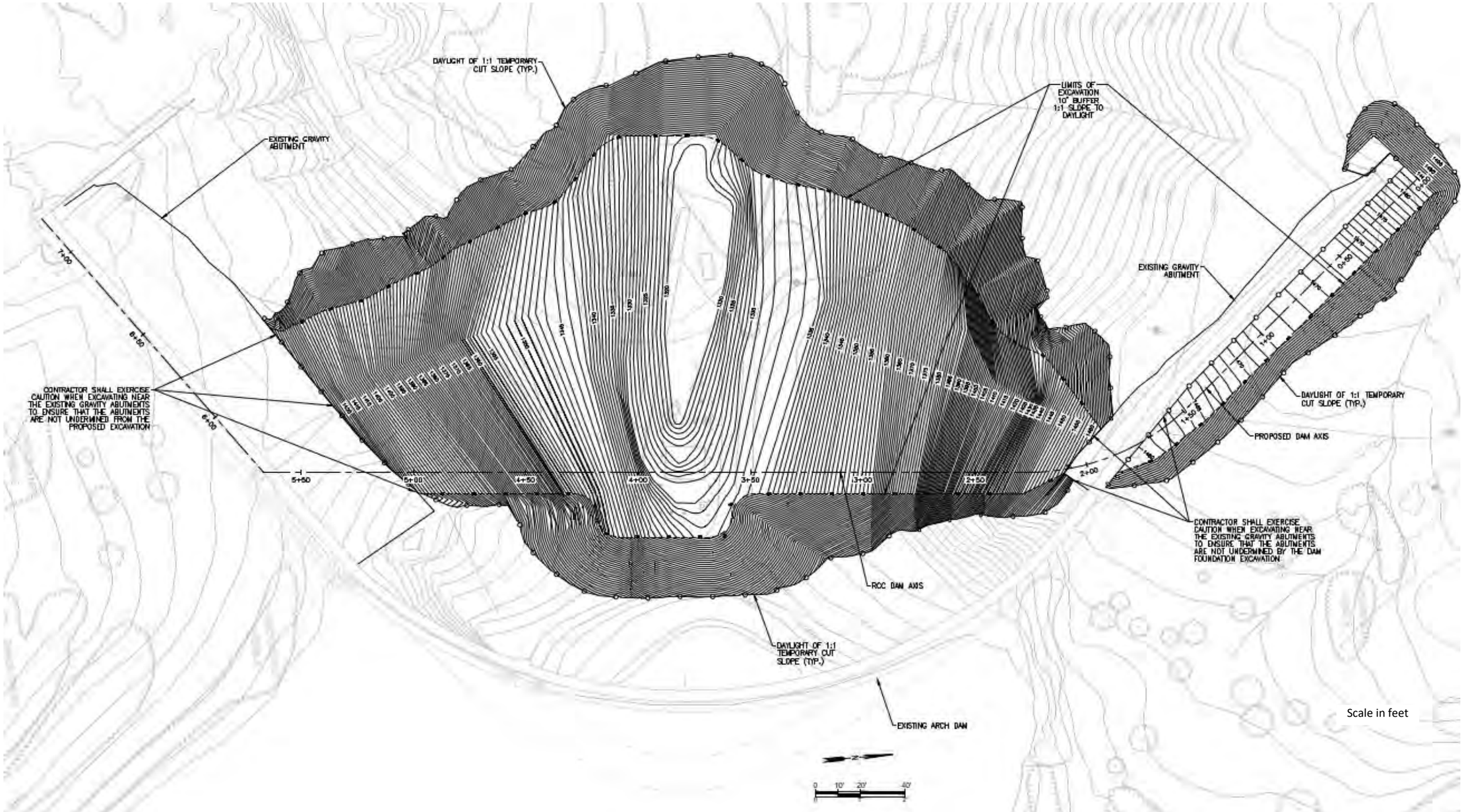
AECOM

Site Plan

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: D. Rector	DATE: 10/12/2017	FIGURE NO: 2
CHECKED BY: L. Handfelt	DATE: 10/16/2017	

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Rancho California Water District

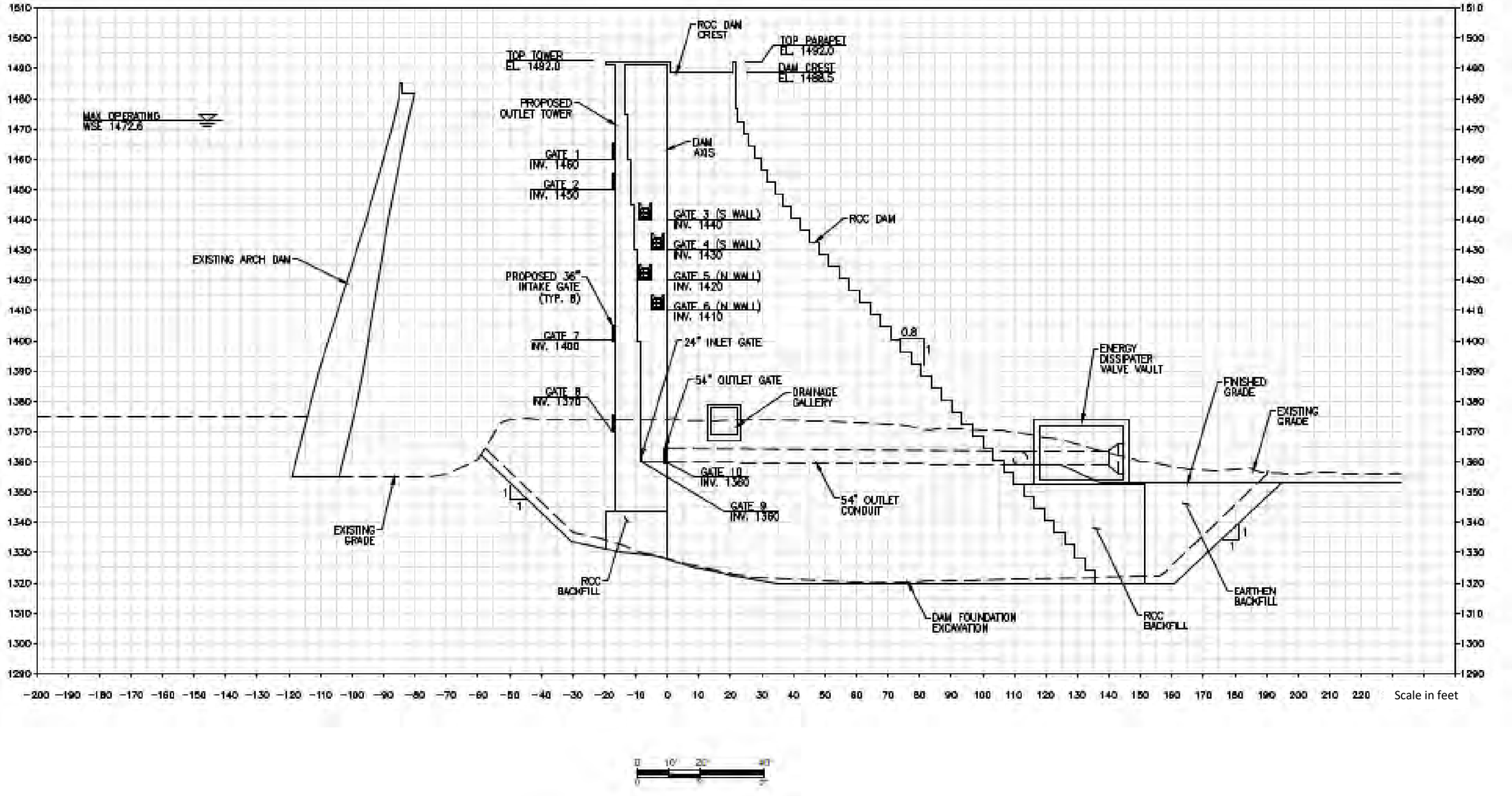
AECOM

Dam Foundation Excavation

Vail Dam Geotechnical Investigation, Temecula, California

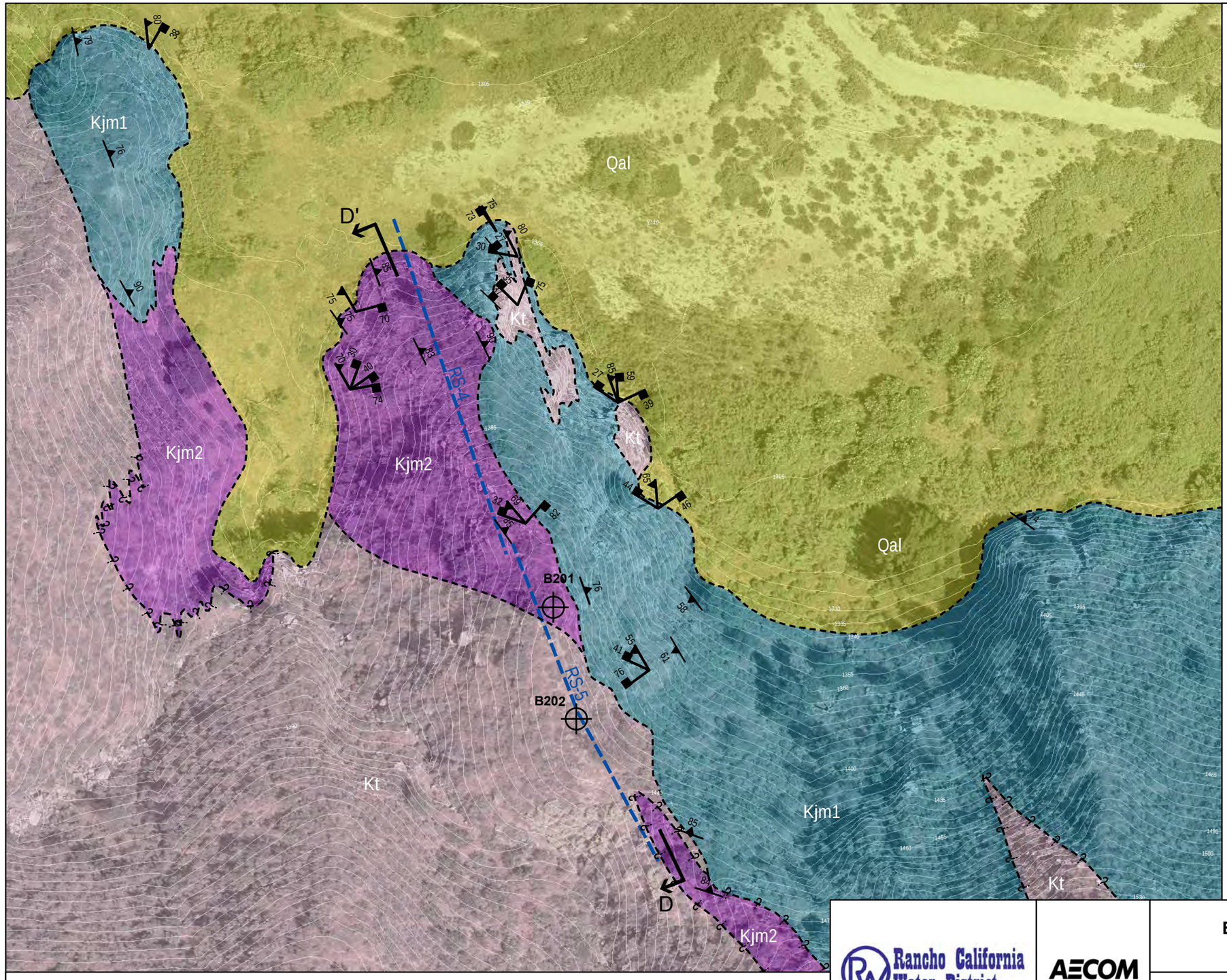
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CHECKED BY: L. Handfelt	DATE: 11/22/2021	

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Rancho California Water District	AECOM	**Maximum Dam Cross Section** Vail Dam Geotechnical Investigation, Temecula, California	
		DRAWN BY: D. LAFRANCE	DATE: 11/22/2021
		CHECKED BY: L. Handfelt	DATE: 11/22/2021
			FIGURE NO: 4

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LEGEND

- Qal — Quaternary Alluvium
- Kt — Cretaceous Tonalite
- Kjm1 — Cretaceous-Jurassic Gneiss
- Kjm2 — Cretaceous-Jurassic Migmattic Gneiss
- Geologic Contact, Queried, Where Location Is Uncertain
- Strike and Dip of Foliation
- Strike and Dip of Joint
- Strike and Dip of Foliation and Joint
- B201 — Core Boring
- Seismic Refraction Line
- D' / D — Geologic Cross Section

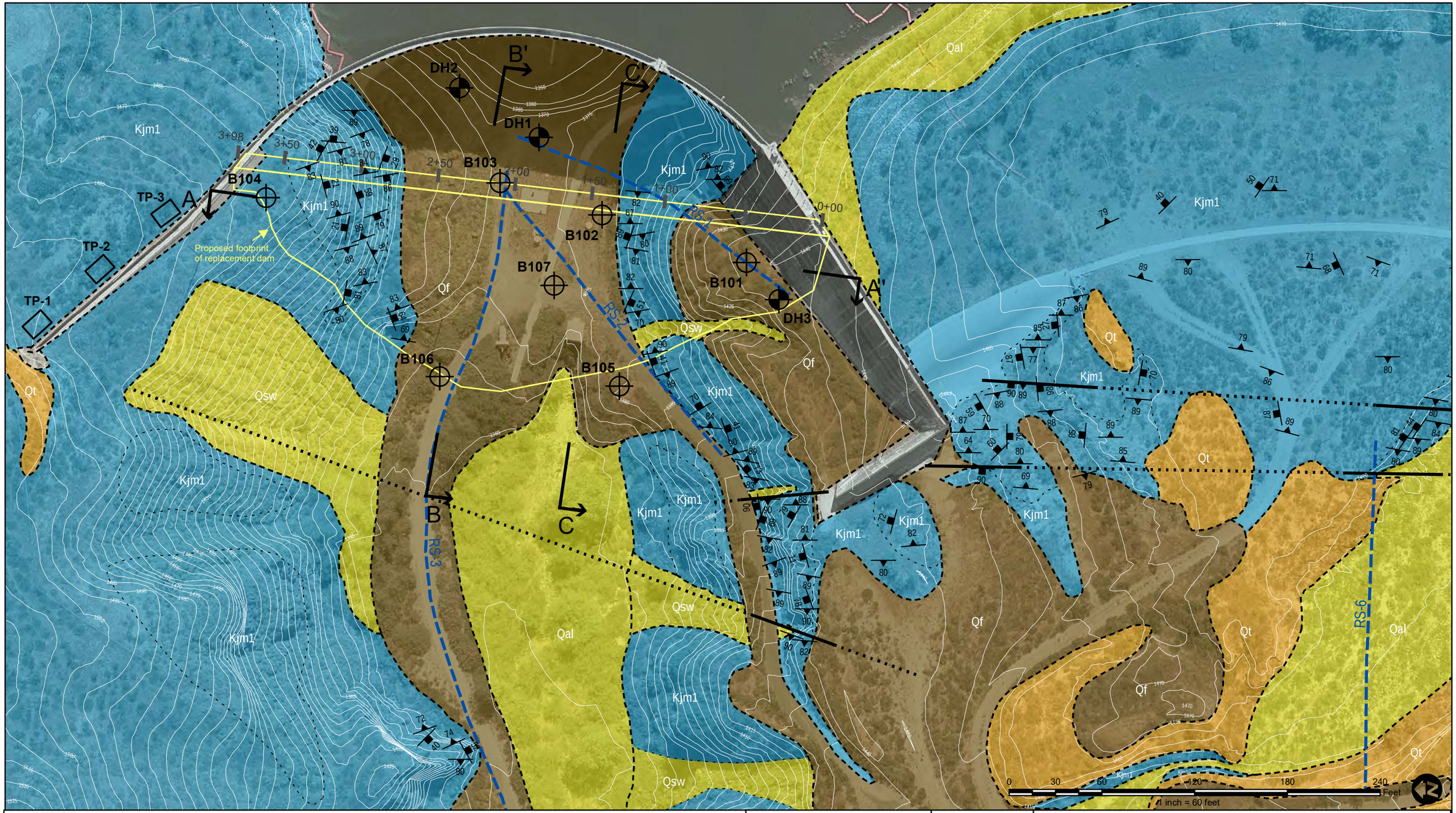
Rancho California Water District

AECOM

Borrow Area Explorations and Geology

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY:	D. Rector	DATE:	10/12/2017	FIGURE NO: 5
CHECKED BY:	D. Schug	DATE:	10/18/2017	



Qf	Quaternary Fill	B201	Core Boring
Qsw	Quaternary Slopewash	DH1	Previous Boring
Qal	Quaternary Alluvium		Seismic Refraction Line
Qt	Quaternary Terrace	TP-1	Test Pit
Kjm1	Cretaceous-Jurassic Gneiss		

80	Strike and Dip of Foliation
30	Strike and Dip of Joint
	Foliation Parallel Shears
A A'	Geologic Cross Section
? ?	Geologic Contact, Queried, Where Location Is Uncertain

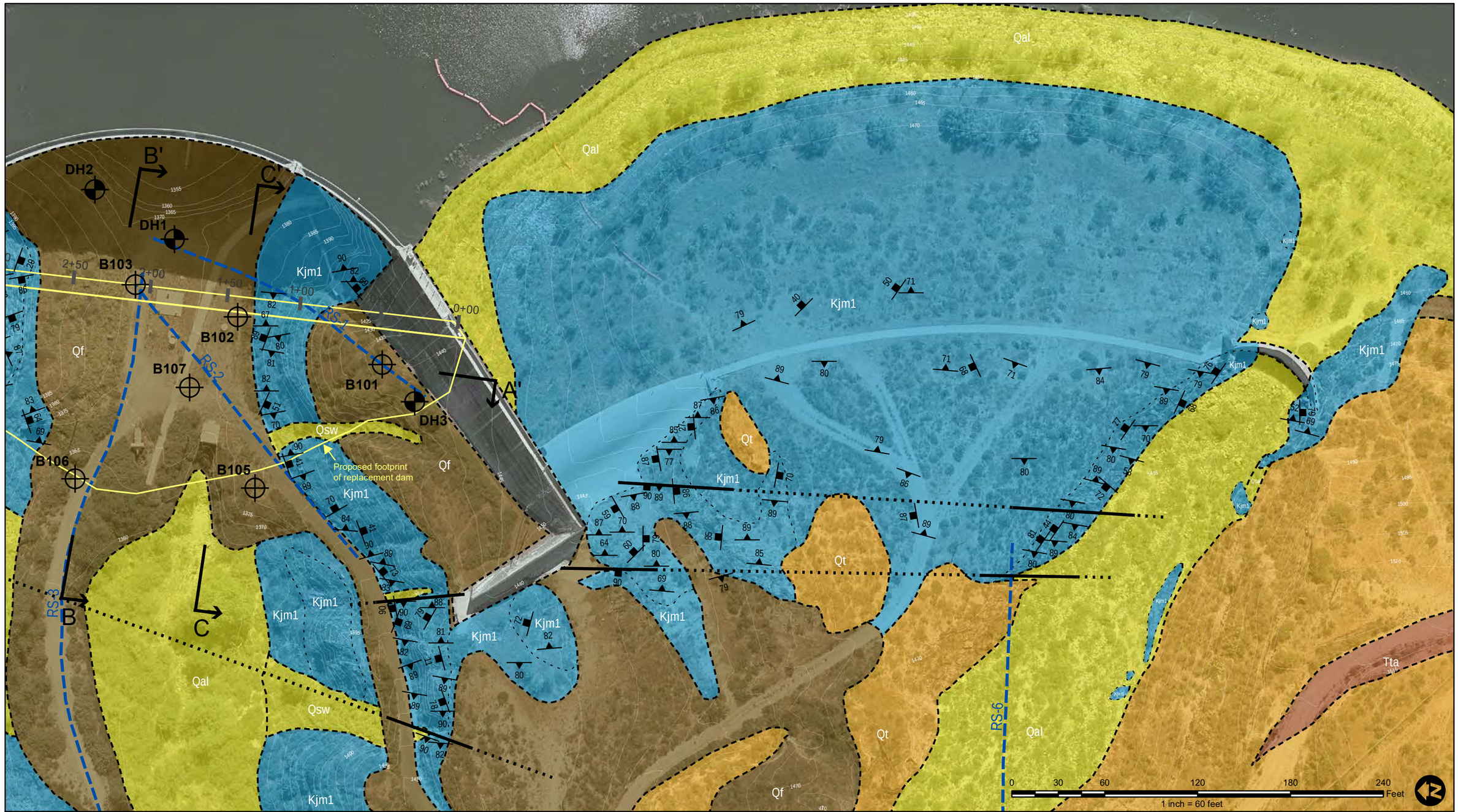
Rancho California Water District

AECOM

Dam Foundation Explorations and Geology

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY:	D. La France	DATE:	10/14/2021	FIGURE NO: 6
CHECKED BY:	C. Goetz	DATE:	10/18/2021	



Qf	Quaternary Fill	Kjm1	Cretaceous-Jurassic Gneiss	80 / 30	Strike and Dip of Foliation
Qsw	Quaternary Slopewash	B201	Core Boring		Strike and Dip of Joint
Qal	Quaternary Alluvium	DH1	Previous Boring		Foliation Parallel Shears
Qt	Quaternary Terrace		Seismic Refraction Line	A A'	Geologic Cross Section
Tta	Pliocene Temecula Arkose				Geologic Contact, Queried, Where Location Is Uncertain

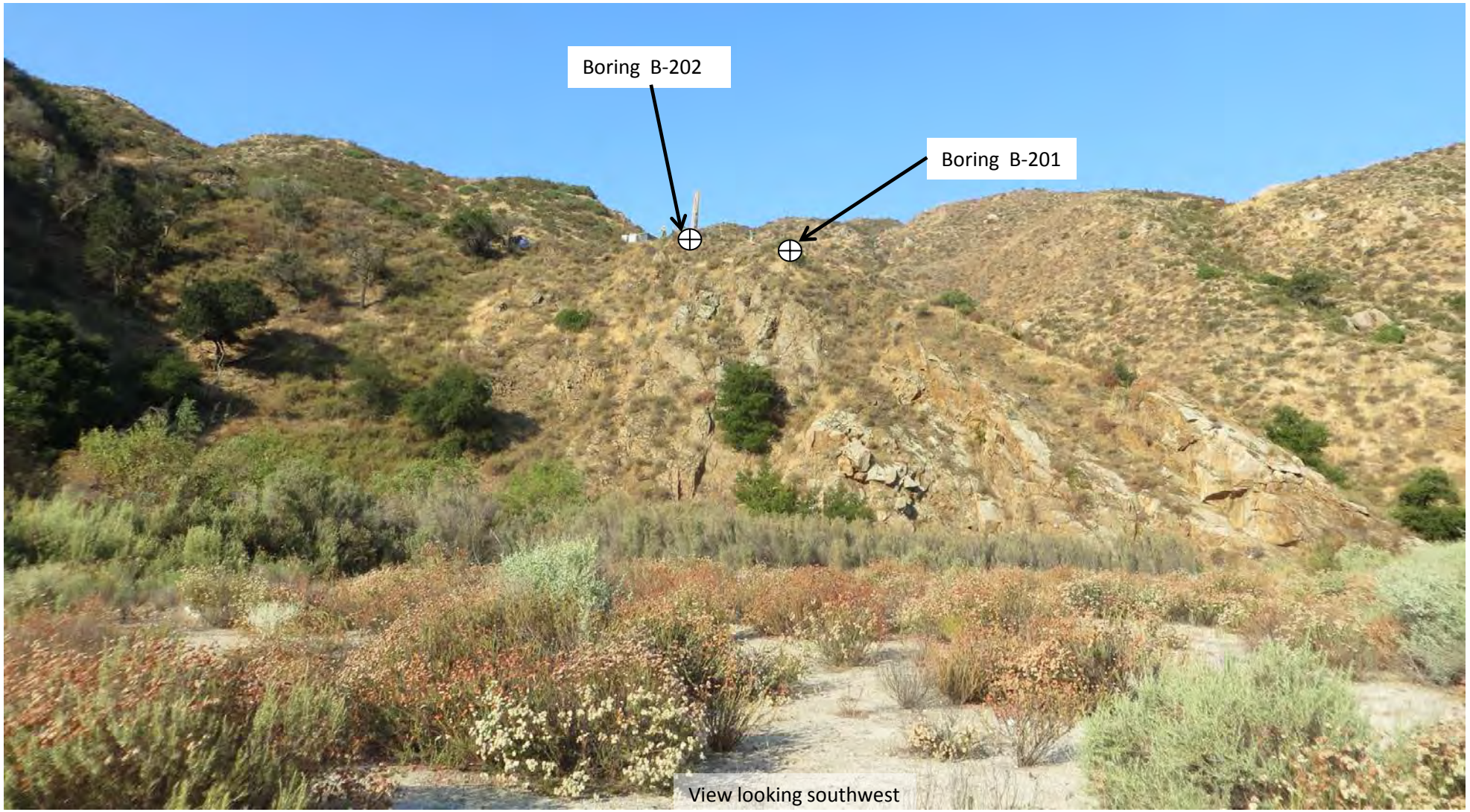
Rancho California Water District

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Spillway Geology

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY:	D. Rector	DATE:	10/12/2017	FIGURE NO: 7
CHECKED BY:	D. Schug	DATE:	10/18/2017	



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Photograph of Borrow Area Borings

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: D. Rector	DATE: 10/12/2017	FIGURE NO: 8
CHECKED BY: L. Handfelt	DATE: 10/16/2017	

File: C:\Users\euijo.marquez\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.Outlook\K2VOK0K5\Figure 8 Photograph Borrow Area redone by CG.xlsx\Borrow Area



Rancho California Water District

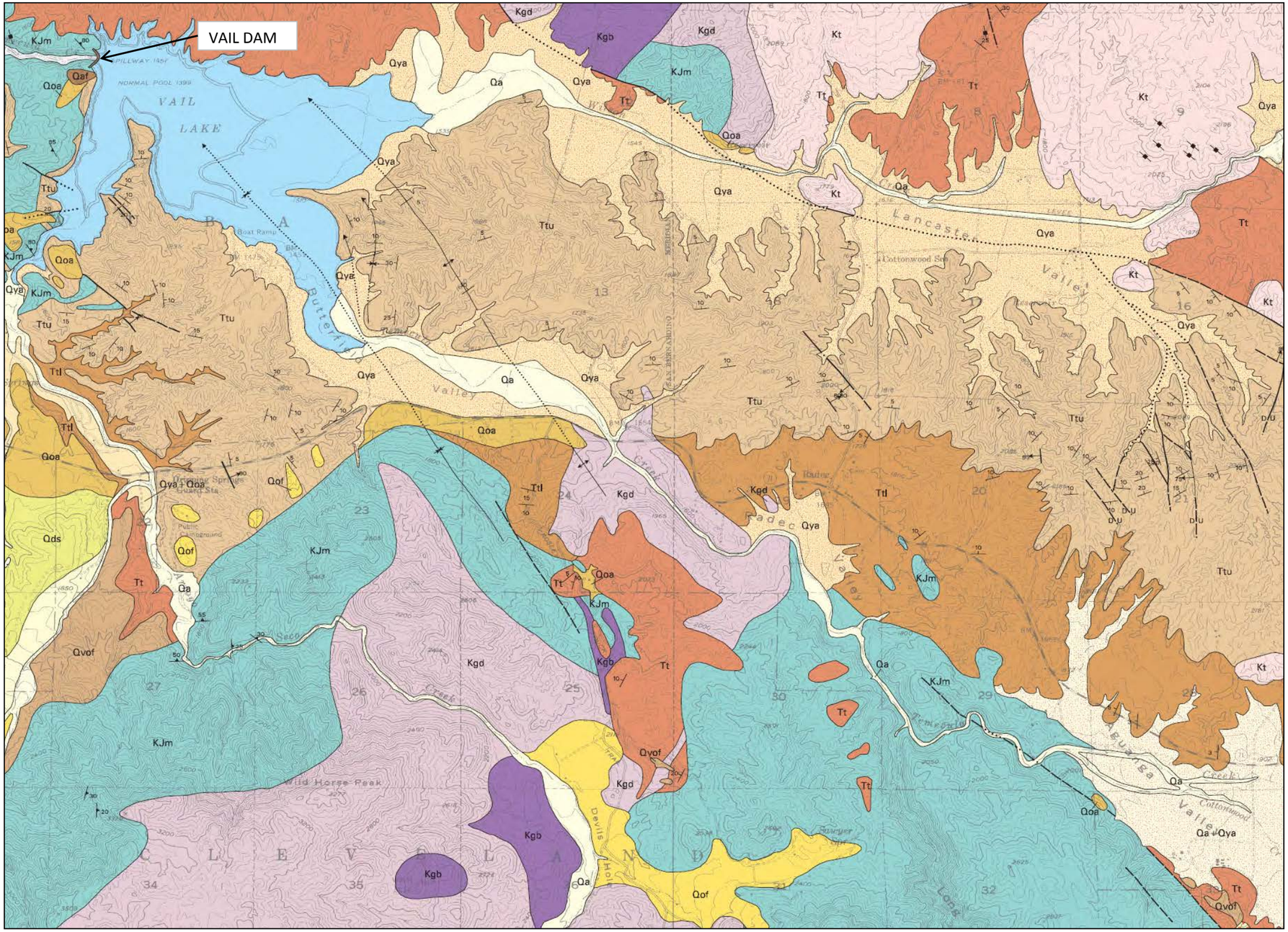
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Photograph of Dam Foundation Borings

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: D. Rector	DATE: 10/12/2017	FIGURE NO: 9
CHECKED BY: L. Handfelt	DATE: 10/16/2017	

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LEGEND

Qaf	*Artificial fill*
Qa	*Holocene , alluvial floodplain deposits*
Qya	*Holocene and Late Pleistocene alluvium*
Qoa	*Late to middle Pleistocene alluvium*
Qvof	*Very old alluvial fan deposits*
Ttu	*Plio-Pleistocene Temecula Arkose, upper part*
Ttl	*Plio-Pleistocene Temecula Arkose, lower part*
Tt	*Plio-Pleistocene Temecula Arkose, lower part*
Kgd	*mid-Cretaceous Granodiorite*
Kt	*mid-Cretaceous Tonalite*
Kgb	*mid Cretaceous Gabbro*
Kjm	*Cretaceous &Jurassic medisedimentary rocks*

Approximate Scale

0 4000 8000

feet

N

Source: Geologic Map of the Vail Lake 7.5' Quadrangle San Diego and Riverside Counties California, A Digital Database California Geological in Cooperation with the United States Geological Survey, Southern California Aerial Mapping Project, Original Scale 1:24,000 (by Michael P. Kennedy).

Rancho California Water District

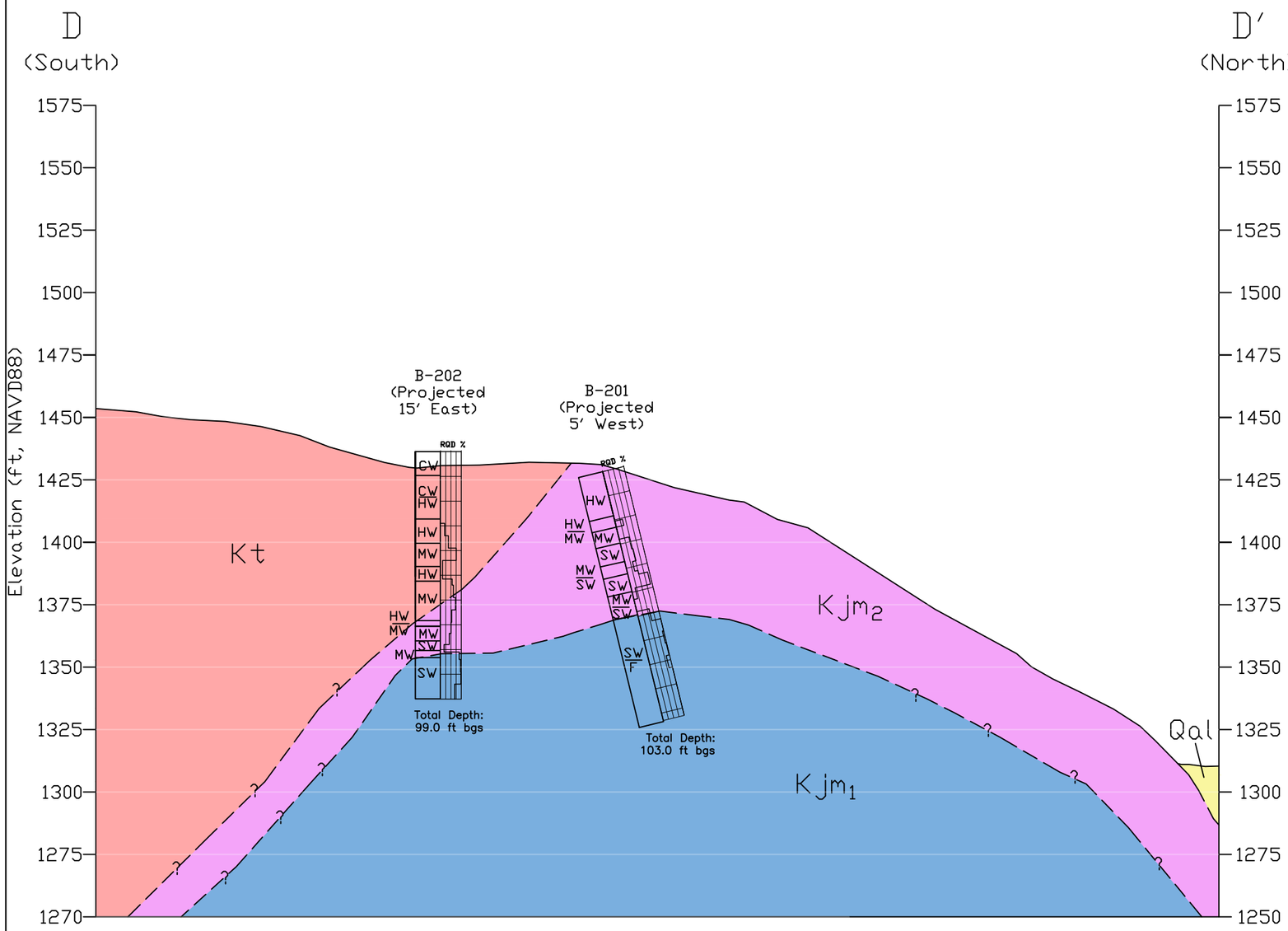
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Regional Geology

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: C. Goetz	DATE: 9/6/2017	FIGURE NO: 10
CHECKED BY: D. Schug	DATE: 9/21/2017	

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LEGEND:

Rock Weathering Profile

OB	OVERBURDEN SOIL
CW	COMPLETELY WEATHERED ROCK
HW	HIGHLY WEATHERED ROCK
MW	MODERATELY WEATHERED ROCK
MW/SW	MODERATELY TO SLIGHTLY WEATHERED ROCK
SW	SLIGHTLY WEATHERED ROCK
SW/F	SLIGHTLY WEATHERED TO FRESH ROCK
F	FRESH ROCK

Rock Quality Designation

ROD %
0 50 100

Qal	ALLUVIAL SOILS (Qal)
Kt	Cretaceous Tonalite (Qal)
Kjm_2	Cretaceous–Jurassic Migmatitic Gneiss (KJm_2)
Kjm_1	Cretaceous–Jurassic Gneiss (KJm_1)

— — —?— APPROXIMATE LOCATION OF GEOLOGIC CONTACT, QUERIED WHERE INFERRED

Notes

1) SEE FIGURE 5 FOR LOCATION OF SECTION.
2) THE SUBSURFACE CONDITIONS SHOWN ARE OBTAINED FROM WIDELY SPACED EXPLORATIONS. INFORMATION ON ACTUAL SUBSURFACE CONDITIONS EXISTS ONLY AT LOCATIONS OF EXPLORATIONS; CONDITIONS BETWEEN EXPLORATIONS MAY VARY FROM THOSE DEPICTED.

0 25 50 100

SCALE: 1"=50'

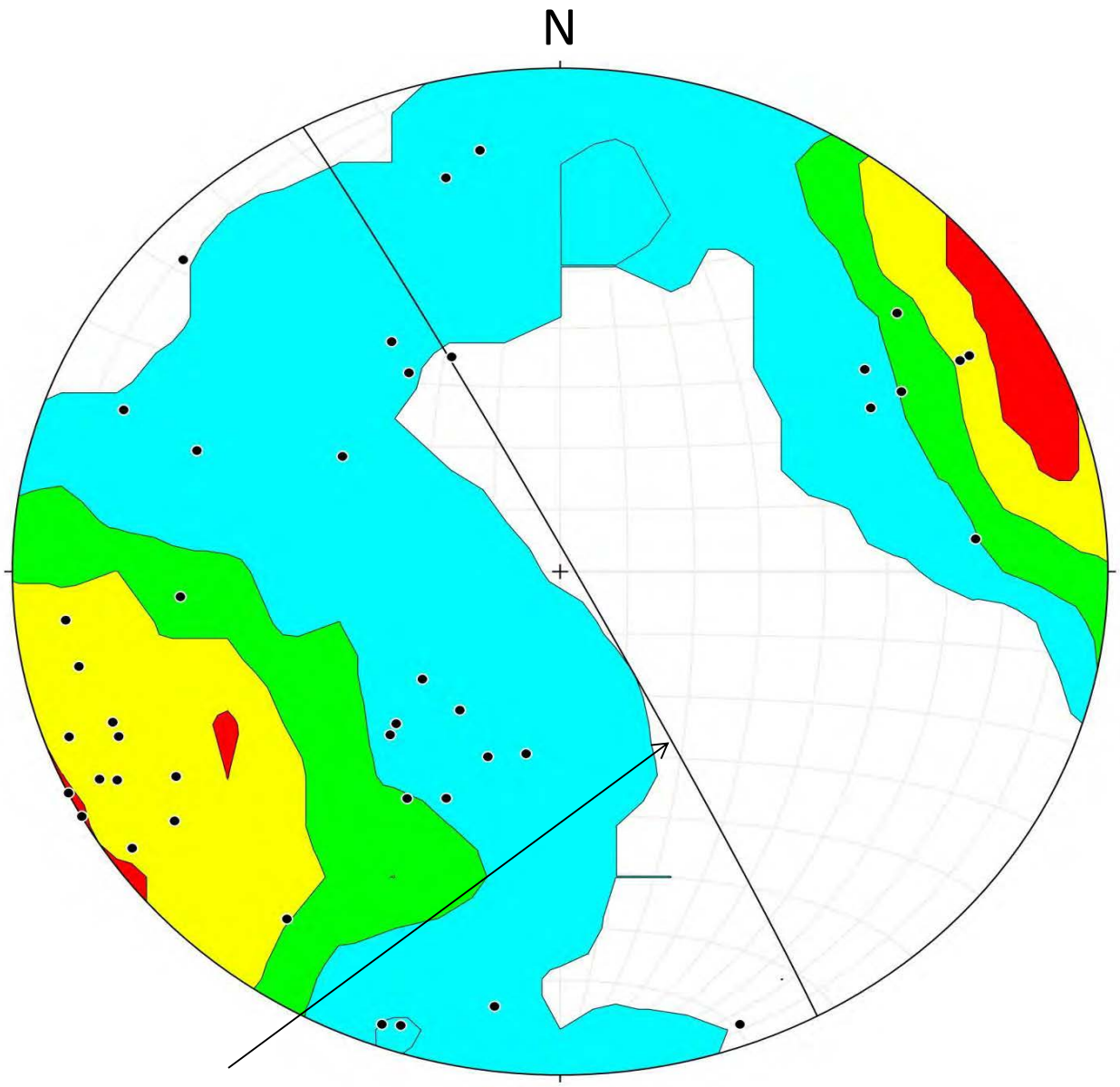
Rancho California Water District

AECOM

Geologic Section D-D' Through Borrow Area

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: D. Rector	DATE: 10/12/2017	FIGURE NO: 11
CHECKED BY: L. Handfelt	DATE: 10/16/2017	



Average Great Circle of primary joint set (foliation joints).
Strike 332 degrees, dipping 80 degrees north.

Notes:
- Diagram is an Equal Area Lower Hemisphere Projection.
- Discontinuity Planes: Planes to poles represented by dots.
- Number of data points = 44
- Contoured percentage of poles.
- Joint sets measured from the proposed borrow site.

Rancho California Water District

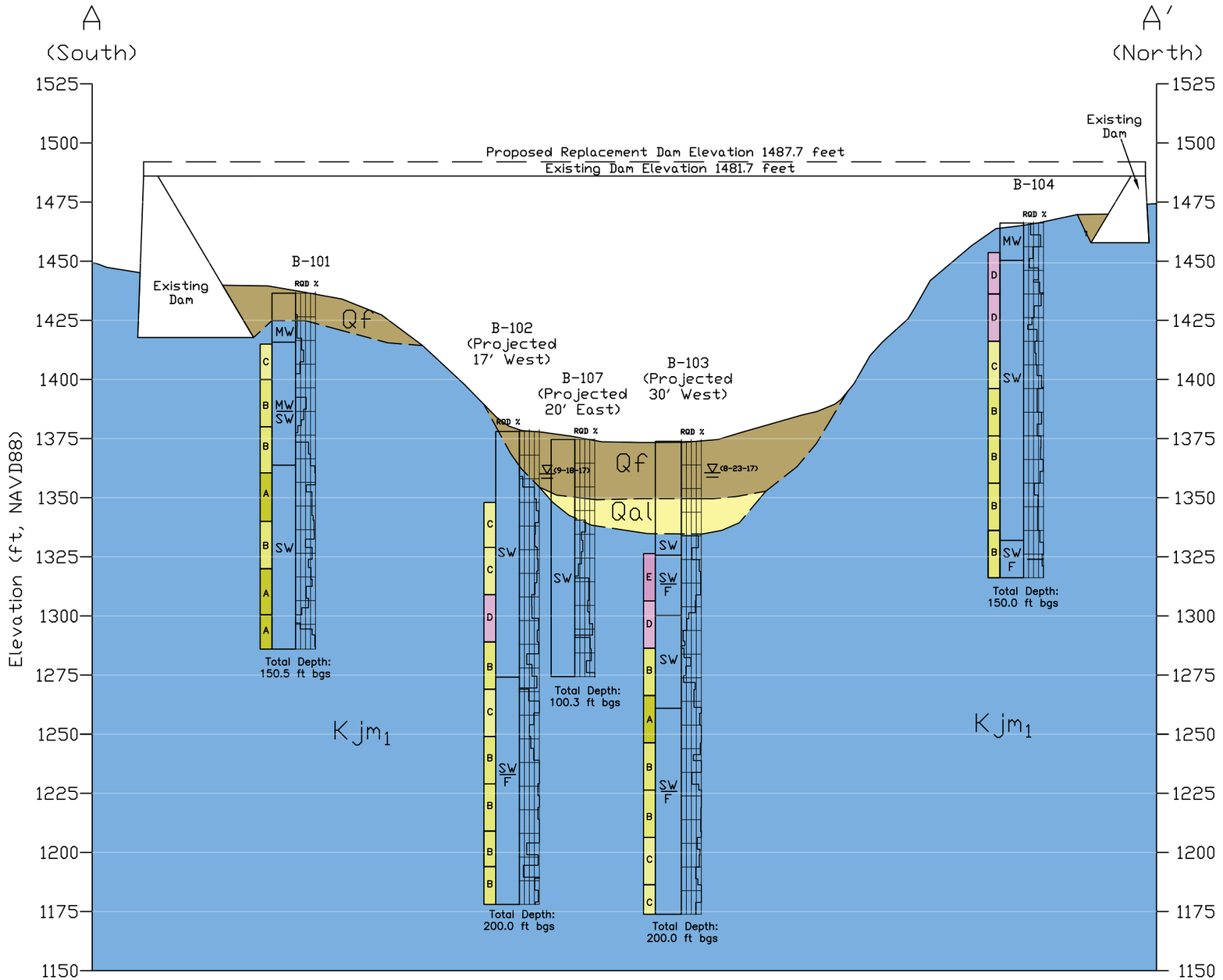
AECOM

Stereonet Plot At Borrow Site

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: D. Rector	DATE: 10/12/2017	FIGURE NO: 12
CHECKED BY: D Schug	DATE: 10/16/2017	

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LEGEND

Rock Weathering Profile

- CONCRETE
- OVERBURDEN SOIL
- CW — COMPLETELY WEATHERED ROCK
- HW — HIGHLY WEATHERED ROCK
- MW — MODERATELY WEATHERED ROCK
- MW/SW — MODERATELY TO SLIGHTLY WEATHERED ROCK
- SW — SLIGHTLY WEATHERED ROCK
- SW/F — SLIGHTLY WEATHERED TO FRESH ROCK
- F — FRESH ROCK

- GROUNDWATER LEVEL MEASURED IN VIBRATING WIRE PIEZOMETER MEASURED ON DATE SHOWN.
- Qf — FILL SOILS (Qf)
- Qal — ALLUVIAL SOILS (Qal)
- Kjm_1 — GNEISSIC BEDROCK
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT, QUERIED WHERE INFERRED

Notes

1) SEE FIGURE 6 FOR LOCATION OF SECTION.
2) THE SUBSURFACE CONDITIONS SHOWN ARE OBTAINED FROM WIDELY SPACED EXPLORATIONS. INFORMATION ON ACTUAL SUBSURFACE CONDITIONS EXISTS ONLY AT LOCATIONS OF EXPLORATIONS; CONDITIONS BETWEEN EXPLORATIONS MAY VARY FROM THOSE DEPICTED.

Rock Quality Designation

RQD % 0 50 100

Packer Testing

	Lugeon Value	Conductivity Classification	Rock Discontinuity Condition
A	<1	Very low	Very tight
B	1–5	Low	Tight
C	5–15	Moderate	Few partly open
D	15–50	Medium	Some open
E	50–100	High	Many open
F	>100	Very high	Open closely spaced or voids

0 25 50 100

SCALE: 1"=50'

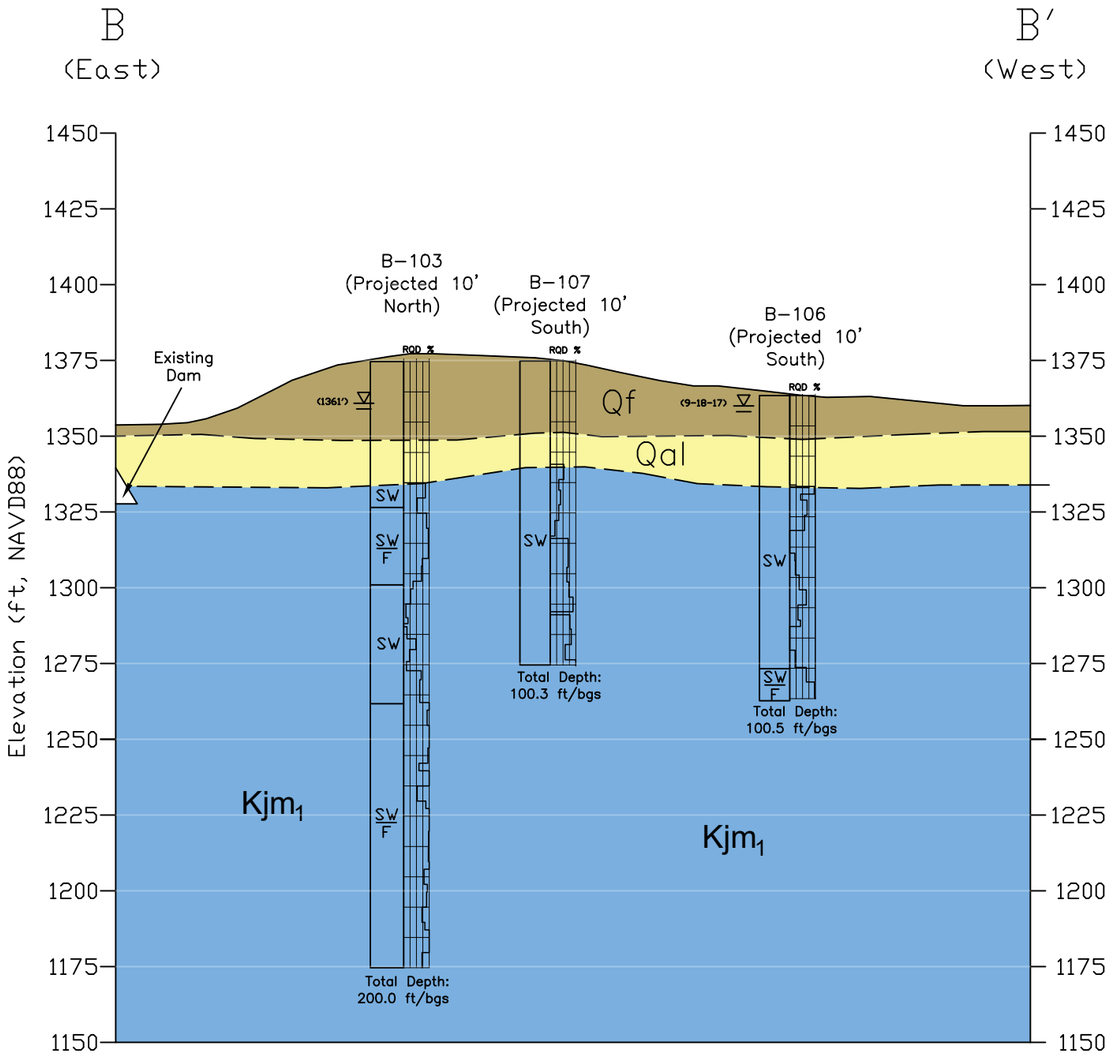
Rancho California Water District

AECOM

Geologic Section A-A' at Replacement Dam

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: D. Rector	DATE: 10/12/2017	FIGURE NO: 13
CHECKED BY: L. Handfelt	DATE: 10/16/2017	



LEGEND:

Rock Weathering Profile

- CONCRETE
- OVERBURDEN SOIL
- CW — COMPLETELY WEATHERED ROCK
- HW — HIGHLY WEATHERED ROCK
- MW — MODERATELY WEATHERED ROCK
- MW/SW — MODERATELY TO SLIGHTLY WEATHERED ROCK
- SW — SLIGHTLY WEATHERED ROCK
- SW/F — SLIGHTLY WEATHERED TO FRESH ROCK
- F — FRESH ROCK

Rock Quality Designation

RQD % 0 50 100

- GROUNDWATER LEVEL MEASURED IN VIBRATING WIRE PIEZOMETER MEASURED ON DATE SHOWN.
- Qf — FILL SOILS (Qf)
- Qal — ALLUVIAL SOILS (Qal)
- Kjm_1 — GNEISSIC BEDROCK
- APPROXIMATE LOCATION OF GEOLOGIC CONTACT, QUERIED WHERE INFERRED

Notes

1) SEE FIGURE 6 FOR LOCATION OF SECTION.
2) THE SUBSURFACE CONDITIONS SHOWN ARE OBTAINED FROM WIDELY SPACED EXPLORATIONS. INFORMATION ON ACTUAL SUBSURFACE CONDITIONS EXISTS ONLY AT LOCATIONS OF EXPLORATIONS; CONDITIONS BETWEEN EXPLORATIONS MAY VARY FROM THOSE DEPICTED.

0 25 50 100

SCALE: 1"=50'

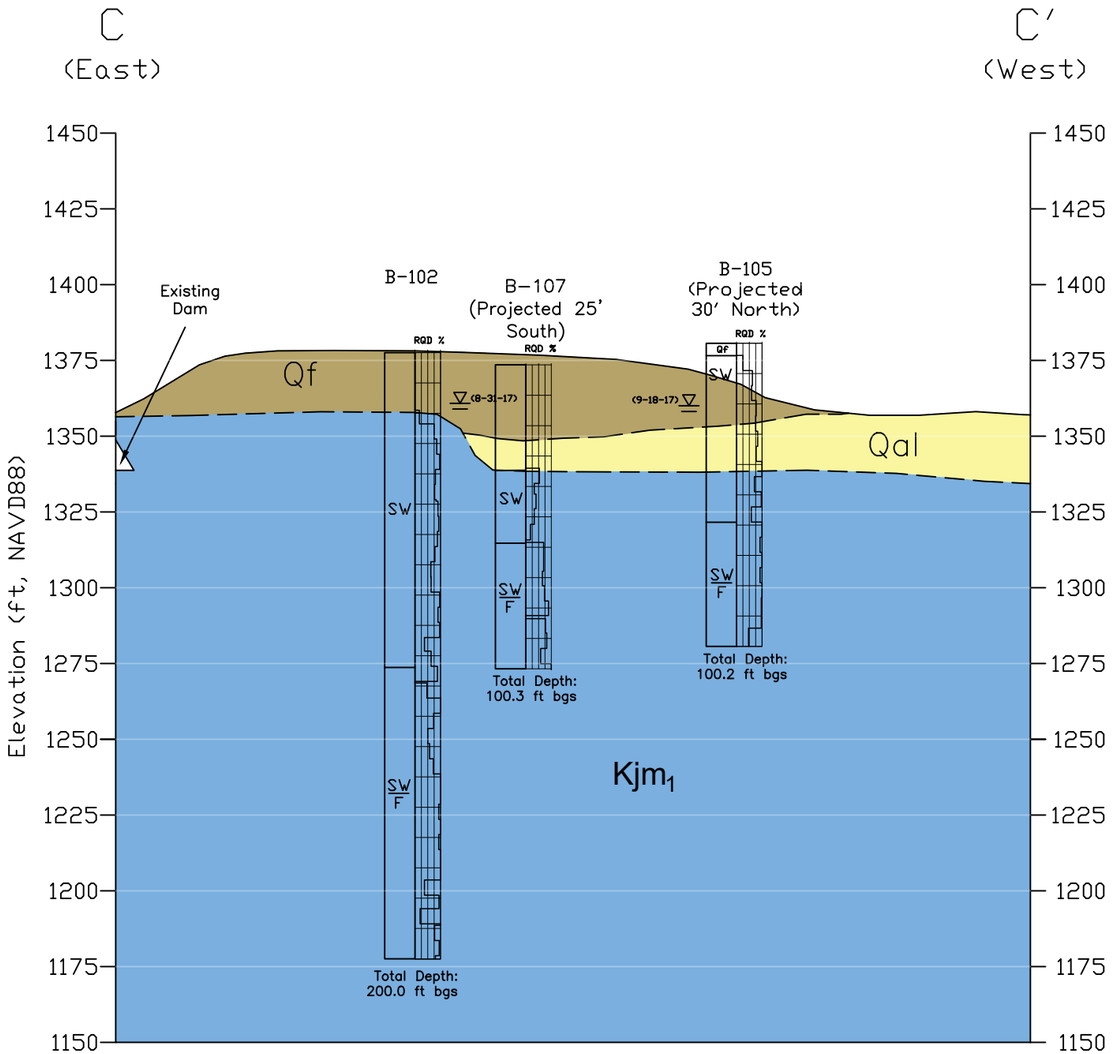
Rancho California Water District

AECOM

Geologic Section B-B' at Replacement Dam

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: D.Rector	DATE: 10/12/2017	FIGURE NO: 14
CHECKED BY: L Handfelt	DATE: 10/16/2017	



LEGEND:

Rock Weathering Profile

- CONCRETE
- OB — OVERBURDEN SOIL
- CW — COMPLETELY WEATHERED ROCK
- HW — HIGHLY WEATHERED ROCK
- MW — MODERATELY WEATHERED ROCK
- MW/SW — MODERATELY TO SLIGHTLY WEATHERED ROCK
- SW — SLIGHTLY WEATHERED ROCK
- SW/F — SLIGHTLY WEATHERED TO FRESH ROCK
- F — FRESH ROCK

Rock Quality Designation

RQD % 0 50 100

- GROUNDWATER LEVEL MEASURED IN VIBRATING WIRE PIEZOMETER MEASURED ON DATE SHOWN.
- Qf — FILL SOILS (Qf)
- Qal — ALLUVIAL SOILS (Qal)
- Kjm_1 — GNEISSIC BEDROCK
- — — —?— APPROXIMATE LOCATION OF GEOLOGIC CONTACT, QUERIED WHERE INFERRED

Notes

1) SEE FIGURE 6 FOR LOCATION OF SECTION.
2) THE SUBSURFACE CONDITIONS SHOWN ARE OBTAINED FROM WIDELY SPACED EXPLORATIONS. INFORMATION ON ACTUAL SUBSURFACE CONDITIONS EXISTS ONLY AT LOCATIONS OF EXPLORATIONS; CONDITIONS BETWEEN EXPLORATIONS MAY VARY FROM THOSE DEPICTED.

0 25 50 100

SCALE: 1"=50'

Rancho California Water District

AECOM

Geologic Section C-C' at Replacement Dam

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: D.Rector	DATE: 10/12/2017	FIGURE NO: 15
CHECKED BY: L. Handfelt	DATE: 10/16/2017	



Rancho California Water District

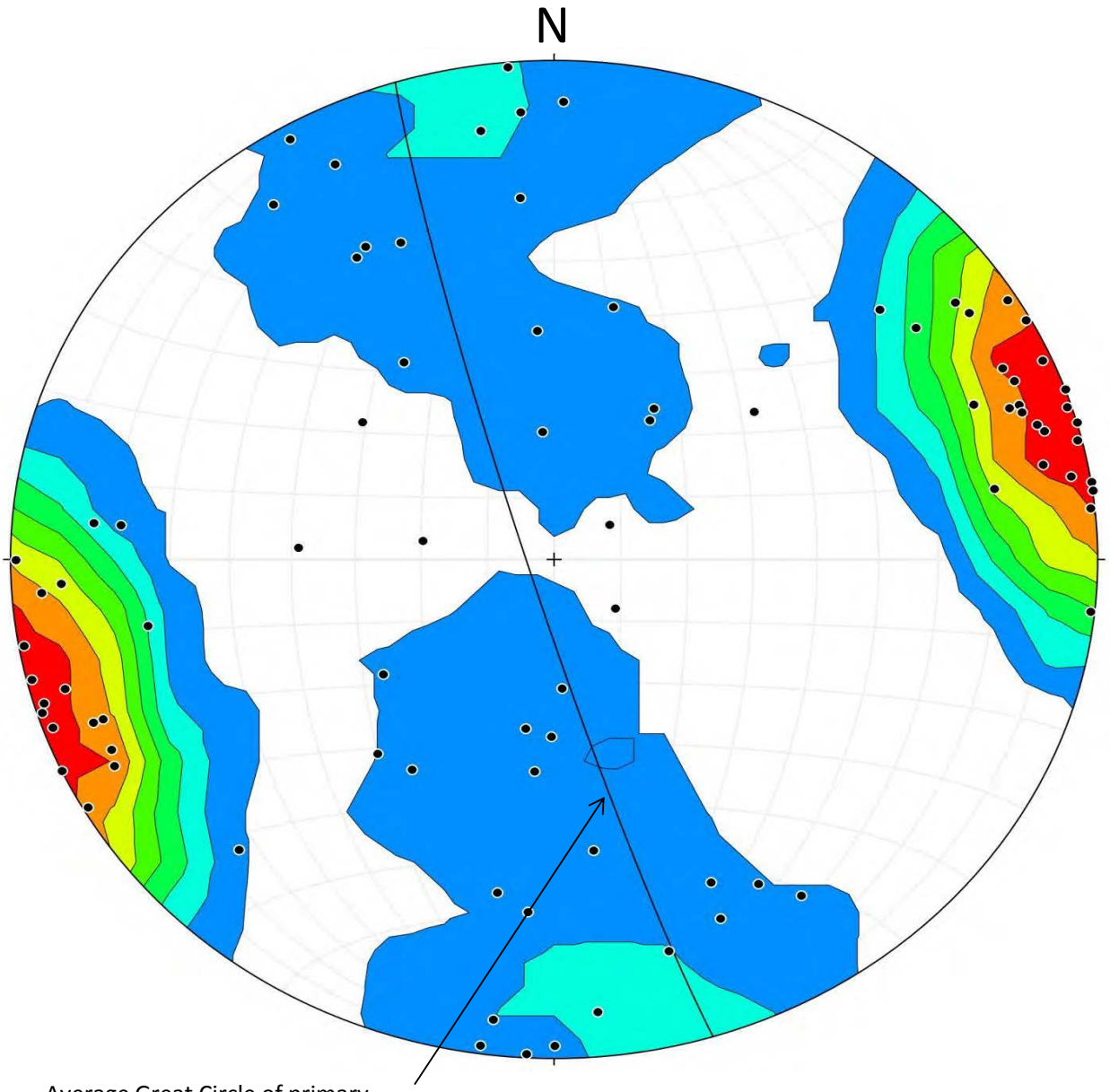
AECOM

Historical Photograph of Existing Vail Dam

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: D. Rector	DATE: 10/12/2017	FIGURE NO: 16
CHECKED BY: L. Handfelt	DATE: 10/16/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Figures\Working folders\Historical Photograph of Existing Vail Dam\Figure 16 Historical Photograph of Existing Vail Dam.xlsx\Flat-Crested Weir



Average Great Circle of primary joint set (foliation joints).
Strike 163 degrees, dipping 86 degrees west.

Notes:
- Diagram is an Equal Area Lower Hemisphere Projection.
- Discontinuity Planes: Planes to poles represented by dots.
- Number of data points = 90
- Contoured percentage of poles.
- Joint sets measured from the right abutment of the proposed dam.

Rancho California Water District

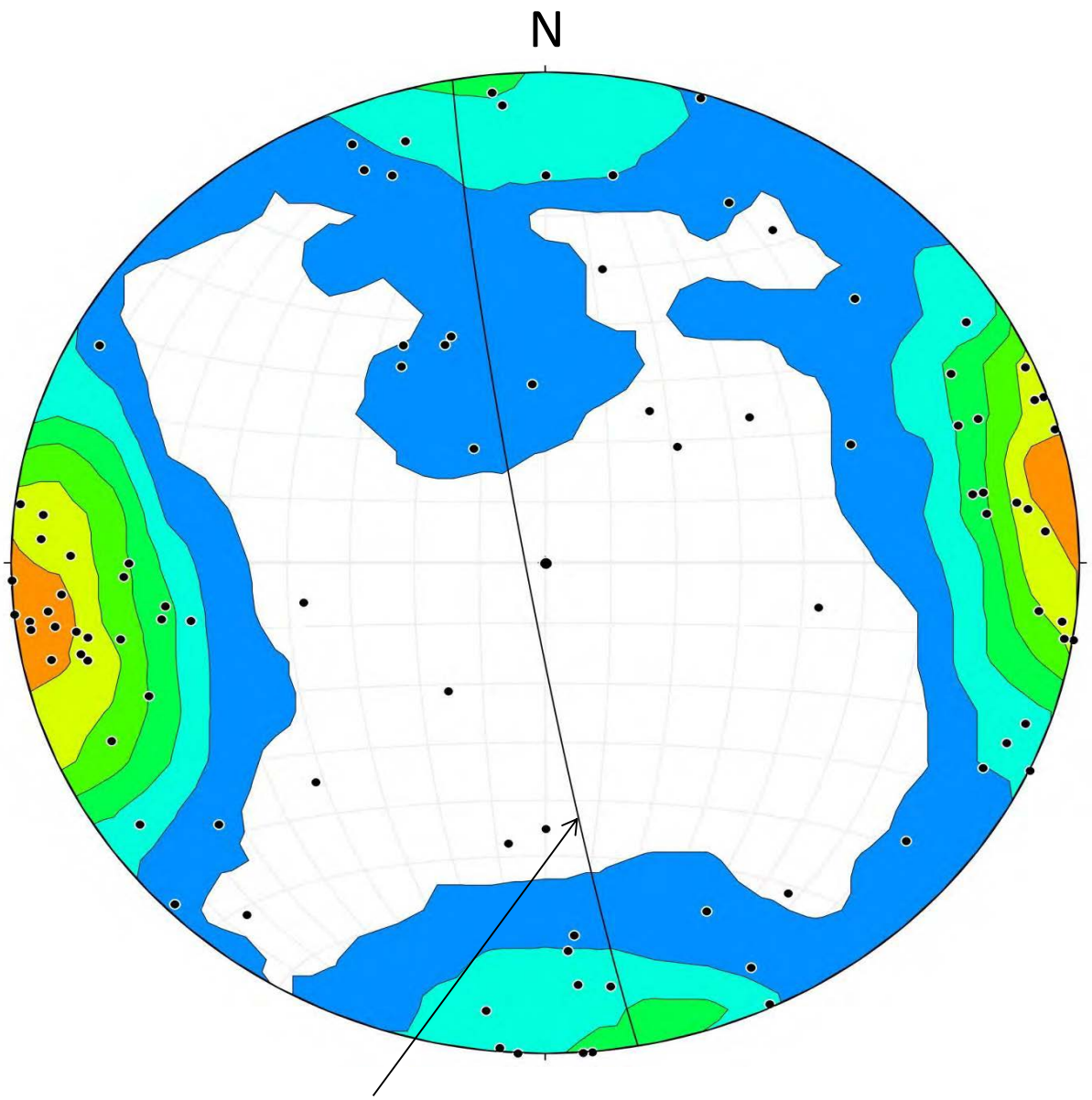
AECOM

Stereonet Plot at Right Abutment of Replacement Dam

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: D. Rector	DATE: 10/12/2017	FIGURE NO: 17
CHECKED BY: L. Handfelt	DATE: 10/16/2017	

File: \\Orange.na.aecomnet.com\Orange\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Figures\Working folders\Stereonet Plot Right Abutment\Figure 16 Stereonet Plot - Right Abutment.xlsx\Left Abutment with great circle



Notes:
- Diagram is an Equal Area Lower Hemisphere Projection.
- Discontinuity Planes: Planes to poles represented by dots.
- Number of data points = 80
- Contoured percentage of poles.
- Joint sets measured from the left abutment of the proposed dam.

Rancho California Water District

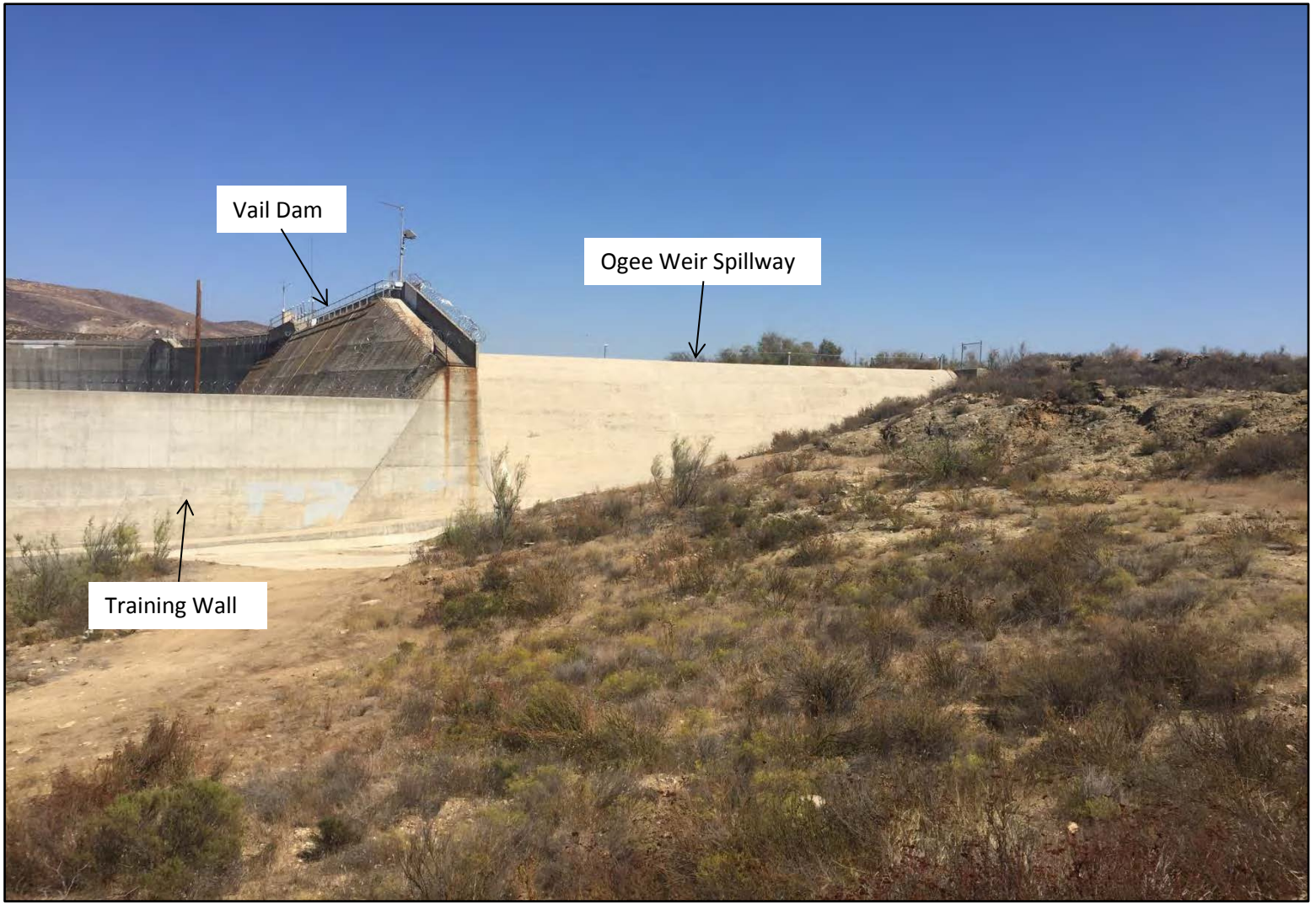
AECOM

Stereonet Plot at Left Abutment of Replacement Dam

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: D. Rector	DATE: 10/12/2017	FIGURE NO: 18
CHECKED BY: L. Handfelt	DATE: 10/16/2017	

File: \\Orange.na.aecomnet.com\Orange\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Figures\Working folders\Stereonet Plot Left Abutment 18\Figure 17 Stereonet Plot - Left Abutment.xlsx\Left Abutment with great circle



Rancho California Water District

AECOM

Photograph of Ogee Weir Spillway

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: D. Rector	DATE: 10/12/2017	FIGURE NO: 19
CHECKED BY: L. Handfelt	DATE: 10/16/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Figures\Working folders\Photgraph of Ogee Weir Spillway\Figure 19 Photograph of Ogee Weir Spillway.xlsx\Ogee Weir



Rancho California Water District

AECOM

Photograph of Flat-Crested Weir Spillway

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: D. Rector	DATE: 10/12/2017	FIGURE NO: 20
CHECKED BY: L. Handfelt	DATE: 10/16/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Figures\Working folders\Photograph of Flat-Crested Spillway\Figure 20 Flat Crested Weir Spillway.xlsx\Flat-Crested Weir



Rancho California Water District

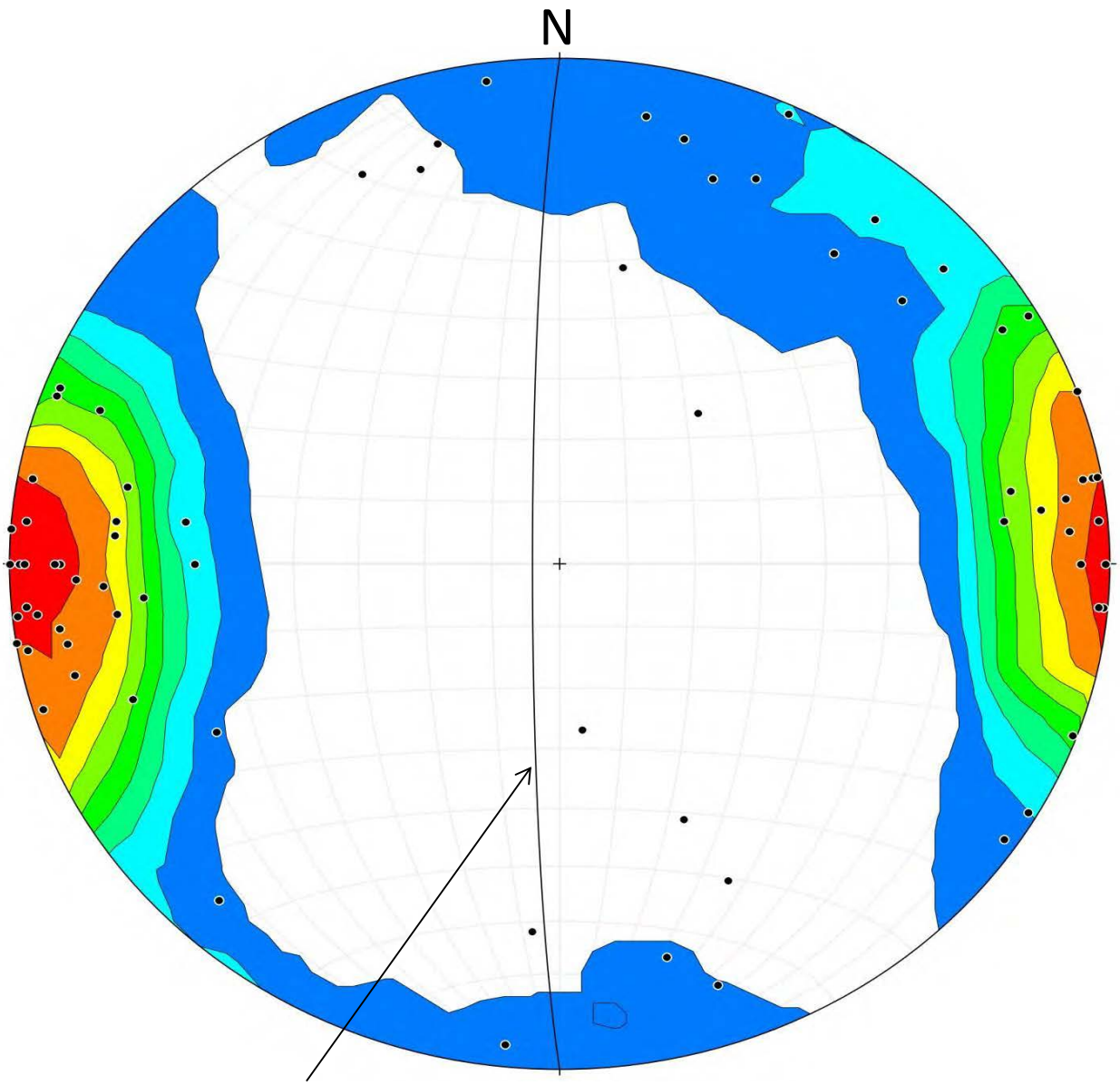
AECOM

Photograph of Overpour Weir Spillway

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: D. Rector	DATE: 10/12/2017	FIGURE NO: 21
CHECKED BY: L. Handfelt	DATE: 10/16/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Figures\Working folders\Photograph of Overpour Weir Spillway\Figure 10 Flat Overpour Weir Spillway.xlsx\Overpour Weir



Average Great Circle of primary joint set (foliation joints). Strike 360degrees, dipping 86 degrees west.

Notes:
- Diagram is an Equal Area Lower Hemisphere Projection.
- Discontinuity Planes: Planes to poles represented by dots.
- Number of data points = 80
- Contoured percentage of poles.
- Joint sets measured from the area of the Ogee Weir Spillway

Rancho California Water District

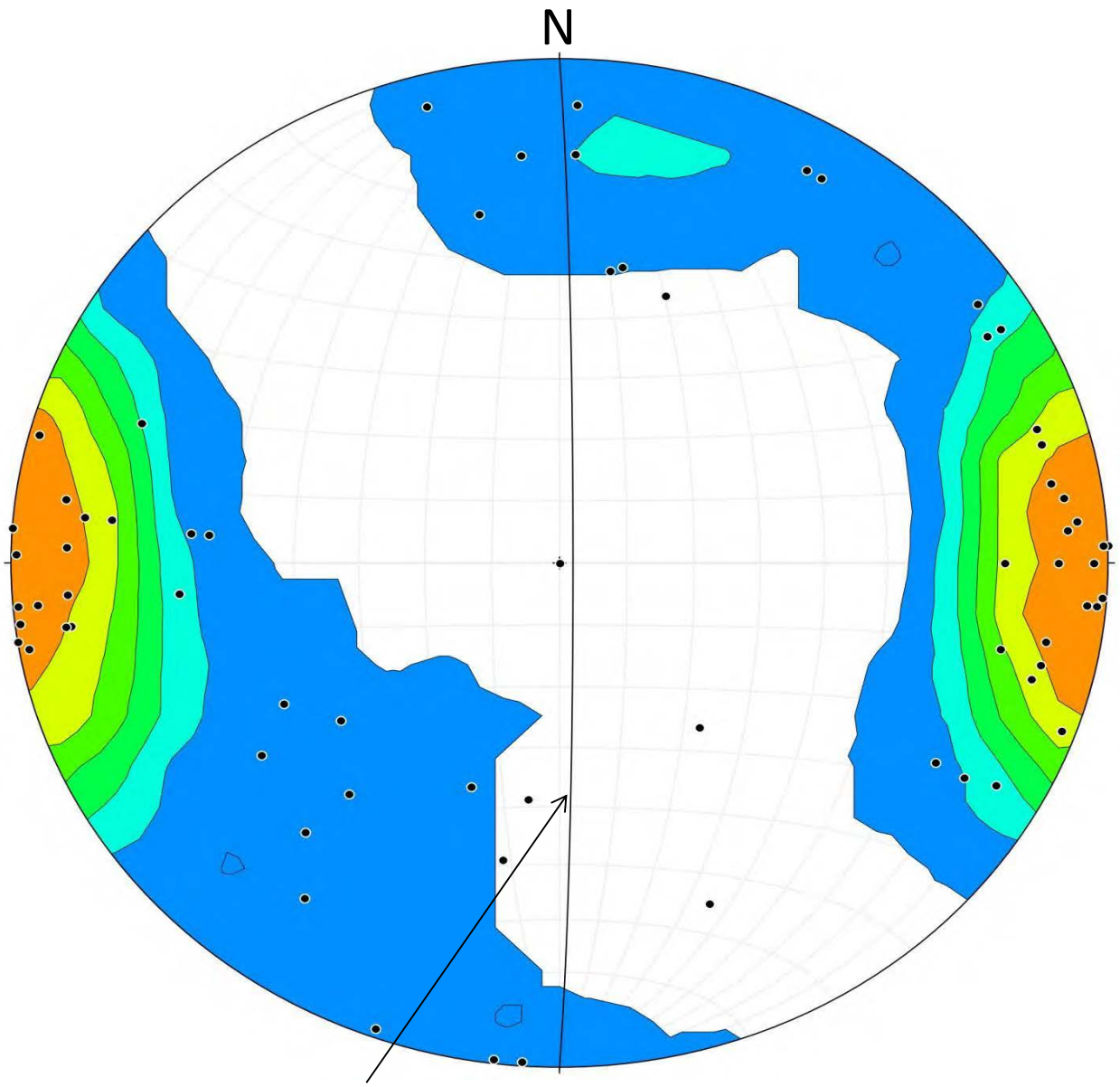
AECOM

Stereonet Plot at Ogee Weir Spillway

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: D. Rector	DATE: 10/12/2017	FIGURE NO: 22
CHECKED BY: L. Handfelt	DATE: 10/16/2017	

File: \\Orange.na.aecomnet.com\Orange\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Figures\Working folders\Stereonet Plot Ogee Weir Spillway\Figure 18 Stereonet Plot - Ogee Weir Spillway.xlsx\Ogee Weir with great circle



Average Great Circle of primary joint set (foliation joints). Strike 360 degrees, dipping 88 degrees east.

Notes:
- Diagram is an Equal Area Lower Hemisphere Projection.
- Discontinuity Planes: Planes to poles represented by dots.
- Number of data points = 70
- Contoured percentage of poles.
- Joint sets measured from the area of the Flat-Crested Weir Spillway.

Rancho California Water District

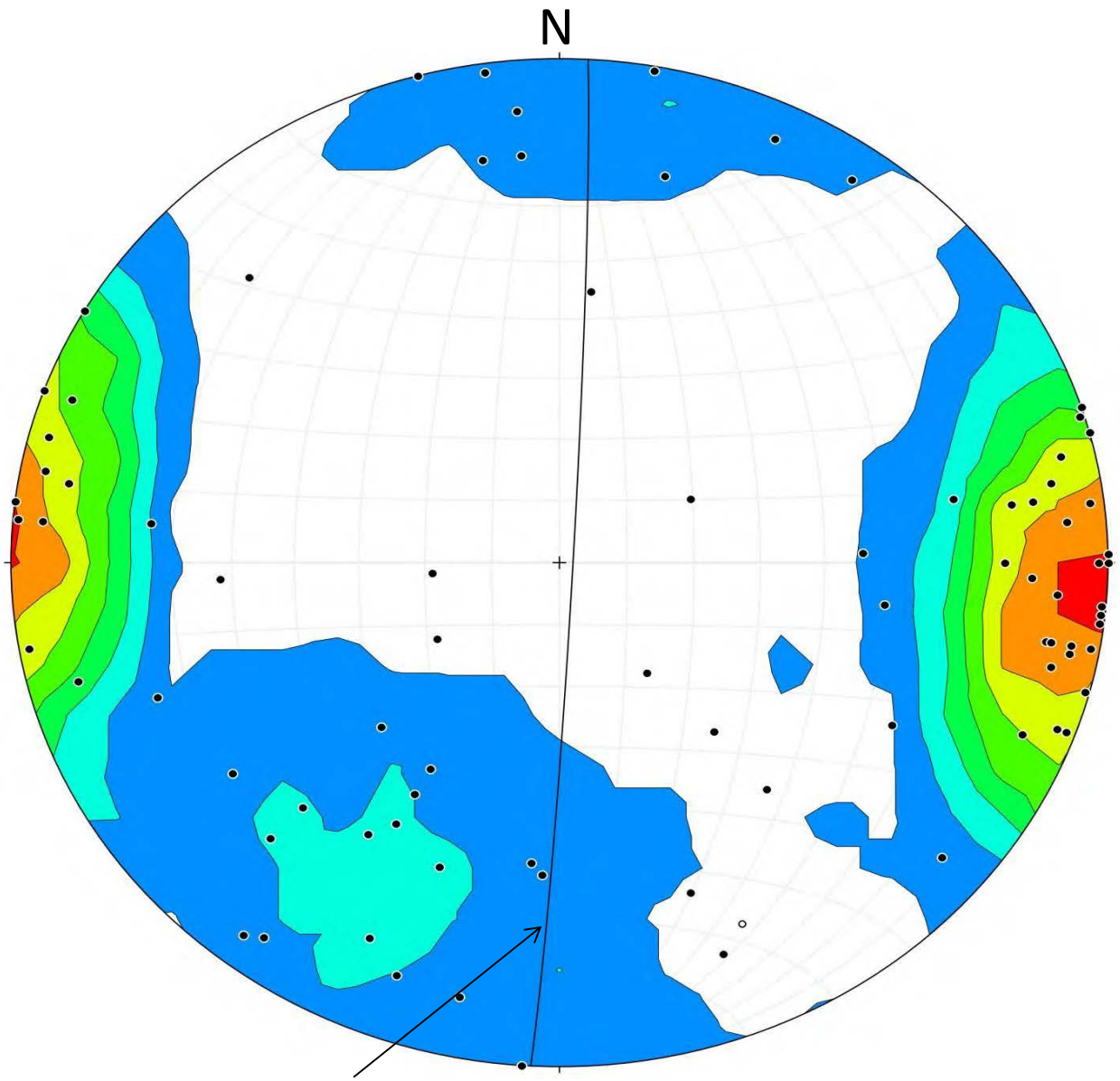
AECOM

Stereonet Plot at Flat-Crested Weir Spillway

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: D. Rector	DATE: 10/21/2017	FIGURE NO: 23
CHECKED BY: L. Handfelt	DATE: 10/16/2017	

File: \\Orange.na.aecomnet.com\Orange\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Figures\Working folders\Stereonet Plot Flat-Crested Weir Spillway\Figure 19 Stereonet Plot - Flat-Crested Weir Spillway.xlsx\Flat Crested with Great Cricle



Average Great Circle of primary joint set (foliation joints).
Strike 3 degrees, dipping 88 degrees east.

Notes:
- Diagram is an Equal Area Lower Hemisphere Projection.
- Discontinuity Planes: Planes to poles represented by dots.
- Number of data points = 85
- Contoured percentage of poles.
- Joint sets measured from the area of the Overpour Weir Spillway

Rancho California Water District

AECOM

Stereonet Plot at Overpour Weir Spillway

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: D. Rector	DATE: 10/12/2017	FIGURE NO: 24
CHECKED BY: L. Handfelt	DATE: 10/16/2017	

File: \\Orange.na.aecomnet.com\Orange\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Figures\Working folders\Stereonet Plot Overpour Weir Spillway\Figure 20 Stereonet Plot -Overpour Spillway.xlsx\Overpour with great circle

Appendix A

As-Builts of Existing Dam

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Approx Upstream Toe of Dam below Elev. 1340

Top of parapet Elev 1427.6

CREST ELEV. 1419

Contraction Joint Sta 1+82.92

Contraction Joint Sta 2+29.32

Contraction Joint Sta 2+79.32

Contraction Joint Sta 3+29.32

Contraction Joint Sta 3+34.50

Contraction Joint Sta 4+29.32

Contraction Joint Sta 4+79.20

Sta 5+29.20 North End of Sheet 2

Reference Line

Bracing Wall radial to center for El. 1370

Bracing Wall radial to center for El. 1390

Sta 4+93.20 Bracing Wall radial to center for El. 1400 ring

6" Outlet Pipe at Elev. 1352 radial to center of 1352 ring

6" Outlet Pipe of Elev. 1360 radial to center of 1352 ring

NOTE: This center and r's required for determining batter of Forms below Elev. 1340

P.I. "G"

P.I. "H"

Match Mark for Sheet 3

N. 45° 45' 45" E 196'

S. 45° 45' 45" W

6° 54'

98° 02'

45° 02'

45° 31'

1470 TO PARAPET COPING

NOTE:
Contraction Joints shown are to be warped so that plane of joint at any elevation will be radial to arch center for that elevation.

VAIL COMPANY
LOS ANGELES, CALIFORNIA

VAIL DAM
TEMECULA CREEK - RIVERSIDE COUNTY

PLAN

No	Date	Description
(3)	8/1/48	Located bracing walls, Blocks "G" & "H"
(2)	7/1/48	Added location of outlet pipes
(1)	4/30/48	Indicated parapet.

REVISIONS

GEO
LRC Drawn: May 1948 - JSB-LRC
GEG Checked:
By Scale: 1" = 10'
Datum: U.S.G.S.

F. C. Tindall
REGISTERED CIV. ENGR. No 1327
CONSULTING ENGINEER

SHEET 1 OF 3 SHEETS

NOTE: This center and its required for determining batter of forms below Elev. 1340

NOTE:
Contraction Joints shown are to be warped so that plane of joint at any elevation will be radial to arch center for that elevation.

5	8/1/48	Located Gate Lift Platform At Sta 4+37.40	MGB
4	7/1/48	Located bracing walls Blocks C & D	RGB
3	6/1/48	Located bracing walls Blocks G & H	SPB
2	1948	Added location of outlet pipes	LRC
1	5/1948	Added indicated parapet	GGC
No.	Date	Description	By

REVISIONS

VAIL COMPANY
LOS ANGELES, CALIFORNIA

VAIL DAM
ON TEMECULA CREEK-RIVERSIDE COUNTY

PLAN

Drawn: May 1948-JSB-LRC
Checked
Scale: 1"=40'
Datum: U.S.G.S.

R.C. Goodwill
REGISTERED CIV. ENGR. NO. 1327
CONSULTING ENGINEER

SHEET 1 OF 3 SHEETS

N 171050 N 171100 N 171150 N 171000 N 170950

E 189250 E 189200 E 189150 E 189100 E 189050 E 189000

N 171300 N 171350 N 171250 N 171200

1400 1410 1420 1430 1440 1450 1460 1470 1480 1490

March Mark for Sheet 1
Sta. 5+73.38

(1) Top of Parapet Elev. 1482.8
Arch Crest Elev. 1475.1

Contr. Joint

Pt. W

Non-Overflow Crest Elev. 1482.8

Contraction Joint Sta. 5+79.21

For details of this block see Sheet 4 of 4

Non-Overflow Crest Elev. 1479.2

REFERENCE LINE "A"

Top of Parapet Elev. 1482.8

Contr. Joint Sta. 6+79.38

(4) 10 Ladder Rungs 12" c.c. Vert. 2 Ladder Runs 16" c.c. Vert. Ref. Line Sta. 6+81.20 "B" 6+81.20

Contr. Jt. Sta. 6+79.38 Parapet Elev. 1482.8

Sta. "A" 6+79.38

Sta. "A" 6+80.58

Sta. "A" 7+44.22

(5) Contr. Jt. Sta. 6+81.38 Above Elev. 1465

Elev. 1465

Excavate to Elev. 1465.0

Excavate to Elev. 1465.0

Spillway Crest Elev. 1470.0

March Mark 20

Sheet 3

Pt. V

R = 520.69

B

B

Exact station to be determined in field if station is greater than 6+00, construct contr. jt. midway between 7+32 and determined station.

UPSTREAM FACE-REFERENCE LINE "B"

O.G. Spillway Crest Elev. 1470.0

Contr. Jt. Sta. "B" 7+32.20

Approx. theoretical toe of downstream face

Outside Edge of Spillway Bucket

Pt. U

K

K

D

D

A

A

6" Terra Cotta Open Joint Tile Drains.

CURVE DATA FOR REFERENCE LINE "B"

R = 520.69 ft.
Δ = 48°-25'-00"

Coordinates:	North	East
Center of Curve	170,863.24 ✓	188,658.66
B.C. Sta. "B" 6+81.20	171,152.05 ✓	189,089.31 ✓ 71.91
E.C. Sta. "B" 11+21.20	170,730.85	189,160.24

4'-6"
Elev. Varies. See Plan
5'-6"
El. 1470.2
0.6
1.9
0.3
1.2
Copper Water Stop to go completely around joint
½" Premoulded Expansion Joint Filler full width of joint.
6" T.C. Tile Drains
Slope 1%
5'-0"

SECT. K-K.
Scale: 1" = 10'

No.	Date	Description	By
4	11/30/48	Added Ladder Rungs, Ogee to Abutment	J.S.B.
3	9/4/48	Moved Contr. Jt. From 6+79.38 To 6+81.20	K.S.B.
2	7/12/48	Revised and redrawn	J.S.B./C.B.
1	6/25/48	Added dimensions & Elevs. Indicated parapet on Arch.	G.E.G.

REVISIONS

Drawn: May 1948, J.S.B.-L.R.C.
Checked:
Scale: 1" = 10'
Datum: U.S.G.S.

VAIL COMPANY
LOS ANGELES, CALIFORNIA

VAIL DAM
ON TEMECULA CREEK - RIVERSIDE COUNTY

PLAN

H. G. Goudall
REGISTERED CIV. ENGR. № 1327
CONSULTING ENGINEER

SHEET 2 OF 5 SHEETS

N 171250 N 171200 N 171150 N 171100 N 171050 N 171000 N 170950

E 189250 E 189200 E 189150 E 189100 E 189050 E 189000

N 171300 N 171350 N 171400 N 171450 N 171500

March Mark For Sheet 1 Sta. 5+29.38

March Mark For Sheet 3

1 Top of Parapet Elev. 1482.8

Arch Crest Elev. 1479.1

Contr. Joint

Pt. W

For details of this block see Sheet 4 of 4

Abutment Axis Sta. 5+50.15 - 35° Rt.

Non-Overflow Crest Elev. 1482.8

Contraction Joint Sta. 5+79.28

Non-Overflow Crest Elev. 1479.1

REFERENCE LINE "A"

Top of Parapet Elev. 1482.8

Contr. Jt. Sta. 6+79.28 Elev. 1455

Contr. Jt. Sta. 6+79.28 Elev. 1455

Ref. Line Sta. "A" 6+79.28 = "B" 6+81.20

Contr. Jt. Sta. 6+79.28 Elev. 1455

Sta. "A" 6+96.28

Sta. "A" 7+08.28

Sta. "A" 7+44.28

Contr. Jt. Sta. 6+81.20 Above Elev. 1455

6" Terra Cotta Open Joint Tile Drains.

UPSTREAM FACE-REFERENCE LINE "B"

O.G. Spillway Crest Elev. 1470.0 Sta. "B" 7+31.20

Contr. Jt.

Approx theoretical toe of downstream face

Outside Edge of Spillway Bucket

Excavate to Elev. 1465.0

Spillway Crest Elev. 1470.0

Excavate to Elev. 1465.0

Exact station to be determined in field. If station is greater than 8+00, construct contr. jt. midway between 7+31.2 and determined station.

R = 520.69

Pt. V

Pt. U

A 1.0 Rad. 180.0

Elev. 1455

Elev. varies from 1470 to Elev. 1465.0

A

B

C

D

K

CURVE DATA FOR REFERENCE LINE "B"

R = 520.69 ft.
Δ = 48°-25'-00"

Coordinates:	North	East
Center of Curve	170,863.24	188,656.66
B.C. Sta. "B" 6+81.20	171,152.05	189,089.91
E.C. Sta. "B" 11+21.20	170,730.85	189,160.24

4@ 6"

3'-6"

Elev. Varies. See Plan

El. 1470.2

0.6

1:2

0.3

1:2

Copper Water Stop to go completely around joint

½" Premoulded Expansion Joint Filler full width of joint.

6" T.C. Tile Drains

Slope 1%

3'-0"

SECT. K-K.
Scale: 1"=10'

No	Date	Description	By
3	9/5/48	Moved Contr. Jt. From 6+79.28 To 6+81.20	K&R
2	7/12/48	Revised and redrawn	JSB&RC
1	6/24/48	Added dimensions & Elevs. Indicated parapet on Arch.	G.E.G.

REVISIONS

Drawn: May 1948, JSB-LRC
Checked:
Scale: 1"=10'
Datum: U.S.G.S

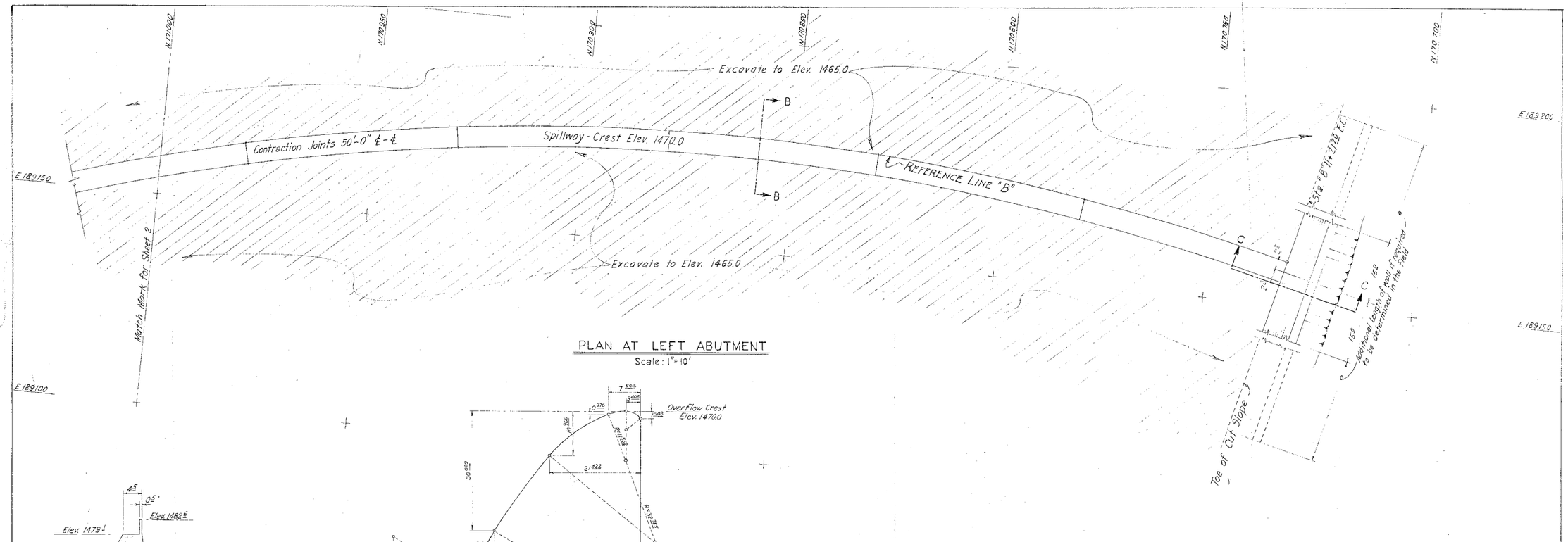
REGISTERED CIV. ENGR. № 1327
CONSULTING ENGINEER

SHEET 2 OF 5 SHEETS

VAIL COMPANY
LOS ANGELES, CALIFORNIA

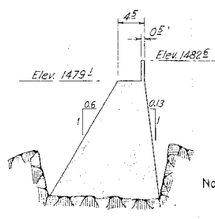
VAIL DAM
ON TEMECULA CREEK - RIVERSIDE COUNTY

PLAN



PLAN AT LEFT ABUTMENT

Scale: 1" = 10'



Note: ① For details of parapet reinforcing see Sheet 2 of 4, Contract Dwgs. dated Sept. 1947

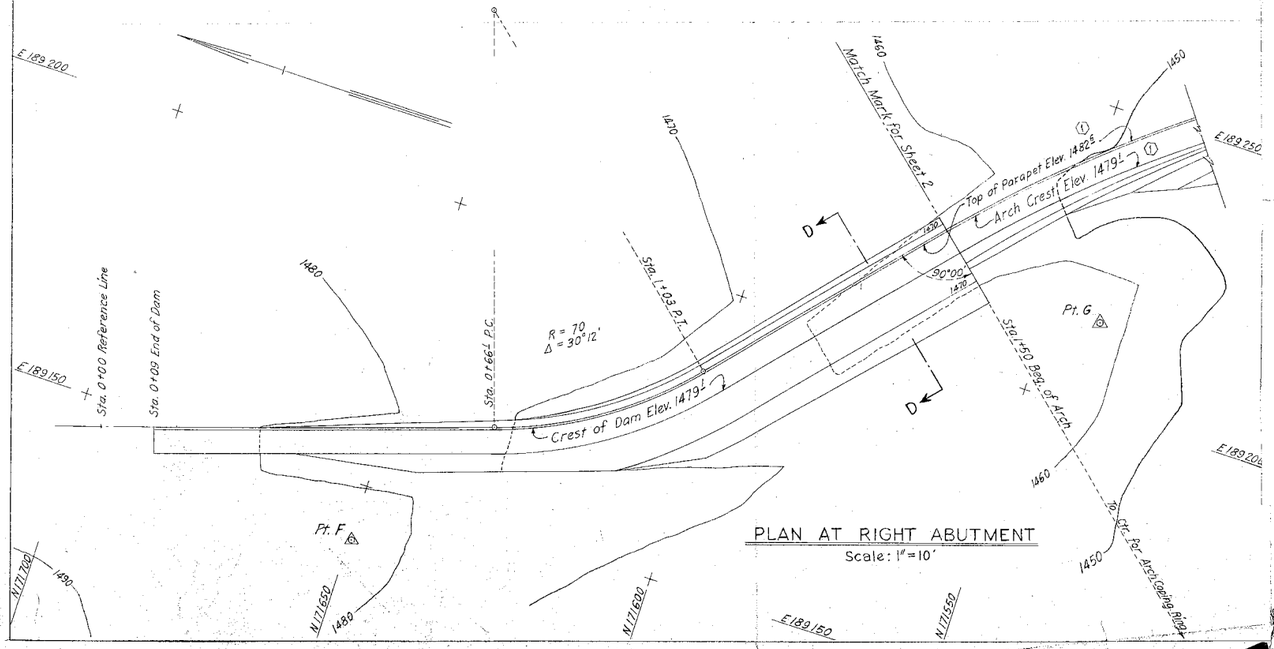
SECTION D-D

Scale: 1" = 10'

SECTION A-A

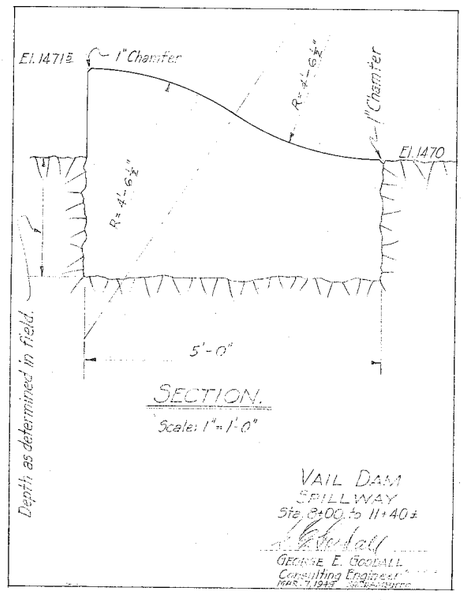
(See Sheet 2)

No Scale



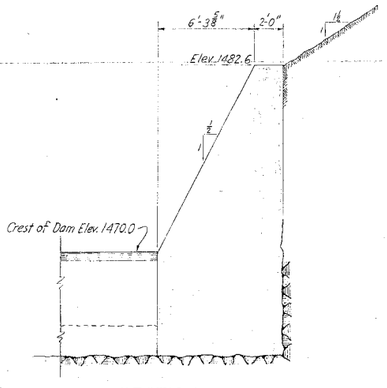
PLAN AT RIGHT ABUTMENT

Scale: 1" = 10'



SECTION

Scale: 1" = 1'-0"



SECTION C C

Scale: ¼" = 1'-0"

VAIL DAM
SPILLWAY
Sta. 0+00 to 11+40±

GEORGE E. GOODALL
Consulting Engineer
LOS ANGELES, CALIFORNIA
JANS. 7, 1948

No.	Date	Description
3	9/15/48	Added Batter Downstream Side Sect. B-B. KGE
2	7/12/48	Revised and Redrawn
1	4/14/48	Added Sections D-D & E-E, dimensions & elevations

REVISIONS

Drawn: May 1948 JSB-LRC
Checked:
Scale: As Shown
Datum: U.S.G.S.

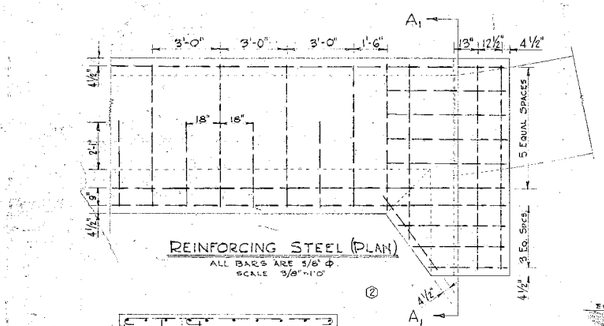
VAIL COMPANY
LOS ANGELES, CALIFORNIA

VAIL DAM
ON TEMECULA CREEK - RIVERSIDE COUNTY

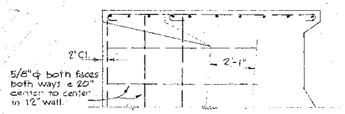
PLAN AND SECTIONS

REGISTERED CIV. ENGR. No 1327
CONSULTING ENGINEER.

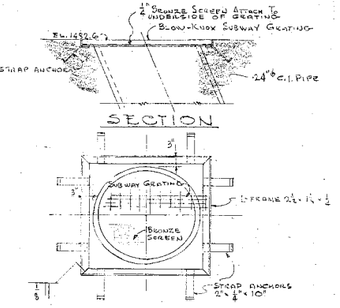
SHEET 3 OF 5 SHEETS



REINFORCING STEEL (PLAN)
ALL BARS ARE 5/8 ϕ
SCALE 3/8"=1'0"



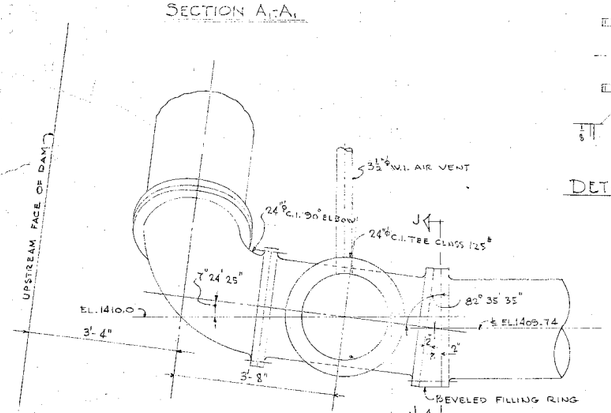
SECTION A₁-A₁



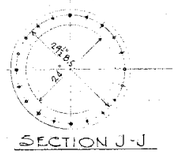
SECTION

PLAN

DETAILS PIPE COVER

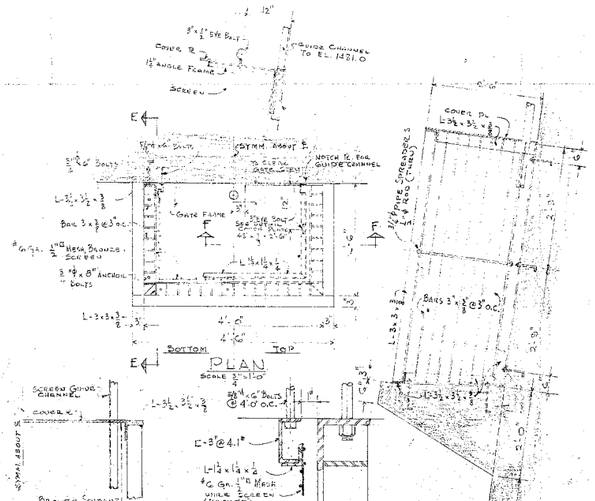


DETAIL INTAKE STA. 5+29.2
SCALE ¾"=1'0"



SECTION J-J

SECTION THRU INTAKE
Scale 1"=1'0"

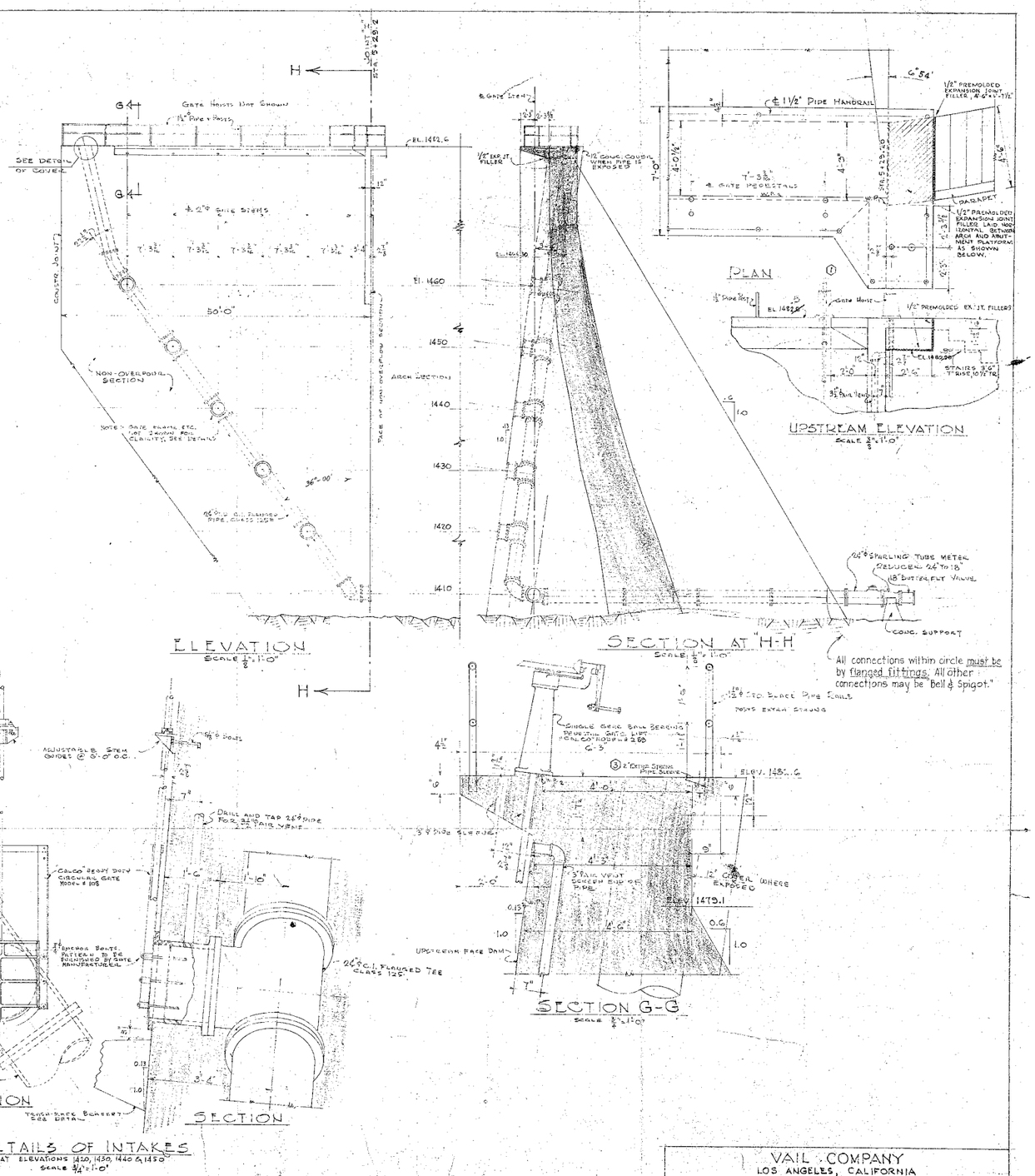


SECTION F-F
Scale 1"=1'0"

DETAIL SCREEN GUIDE
Scale 3"=1'0"

SECTION E-E
Scale ¾"=1'0"

DETAILS TRASH RACK



DETAILS OF INTAKES
AT ELEVATIONS 1420, 1430, 1440 & 1450
SCALE ¾"=1'-0"

(3)	11/1/48 Replaced C.I. Flanges on Pipe Rail with 2 Pipe Sleeves	JGB
(2)	11/1/48 Reinforcement Details Added.	JSB
(1)	11/1/48 Steps and Expansion Jts. Added. Re	JSB

REVISIONS

VAIL COMPANY
LOS ANGELES, CALIFORNIA

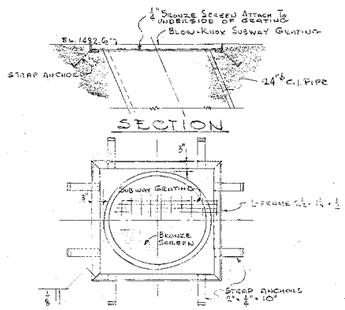
VAIL DAM
ON TEMECULA CREEK - RIVERSIDE COUNTY

OUTLET BLOCK

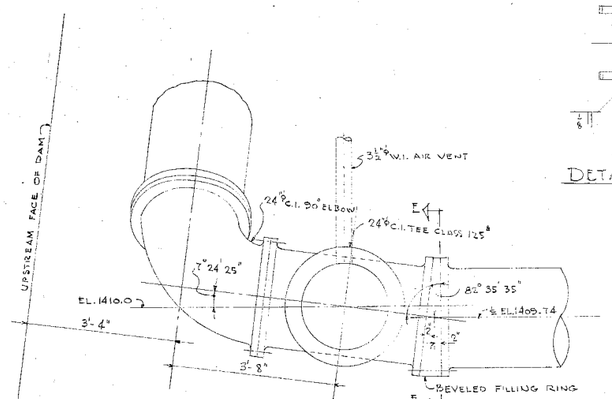
DRAWN: APRIL 1948 BY B.F.
CHECKED
SCALE: AS SHOWN
DATUM: U.S.G.S.

J.E. Woodall
REGISTERED CIV. ENGR. # 327
CONSULTING ENGINEER

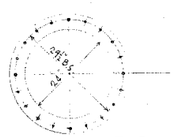
SHEET 4 OF 5 SHEETS

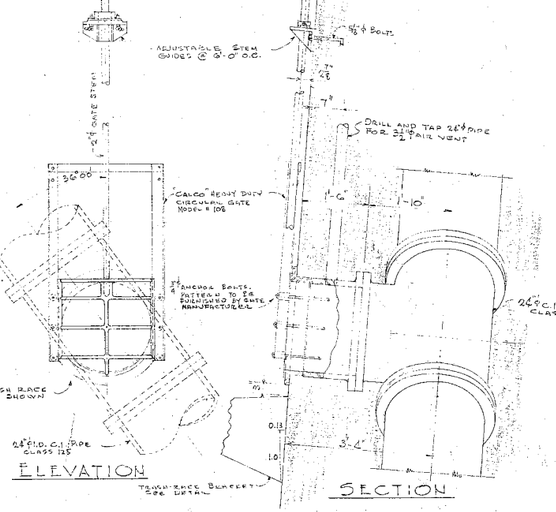


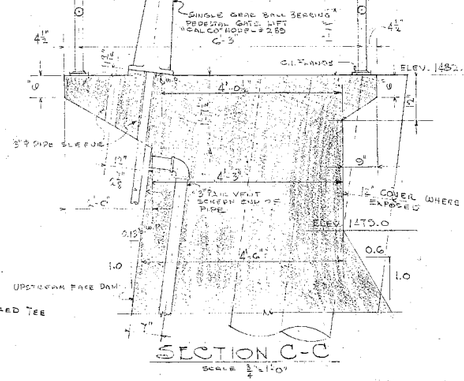
Details Pipe Cover

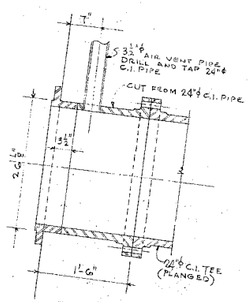


Detail Intake Sta. 4+68.5
Scale 3/4"=1'-0"

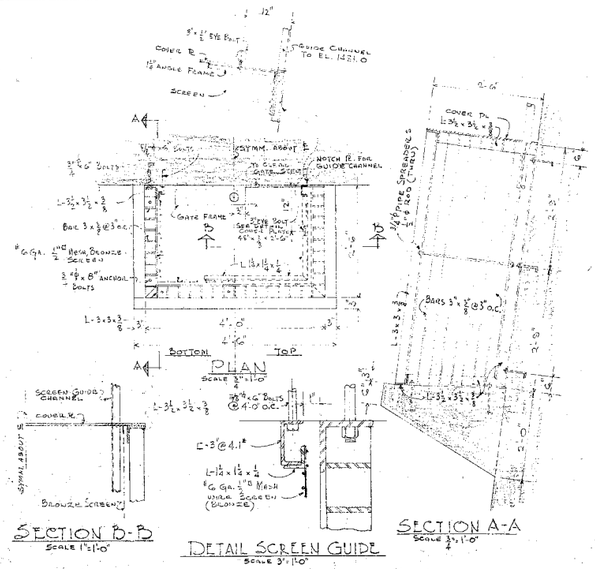








Section Thru Intake
Scale 1"=1'-0"



Details Trash Rack

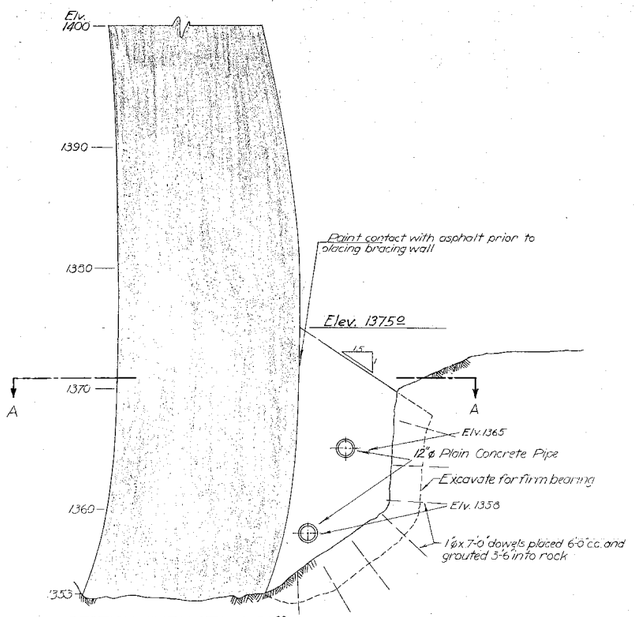
VAIL COMPANY
LOS ANGELES, CALIFORNIA

VAIL DAM
ON TEMECULA CREEK - RIVERSIDE COUNTY

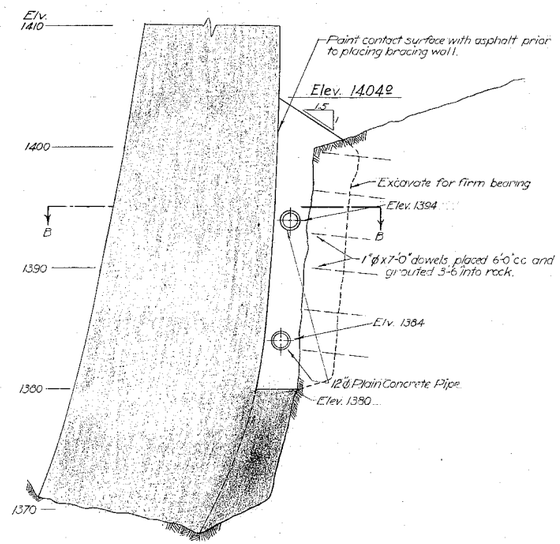
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CHECKED
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DATUM: U.S.G.S.

R. C. Goodall
REGISTERED CIV. ENGR. #1327
CONSULTING ENGINEER

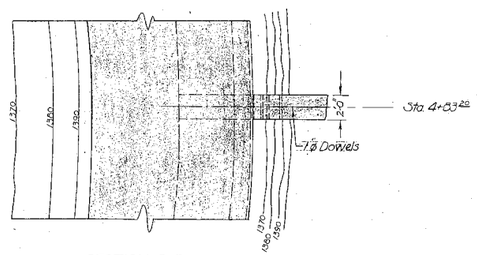
SHEET OF SHEETS



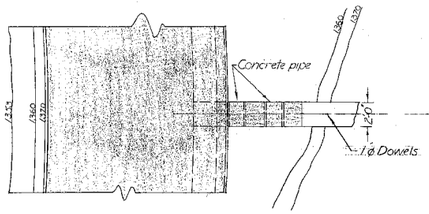
SECTION THRU STA. 4+34.20 RADIAL TO ELV. 1370



SECTION THRU STA. 4+83.20 RADIAL TO ELV. 1380



SECTION B-B



SECTION A-A

SCALE 1"=5'-0"

No.	Date	Description	By
		REVISIONS	

Drawn: Aug 1948-KGB
Checked:
Scale: As Shown
Datum: U.S.G.S.

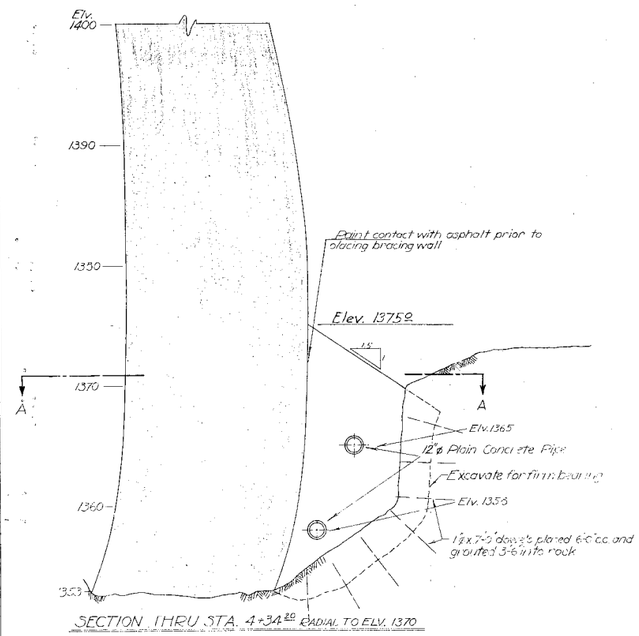
H. C. Woodruff
REGISTERED CIV. ENGR. №1327
CONSULTING ENGINEER

SHEET 5 OF 5 SHEETS

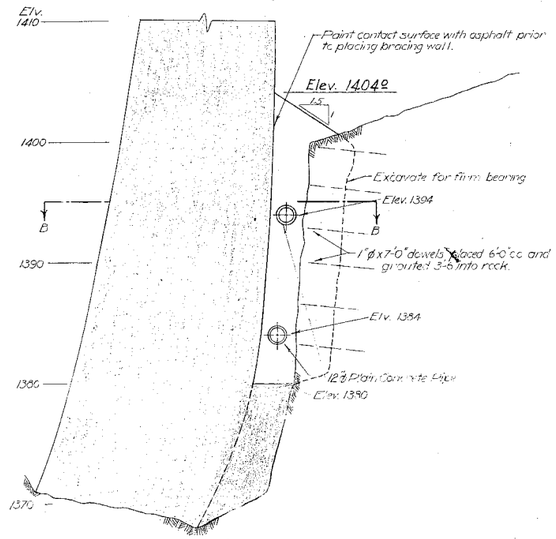
VAIL COMPANY
LOS ANGELES, CALIFORNIA

VAIL DAM
ON TEMECULA CREEK - RIVERSIDE COUNTY

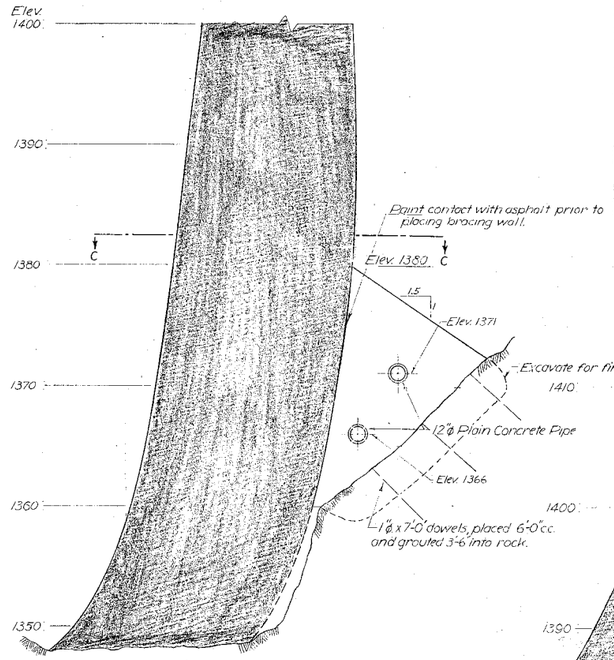
BRACING WALLS



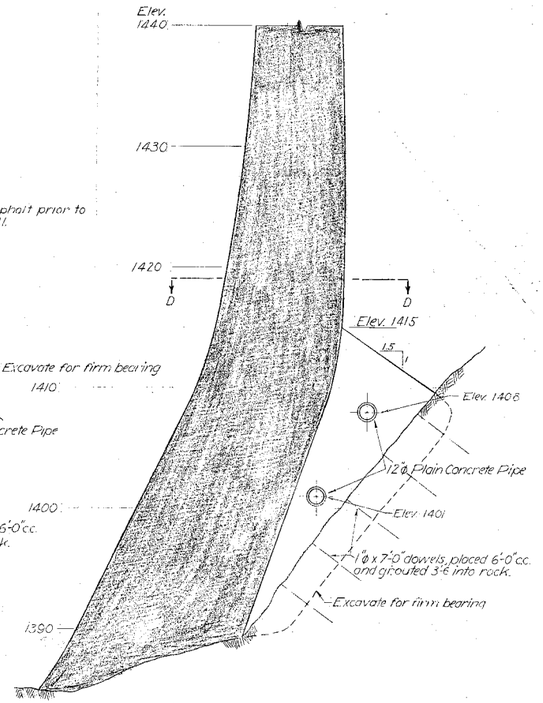
SECTION THRU STA. 4+34.20 RADIAL TO ELEV. 1370



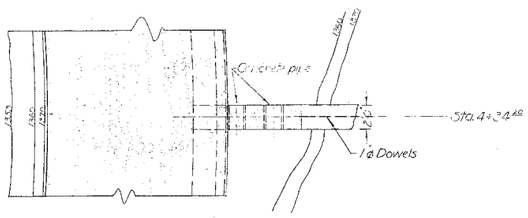
SECTION THRU STA. 4+83.20 RADIAL TO ELV. 1380



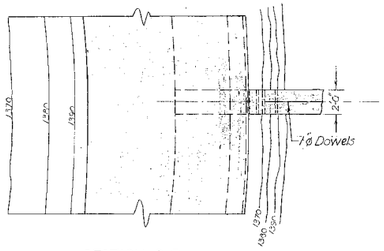
④ SECTION THRU STA. 2+85.20 RADIAL TO ELEV. 1380



④ SECTION THRU STA. 2+34.20 RADIAL TO ELEV. 1420

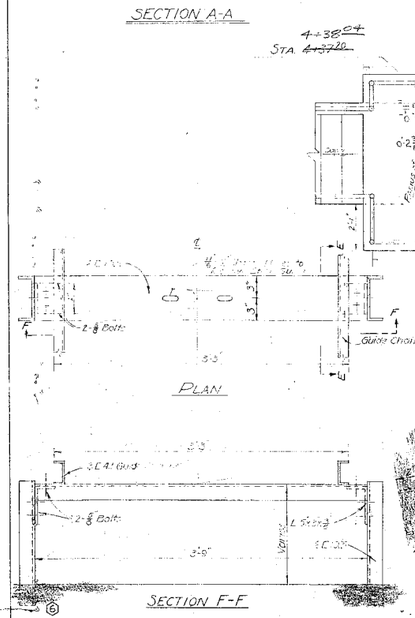


SECTION A-A

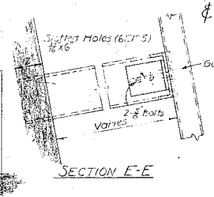


SECTION B-B

SECTION D-D

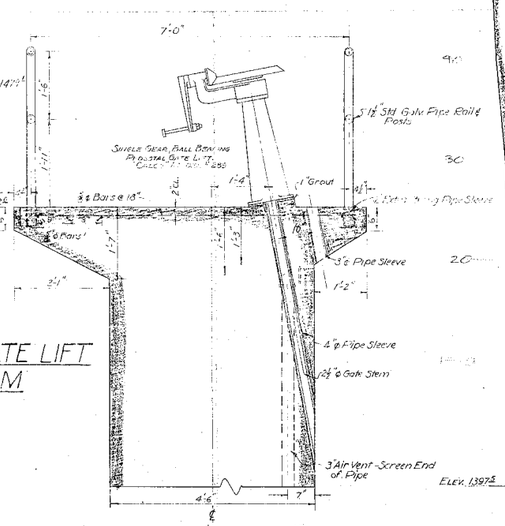


SECTION F-F



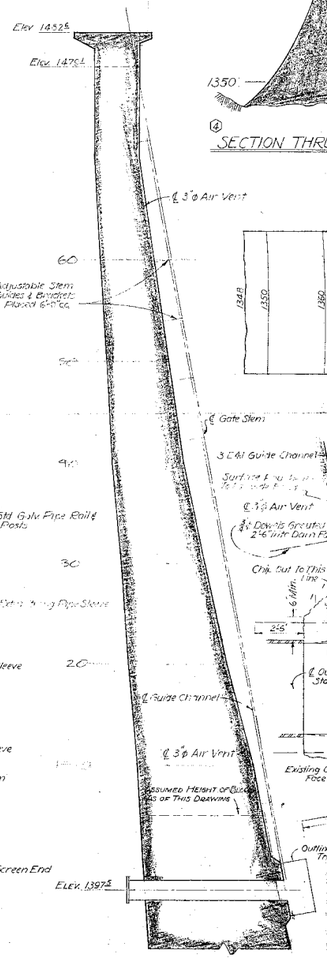
SECTION E-E

PLAN

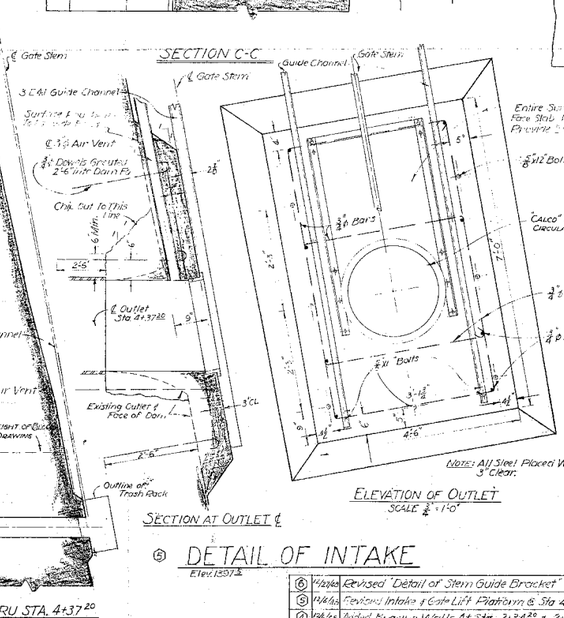


SECTION THRU STA. 4+37.20
SCALE ¾"=1'-0"

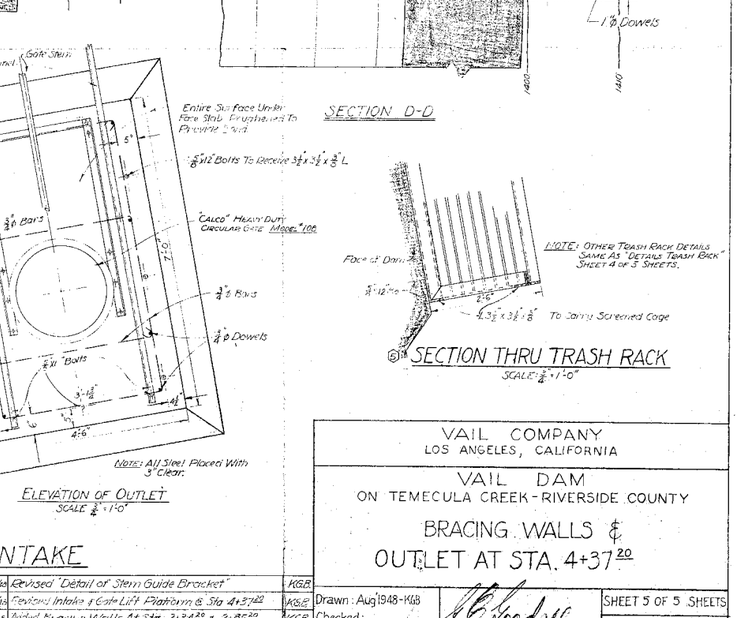
⑤ DETAILS OF GATE LIFT & PLATFORM



SECTION THRU STA. 4+37.20
RADIAL TO 1400' RING
SCALE: 1"=6'



SECTION AT OUTLET ℄



ELEVATION OF OUTLET
SCALE ¾"=1'-0"

NOTE: OTHER TRASH RACK DETAILS SAME AS "DETAILS TRASH RACK" SHEET 4 OF 5 SHEETS.

⑤ SECTION THRU TRASH RACK
SCALE ¾"=1'-0"

⑤ DETAIL OF INTAKE
Elev. 1397±

⑤ DETAIL OF STEM GUIDE BRACKET
SCALE 1½"=1'-0"

No	Date	Description
⑥	9/46	Revised "Detail of Stem Guide Bracket"
⑤	9/46	Revised Intake & Gate Lift Platform @ Sta 4+37.20
④	9/46	Added Bracing Walls At Sta. 2+34.20 & 2+85.20

REVISIONS

KGB
KGB
KGB

Drawn: Aug 1948-KGB
Checked:
Scale: As Shown
Datum: U.S.G.S.

R. C. Goodell
REGISTERED CIV. ENGR. No 1327
CONSULTING ENGINEER

SHEET 5 OF 5 SHEETS

VAIL COMPANY
LOS ANGELES, CALIFORNIA

VAIL DAM
ON TEMECULA CREEK - RIVERSIDE COUNTY

BRACING WALLS & OUTLET AT STA. 4+37.20

NOTE: This center and fe required for determining batter of forms below Elev. 1340

NOTE:
Contraction Joints shown are to be warped so that plane of joint at any elevation will be radial to arch center for that elevation.

VAIL COMPANY
LOS ANGELES, CALIFORNIA

VAIL DAM
ON TEMECULA CREEK - RIVERSIDE COUNTY

PLAN

No	Date	Description	By
2	7/8/48	Added location of outlet pipes	LRC
1	7/30/48	Indicated parapet	GEA

REVISIONS

Drawn: May 1948 - JSB-LRC
Checked:
Scale: 1" = 10'
Datum: U.S.G.S.

H. C. Goodall
REGISTERED CIV. ENGR. No 1327
CONSULTING ENGINEER

SHEET 1 OF 4 SHEETS

Top of Parapet Elev. 14825

Arch Crest Elev. 14795

Contr. Joint

Abutment Axis Sta. 5+55.15 - 15° - 25' W

Non-Overflow Crest Elev. 14795

Pt. W

For details of this block see Sheet 4 of 4

Contraction Joint Sta. 5+79.38

Non-Overflow Crest Elev. 14795

March Mark For Sheet 1 Sta. 5+23.38

REFERENCE LINE "A"

Top of Parapet Elev. 14825

Joint Sta. 6+09.38

Contr. Joint Sta. 6+39.38

Ref. Line Sta. 6+80.25 " " "B" 6+80.25

Contr. Jt. Sta. 6+79.38

Sta. "A" 6+88.25

Crest Elev. varies uniformly from Elev. 14825 to Elev. 14835

Sta. "A" 7+05.38

Sta. "A" 7+41.82

6" Terra Cotta Open Joint Tile Drains.

CUPSTREAM FACE-REFERENCE LINE "B"

O.G. Spillway Crest Elev. 1410.0

Contr. Jt. Sta. B" 7+31.38

Approx. theoretical toe of downstream face

Outside Edge of Spillway Bucket

March Mark For Sheet 2

R = 520.69

Pt. V

Excavate to Elev. 1465.0

Spillway Crest Elev. 1470.0

Excavate to Elev. 1465.0

Exact station to be determined in field. If station is greater than 8+00, construct contr. jt. midway between 7+31.38 and determined station.

Pt. U

CURVE DATA FOR REFERENCE LINE "B"

R = 520.69 ft.
Δ = 48°-25'-00"

Coördinates:	North	East
Center of Curve	170,863.74	188,656.66
B.C. Sta. "B" 6+81.20	171,152.05	189,089.91
E.C. Sta. "B" 11+21.20	170,730.62	189,160.24

Elev. Varies. See Plan

El. 14700

Copper Water Stop to go completely around joint

½" Premoulded Expansion Joint Filler full width of joint.

6" T.C. Tile Drains

Slope 1%

SECT. K-K.

Scale: 1" = 10'

N 171250 N 171200 N 171150 N 171100 N 171050 N 171000 N 170950

E 189250 E 189200 E 189150 E 189100 E 189050 E 183000

NO	Date	Description	By
②	7/14/48	Revised and redrawn	JSB/LRO
①	6/9/48	Added dimensions & Elevs. Indicated parapet on Arch.	G.E.G.

REVISIONS

Drawn: May 1948, JSB-LRO
Checked:
Scale: 1" = 10'
Datum: U.S.G.S

R. C. Goodell
REGISTERED CIV. ENGR. № 1327
CONSULTING ENGINEER

SHEET 2 OF 4 SHEETS

VAIL COMPANY
LOS ANGELES, CALIFORNIA

VAIL DAM
ON TEMECULA CREEK - RIVERSIDE COUNTY

PLAN

N.171220 N.171350 N.171500 N.171650 N.171800 N.171950 N.172100 N.172250 N.172400 N.170700

E.189200 E.189150 E.189100

Excavate to Elev. 1465.0

Contraction Joints 50'-0" ℄-℄

Spillway - Crest Elev. 1470.0

REFERENCE LINE "B"

B B

Excavate to Elev. 1465.0

Match Mark for Sheet 2

C C

1.5% - "B" (1+21.29 E.C.

15°

Additional length of wall, if required to be determined in the field

Toe of Cut Slope

PLAN AT LEFT ABUTMENT

Scale: 1" = 10'

Overflow Crest Elev. 1470.0

R = 4.46'

R = 20.92

R = 17.59

34.600

Elev. Varies

12" Min.

SECTION A-A

(See Sheet 2)

No Scale

4.5 0.5' Elev. 1482.6 Elev. 1479.1 0.6 0.13

① Note: For details of parapet reinforcing see Sheet 2 of 4, Contract Dwgs. dated Sept. 1947

SECTION D-D

Scale: 1" = 10'

E.189200 E.189150 E.189100

March Mark for Sheet 2

Top of Parapet Elev. 1482.6 ①

℄ Arch Crest Elev. 1479.1 ①

Sta. 0+00 Reference Line

Sta. 0+09 End of Dam

Sta. 1+03 P.T.

Sta. 0+66.1 P.C.

R = 70

Δ = 30°12'

90°00'

Crest of Dam Elev. 1479.1

Pt. F Pt. G

319.150 Beg. of Arch

20 Ctrs. for Arch Coping

PLAN AT RIGHT ABUTMENT

Scale: 1" = 10'

5'-0" 6" 6" Elev. 1470.0 Min. 2' below Sound Rock Line Elev. 1465.0

SECTION B-B

Scale: 3/8" = 1'-0"

6'-3⅜" 2'-0" Elev. 1482.6 Crest of Dam Elev. 1470.0

SECTION C-C

Scale: 1/4" = 1'-0"

VAIL COMPANY
LOS ANGELES, CALIFORNIA

VAIL DAM
ON TEMECULA CREEK - RIVERSIDE COUNTY

PLAN AND SECTIONS

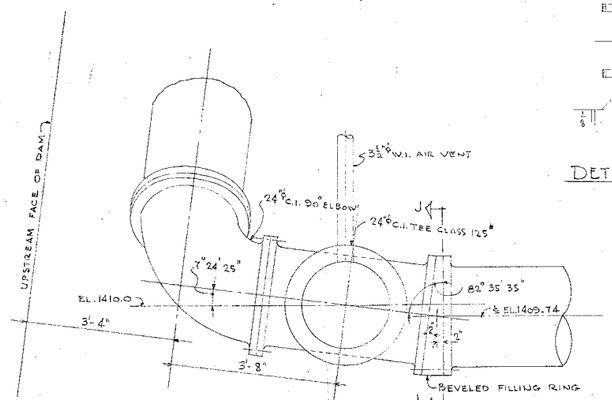
No	Date	Description	By
②	7/12/48	Revised and Redrawn	JSB-LRC
①	6/9/48	Added Sections D-D & E-E, dimensions & elevations. Indicated parapet	G.E.G.

REVISIONS

Drawn: May 1948 - JSB-LRC
Checked:
Scale: As Shown
Datum: U.S.G.S.

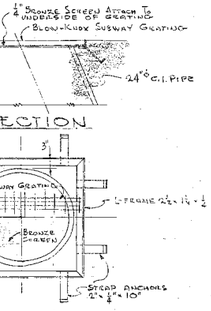
H. C. Lindall
REGISTERED CIV. ENGR. № 1327
CONSULTING ENGINEER.

SHEET 3 OF 4 SHEETS

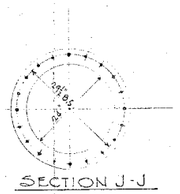


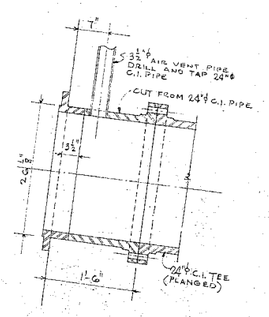
DETAIL INTAKE STA. 5+29.2

SCALE ¾"=1'-0"



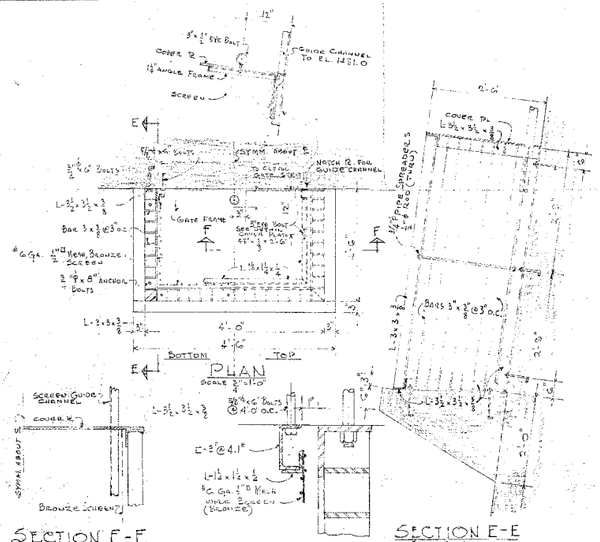
DETAILS PIPE COVER



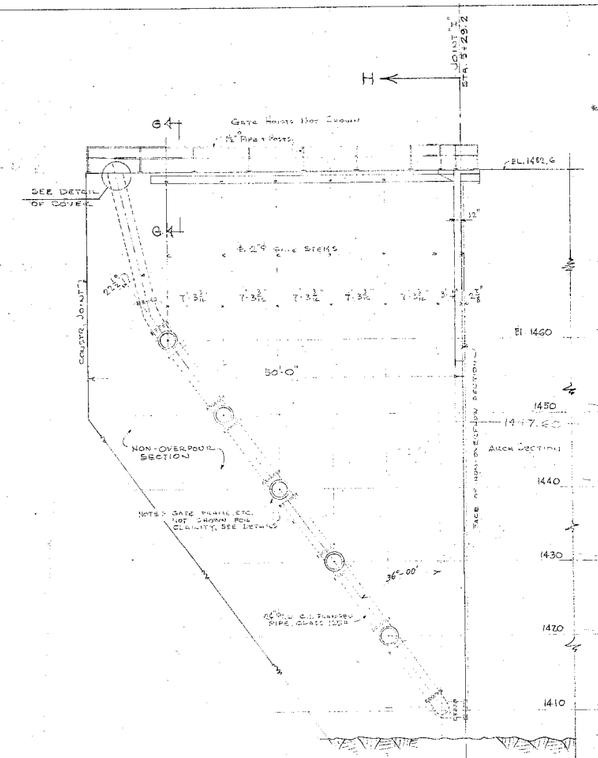


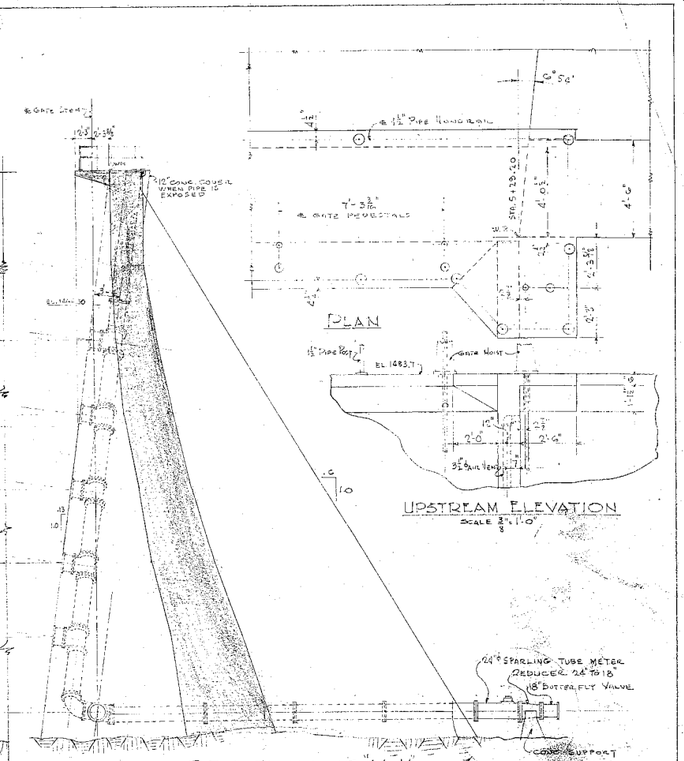
SECTION THRU INTAKE

SCALE 1"=1'-0"

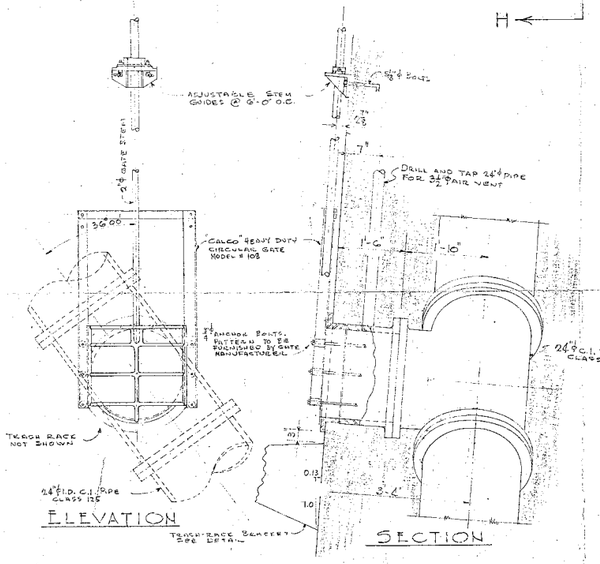


DETAILS TRASH RACK





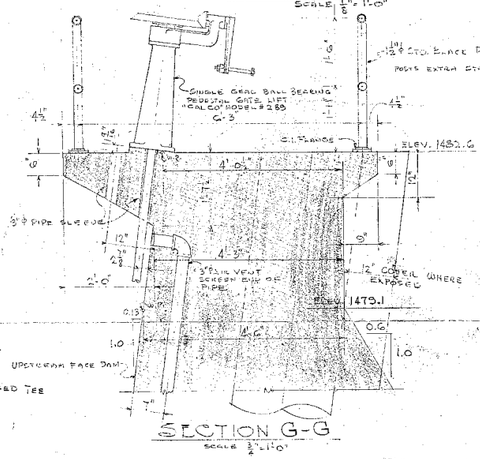
All connections within circle must be by flanged fittings. All other connections may be bell & spigot.



DETAILS OF INTAKES

AT ELEVATIONS 1420, 1430, 1440 & 1450

SCALE ¾"=1'-0"



VAIL COMPANY

LOS ANGELES, CALIFORNIA

VAIL DAM

ON TEMECULA CREEK - RIVERSIDE COUNTY

OUTLET BLOCK

DRAWN: APRIL 1948 BY B.F.

CHECKED

SCALE: AS SHOWN

DATUM: U.S.G.S.

R.E. Woodall

REGISTERED CIV. ENGR. #1327

CONSULTING ENGINEER

SHEET 4 OF 4 SHEETS

Approx Upstream Toe of Dam below Elev. 1340

CREST ELEV. 1482.6

Contraction Joint Sta 4+79.20

Contraction Joint Sta 3+79.20

Contraction Joint Sta 3+29.20

Contraction Joint Sta 2+79.20

Contraction Joint Sta 2+29.20

Contraction Joint Sta 1+82.99

Reference Line

319.5-79.20

Match Mark for Sheet 2

Match Mark for Sheet 3

Pt. "W"

Pt. "G"

NOTE: This center and r_e required for determining batter of Forms below Elev. 1340

r_e = 74.4

r_e = 85.8

r_e = 101.7

r_e = 116.0

r_e = 127.8

r_e = 137.3

r_e = 146.8

r_e = 157.4

r_e = 170.5

r_e = 180.2

r_e = 190.2

r_e = 200.6

r_e = 209.1

r_e = 215.8

r_e = 221.7

5'56"

5°40'

98° 00'

45° 37'

196'

1470 TO 1482.6 COPING

NOTE:
Contraction Joints shown are to be warped so that plane of joint at any elevation will be radial to arch center for that elevation.

VAIL COMPANY
LOS ANGELES, CALIFORNIA

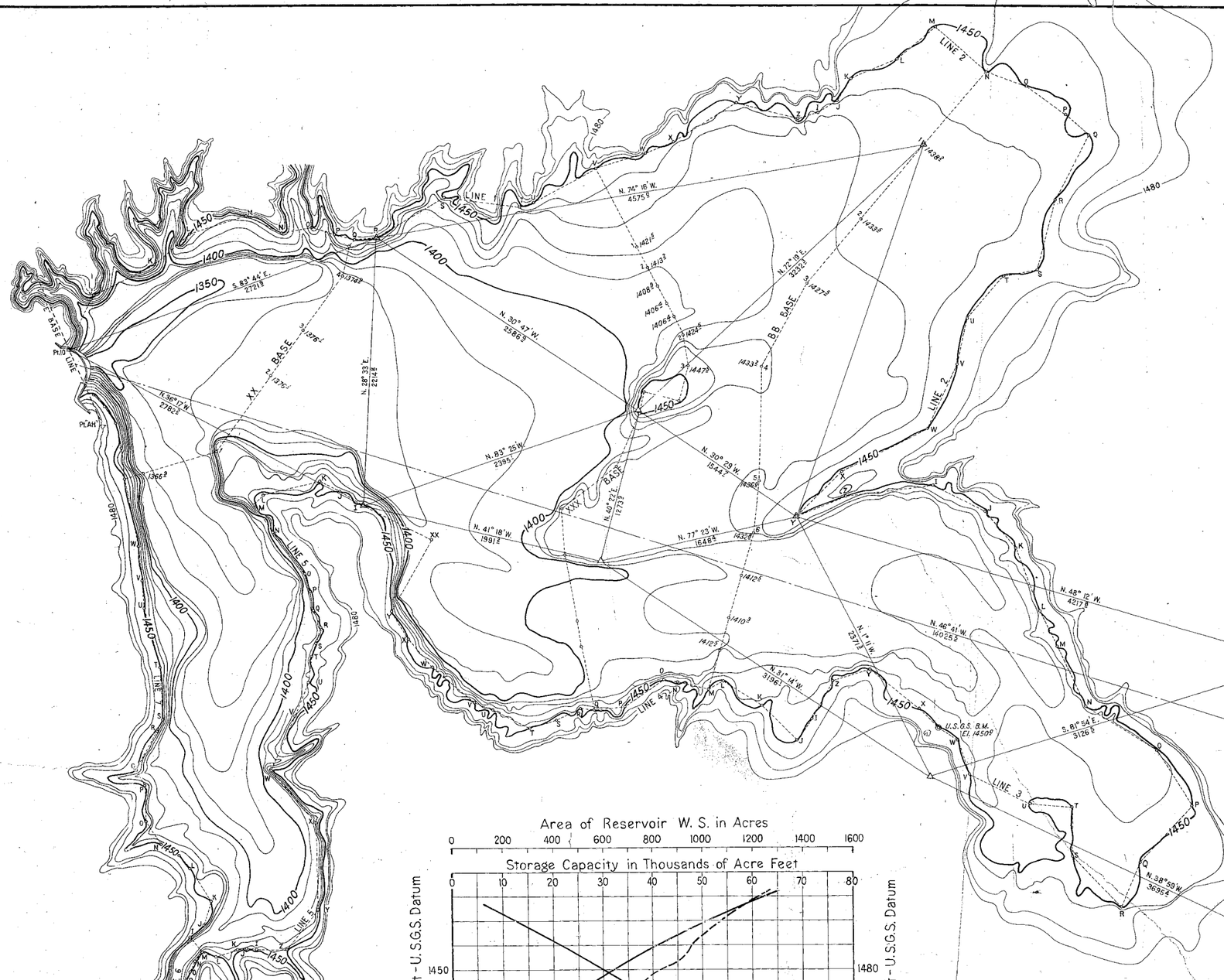
VAIL DAM
ON TEMECULA CREEK - RIVERSIDE COUNTY

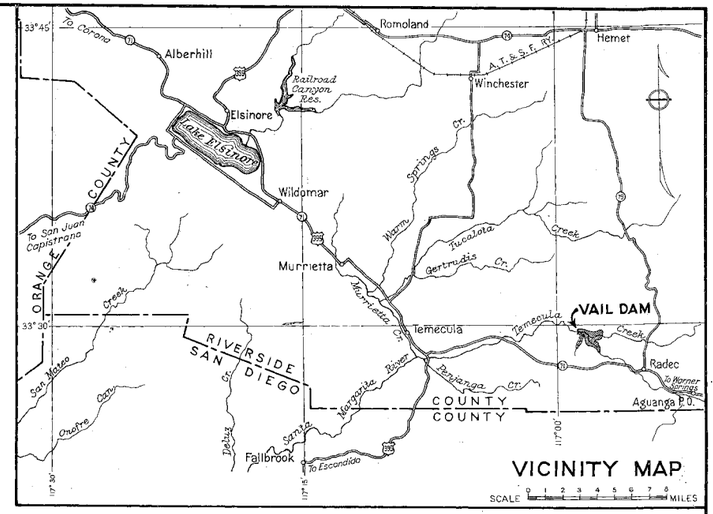
PLAN

Drawn: May 1948 - JSB-LRC
Checked:
Scale: 1" = 10'
Datum: U.S.G.S.

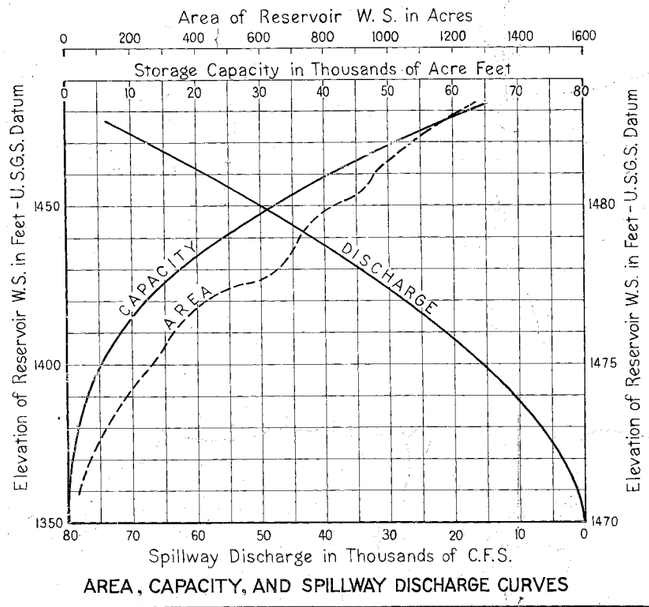
REGISTERED CIV. ENGR. No 1327
CONSULTING ENGINEER

SHEET 1 OF 3 SHEETS





VICINITY MAP



AREA, CAPACITY, AND SPILLWAY DISCHARGE CURVES

RESERVOIR MAP

Scale: 1 in = 400 ft.
Contour Interval 10 feet U.S.G.S. Datum
Scale 0 400 800 1200 1600 2000 Feet

VAIL COMPANY
LOS ANGELES, CALIFORNIA

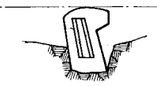
VAIL DAM
ON TEMECULA CREEK - RIVERSIDE COUNTY

VICINITY AND RESERVOIR MAPS, AREA, CAPACITY AND SPILLWAY DISCHARGE CURVES

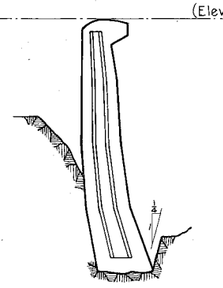
DRAWN: JUN 1947 BY: LRC
CHECKED:
SCALE: AS SHOWN
DATUM: U.S.G.S.

George C. Goodall
REGISTERED CIV ENGR. № 1327
CONSULTING ENGINEER

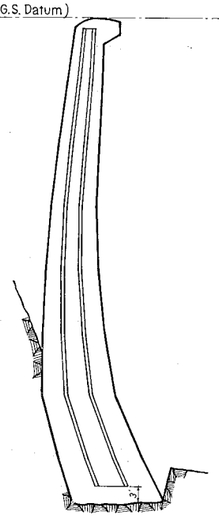
SHEET 1 OF 4 SHEETS



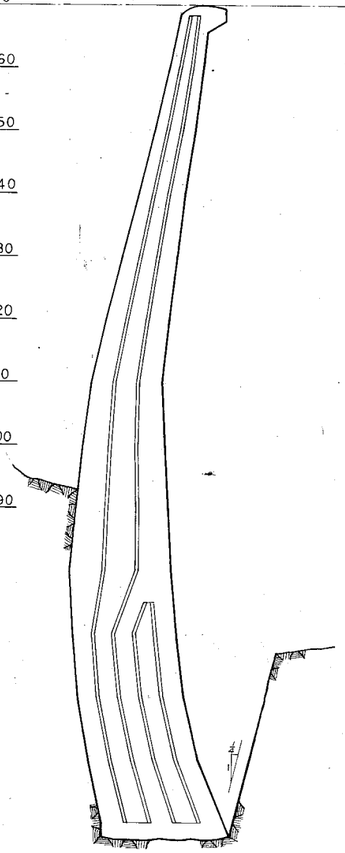
JOINT "B"



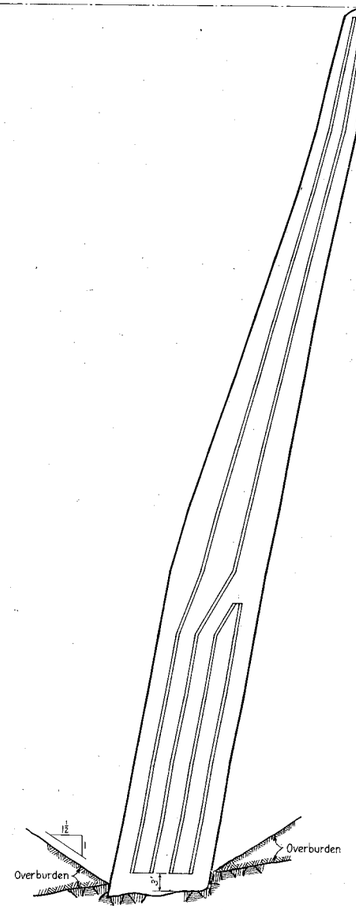
JOINT "C"



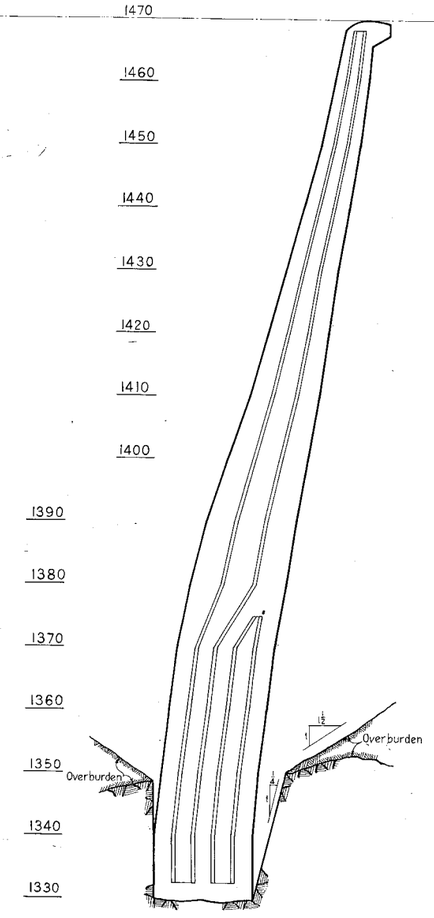
JOINT "D"



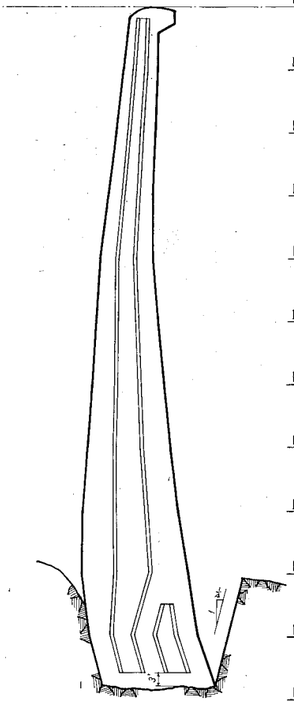
JOINT "E"



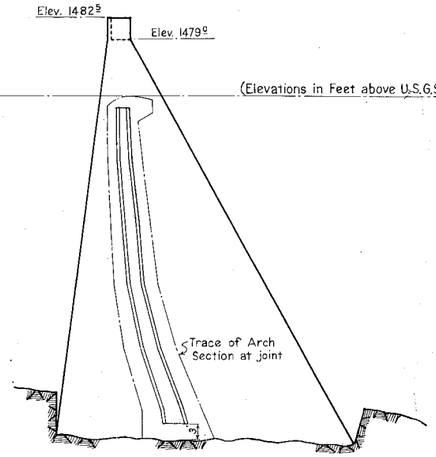
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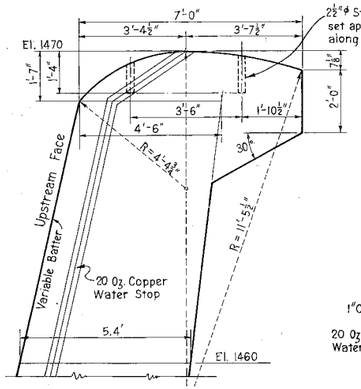
JOINT "G"



JOINT "H"

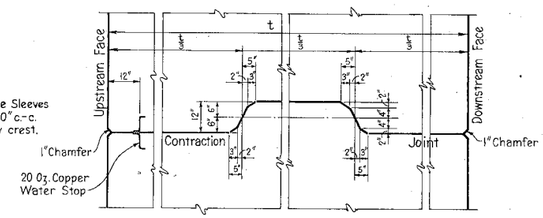


JOINT "I"

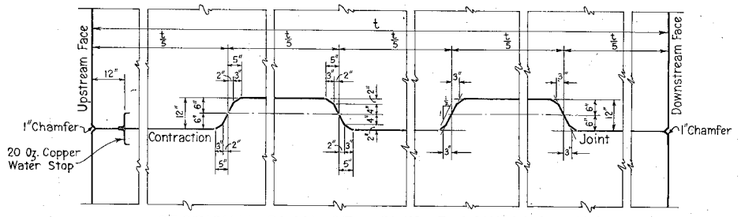


SPILLWAY COPING DETAILS

Scale : ½" = 1'-0"



SECTIONAL PLAN OF JOINT ABOVE ELEV. 1380



SECTIONAL PLAN OF JOINT BELOW ELEV. 1370

ARCH CONTRACTION JOINT KEYWAY DETAILS

(Joints "B" to "I" Inclusive)

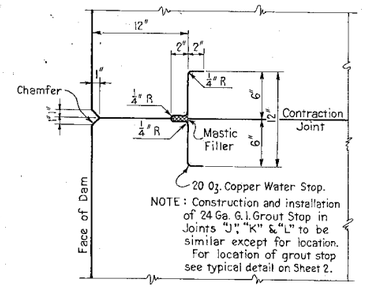
No Scale

ARCH CONTRACTION JOINTS

Scale : 1" = 10'

NOTE:

Paint contact between rock and upstream face of dam with asphalt.



TYPICAL DETAIL OF COPPER WATER STOP & G.I. GROUT STOP

Scale : 1½" = 1'-0"

VAIL COMPANY
LOS ANGELES, CALIFORNIA

VAIL DAM
ON TEMECULA CREEK - RIVERSIDE COUNTY

CONTRACTION JOINT AND SPILLWAY COPING DETAILS

DRAWN: SEPT. 1947 BY: LRC
CHECKED:
SCALE: AS SHOWN
DATUM: U.S.G.S.

George C. Goodall
REGISTERED CIV. ENGR. № 1327
CONSULTING ENGINEER

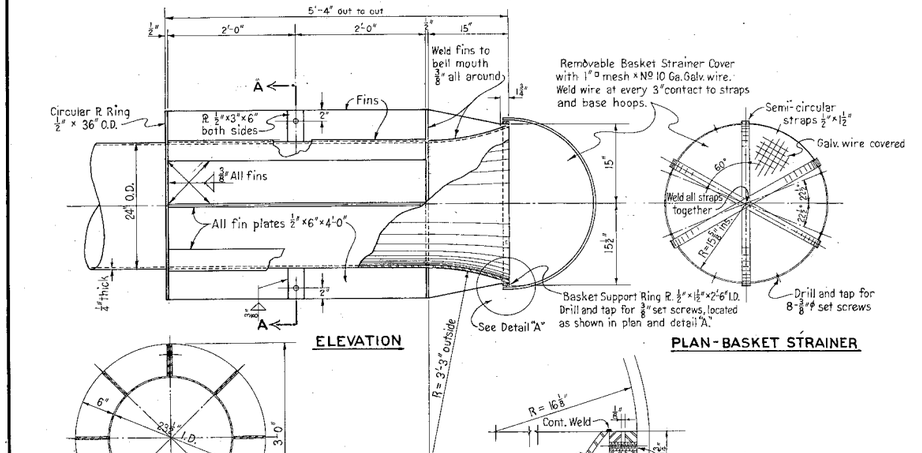
SHEET 3 OF 4 SHEETS

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER RESOURCES

APPLICATION No. 828
APPROVED AS TO SAFETY

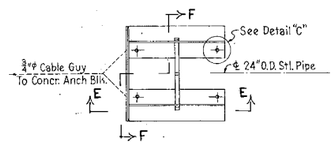
DEC. 23, 1947

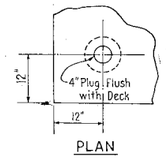
STATE ENGINEER

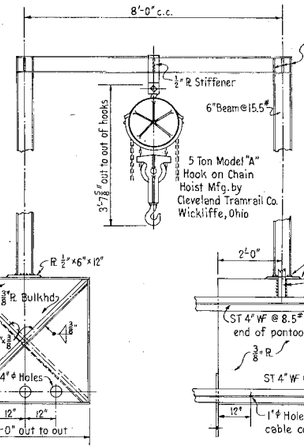


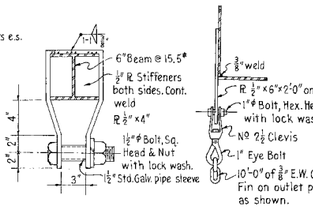
OUTLET PIPE DETAILS AT INTAKE END

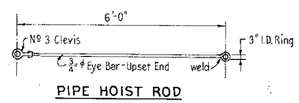
Scale: 1" = 1'-0"

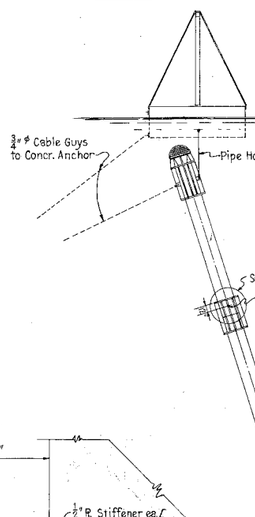


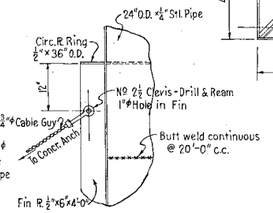


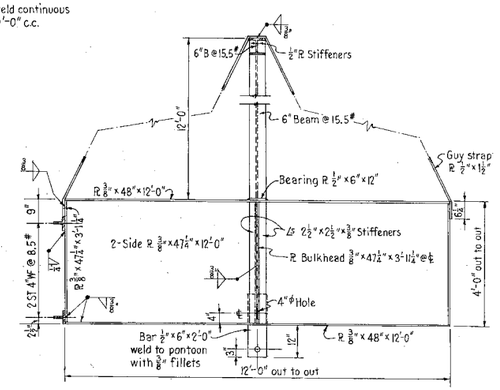


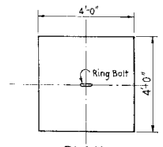


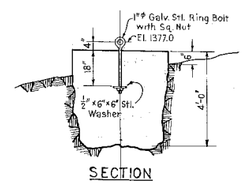


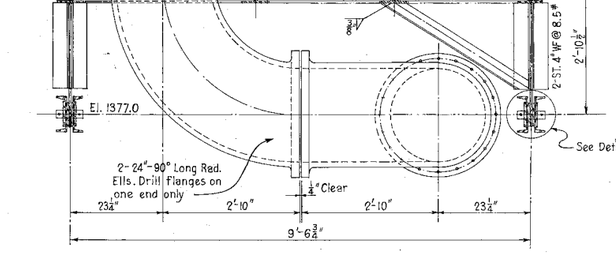


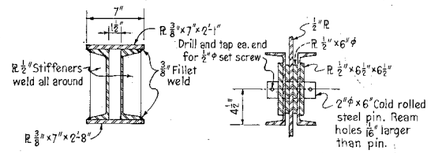


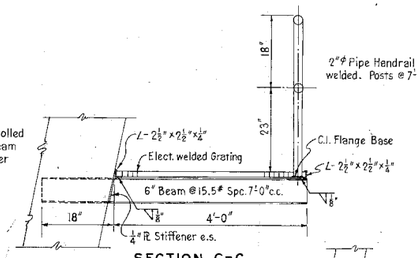


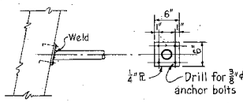


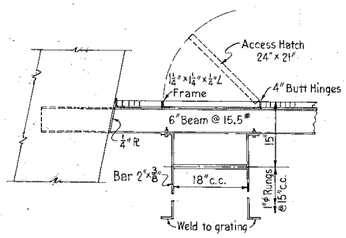






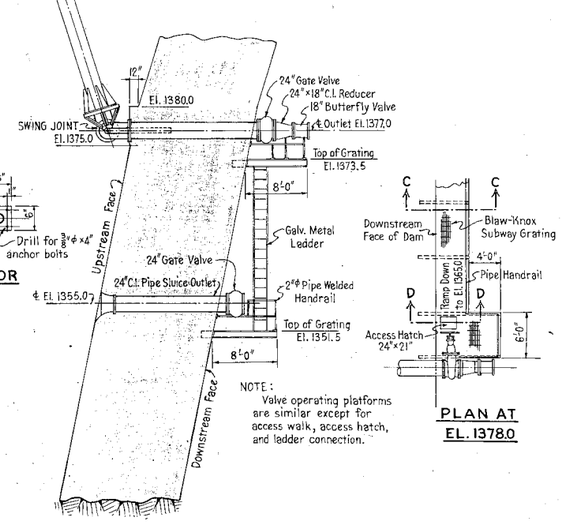






OUTLET PIPE - DETAILS AT SWING JOINT

Scale: ¾" = 1'-0"



OUTLET PIPE ASSEMBLY

Scale: ⅛" & ¾" = 1'-0"

PONTOON FLOAT DETAILS

Scale: ½" - ¾" & 1½" = 1'-0"

VAIL COMPANY LOS ANGELES, CALIFORNIA	
VAIL DAM ON TEMECULA CREEK - RIVERSIDE COUNTY	
OUTLET DETAILS	
DRAWN: DEC. 1947 BY B.F. LRC CHECKED: SCALE: AS SHOWN DATUM: U.S.G.S.	George B. Woodall REGISTERED CIV. ENGR. № 1327 CONSULTING ENGINEER
SHEET 4 OF 4 SHEETS	

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER RESOURCES

APPLICATION No. 828
APPROVED AS TO SAFETY

DEC. 23, 1947
STATE ENGINEER

NOTE: INFILTRATION LINE AND STRAINER TO BE SURROUNDED WITH 6" OF GRAVEL AND COBBLES FROM 2" TO 3" IN DIAMETER, ONE FOOT OF FINE GRAVEL AND ONE FOOT OF SAND. (MINIMUM) ALIGNMENT AND GRADE OF INFILTRATION LINE TO BE DETERMINED IN FIELD.

24"ϕ CONC. PIPE

CONTINUOUS CONC. CRADLE

4'-0"

3" CLEAR.

DETAIL PIPE CRADLE

5/16" CONT. FL. WELD TO VERT. PIPE

16'-0" OF 24"ϕ 5/16" PERFORATED STEEL PIPE

JOINT EL. 1360.0

24"ϕ CONC. PIPE FLARE ENDS

WELD

24"ϕ C.I. SLUICE PIPE

24" GATE VALVE (HAND OPERATED)

24" BUTTERFLY VALVE

℄ EL. 1352.5

3'-6"

42" HANDRAIL & POSTS

PIPE CRADLE (NOT SHOWN ON SECT.)

5'-0"

JOINT EL. 1350.0

24"ϕ REDUCER

EL. 1349.0

OPERATING PLATFORM

SEE SECTION B-B ON SHEET 3 FOR CONTROL VALVE DETAILS & SECTION C-C SHEET 3 FOR ENTRANCE ON PLATFORM

24"ϕ x 5/16" R. OR. PIPE WELD OR BOLT TO 24"ϕ C.I. PIPE CLASS 125#

8'-0"

SECTION THRU OUTLET STA 4+64.50

SCALE 1/4"=1'-0"

CREST EL. 1479.1 (NOT TO SCALE)

STA. 4+37.50

STA. 4+46.50

℄ EL. 1347.5

EL. 1341.0

20'-0"

1391.0

EL. 1375.5

6'-0"

NOTE: FOR SPACING OF LADDER RUNGS AND DETAILS OF SAFETY CAGE AND ACCESS DOOR, SEE SHEET 4 OF CONTRACT PLANS DATED DEC. 20, 1947

STA. 3+64.50

℄ EL. 1352.5

EL. 1349.0

1'-8"

12'-0"

42" PIPE HANDRAIL & POSTS

EL. 1355.0

ELEVATION LOOKING UPSTREAM SIDE OF DAM (DEVELOPED)

SHOWING LOCATION OF LADDER & ACCESS DOOR

SCALE 1/4"=1'-0"

20'-0"

24" PIPE HANDRAIL & POST

EL. 1380.0

SEE SECTION

BEAM KING POST

CONC. PILASTER WITH 2 1" ϕ CURVED BOLTS IN LEAD HOLES

6"WF @ 15.5#

CONC. PIER

EL. 1325.0

1" GROUT

PLUMB E. FACE IF NECESSARY

4-3/4"ϕ x 2'-0" ANCHOR BOLTS & REINF. (SEE SHEET)

1/2" MIN. INTO ROCK

ELEVATION LOOKING DOWNSTREAM

SCALE 3/4"=1'-0"

4'-6"

6"WF @ 15.5#

3'-0"

3'-0"

3'-0"

5'-0"

SEE DETAIL 1-1

X-BRACING 2"x 3/8" BARS WELD TO STRAP. CONNECT L TO STRAP WITH CLIP L.

BASE PLATE

PLAN

6"WF @ 15.5#

WELD HEAD TO PL.

BASE PLATE 16"x 1'-6"

4-7/8"ϕ HOLES FOR 3/4"ϕ x 10" BOLTS

4-3/4"ϕ x 2 1/2" STUD BOLTS & CUT WASHERS

BOTTOM FLANGE 6"WF @ 15.5#

DETAIL 1-1

SECTION C-C

SCALE 1/2"=1'-0"

DETAIL BASE PLATE

Scale 1"=1'-0"

L 3x3x5/16 2 REQ'D

#6 GA. EL. WELD SPACED AS SHOWN ON TOP OF THESE BARS

SEE DETAIL 1-1

2 BARS 5'-10" @ 3'-0" O.C.

L 3x3x5/16 (BENT)

L 2x2x1/4

4'-0"

5'-0"

4'-0"

2'-3"

SECTION THRU OUTLET STA 4+37.50

EL. 1400.0

24"ϕ OUTLET STA. 4+37.50

WALKWAY

OPERATING PLATFORM

LANDING EL. 1391.0

ACCESS DOOR

1360

1370

1380

1390

1400

1410

PLAN AT ACCESS LADDER

SCALE 1"=10'

1'-6"

CUT OUT, HEAT AND WELD ENDS TO SECTION AFTER BENDING

6"WF @ 15.5#

5/16 HOLE

DETAIL 2-2

FLUME

Joint EL. 1400.0

24"ϕ FLANGE AND PLATE TO

24"x18" REDUCER

18" BUTTERFLY VALVE

℄ EL. 1397.5

42" PIPE HANDRAIL & POSTS

OPERATING PLATFORM

EL. 1391.0

8'-0"

SECTION THRU OUTLET STA 4+37.50

4'-0"

4'-6"

ELEV. AT TRASHRACK

L 3x3x5/16 CLIP ANGLE 4" LONG

SPACER PLATE & BOLT

BRONZE SCREEN WELD TO ANGLE FRAME

BARS 3"x 3/8" @ 5" O.C.

3x3x5/16 (BENT)

WELD

WELD

4'-0"

SECTION B-B

VAIL COMPANY
LOS ANGELES, CALIFORNIA

VAIL DAM
ON TEMECULA CREEK - RIVERSIDE COUNTY

WALKWAY & OUTLET DETAILS

DRAWN: JULY 1948 F.B.E.
CHECKED
SCALES: AS SHOWN
DATUM: U.S.G.S.

H. E. Goodall
REGISTERED CIV. ENGR. № 1327
CONSULTING ENGINEER

SHEET 1 OF 1 SHEETS

N. 171,377.74
E. 189,302.50
El. 1352.50 @ ℄ H

N. 171,349.92
E. 189,299.39
El. 1352.40 @ ℄ G

N. 171,320.62
E. 189,295.27
El. 1361.03 @ ℄ F

N. 171,311.50
E. 189,263.18
El. 1397.50 @ ℄ TUNNEL
El. 1361.03 @ ℄ PORTAL

N. 171,308.35
E. 189,294.60
El. 1361.03 @ ℄ E

N. 171,271.37
E. 189,187.16
El. 1410.00 @ ℄ A

N. 171,282.92
E. 189,195.42
El. 1410.00 @ ℄ B

Approx. Upstream Toe of Dam below Elev. 1340

Top of parapet Elev. 1482.0 CREST ELEV. 1479

Contraction Joint Sta. 2+79.92

Contraction Joint Sta. 2+29.92

Contraction Joint Sta. 1+82.92

Contraction Joint Sta. 1+34.92

Contraction Joint Sta. 0+84.92

Contraction Joint

RISER

NOTE: This center and Re required for determining batter of Forms below Elev. 1340

Re = 74'
Re = 85'
Re = 101.7'
Re = 116'
Re = 127'
Re = 137'
Re = 146'
Re = 157'
Re = 170.5'
Re = 180'
Re = 190'
Re = 200'
Re = 209'
Re = 215'
Re = 221'

4° 55'
5° 56'
4° 04'
46° 02'
46° 37'

1410.70 to 1466.6 Coping Rad.

18" ϕ Galv. Pipe Flow Well

Sta. 4+23.92 24" Outlet Pipe at Elev. 1397 radial to center of 1400 ring

Sta. 4+23.92 24" Outlet Pipe at Elev. 1352 radial to center of 1352 ring

Bracing wall radial to center for El. 1370

Bracing wall radial to center for Elev. 1420

Bracing wall radial to center for Elev. 1420

Reference Line

Sta. 5+39.26

Conc. Pipe Supports

Conc. Pipe Supports

Conc. Deck

Pt. "A"

Pt. "G"

Match Mark for Sheet 3

N. 45° 45' 45" E. 19.1'

S. 40° 35' 15" E.

NOTE:
Contraction Joints shown are to be warped so that plane of joint at any elevation will be radial to arch center for that elevation.

VAIL COMPANY
LOS ANGELES, CALIFORNIA

VAIL DAM
ON TEMECULA CREEK - RIVERSIDE COUNTY

PLAN OF OUTLET PIPING

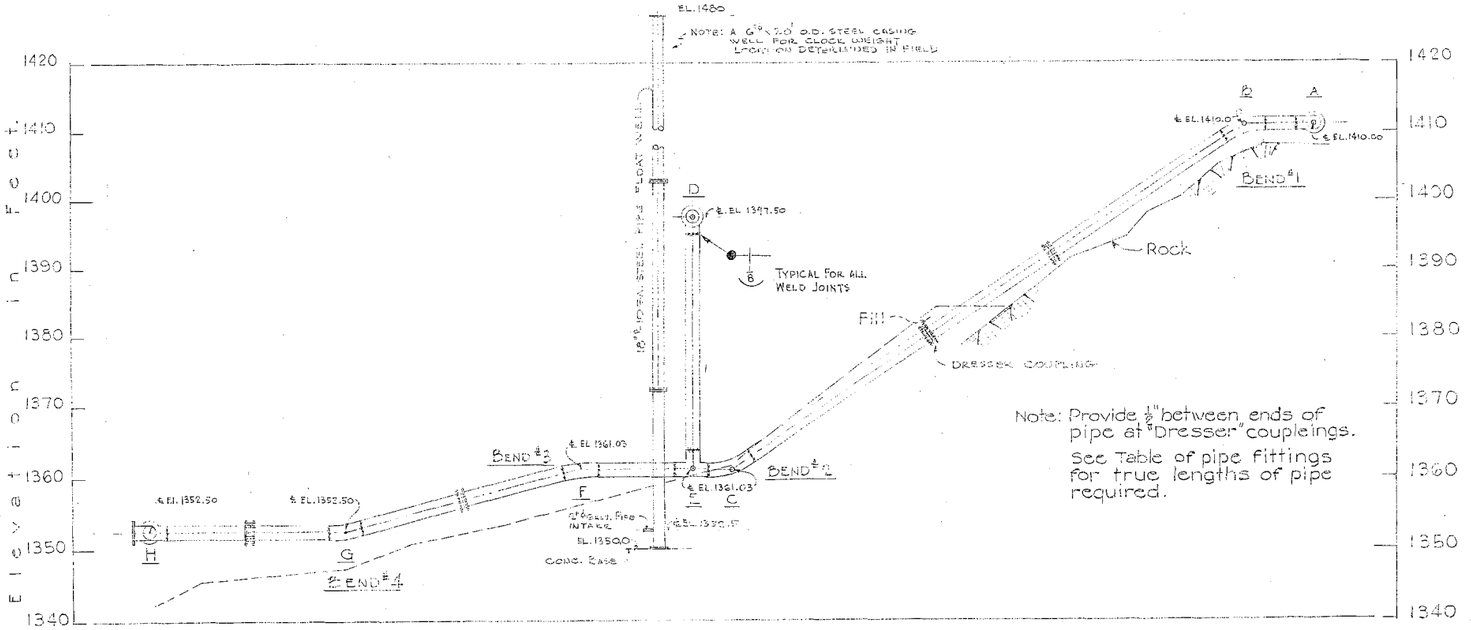
No.	Date	Description	By
1	4/49	Pipe Anchors & Support Added	JSB

REVISIONS

Drawn:
Checked:
Scale: 1" = 10'
Datum: U.S.G.S.

L. C. Goodall
REGISTERED CIV. ENGR. No. 1327
CONSULTING ENGINEER

SHEET 1 OF 3 SHEETS

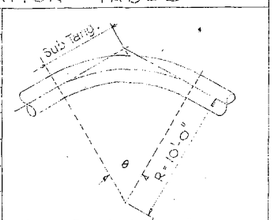


Note: Provide ½" between ends of pipe at "Dresser" coupleings.
See Table of pipe fittings for true lengths of pipe required.

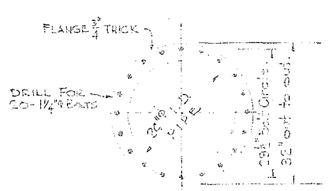
PROFILE ON ℄ 24" DIA. PIPE
(DEVELOPED)

◦ FABRICATION TABLE ◦

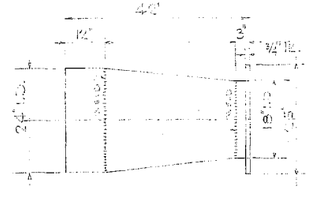
BEND	ANGLE θ	SUB TANG.
1 & 2	35° 30'	3'-2 3/8"
3	27° 58'	2'-5 7/8"
4	26° 50'	2'-4 5/8"

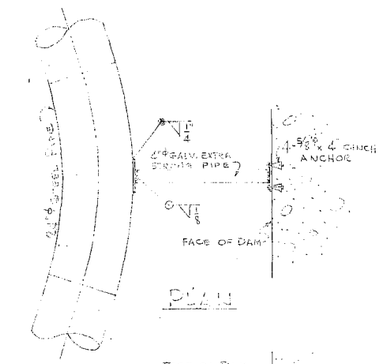


NOTE: RADII 10.0' ALL BENDS

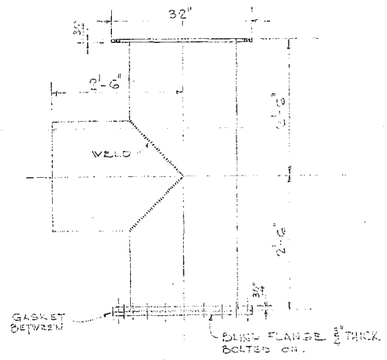


END VIEW OF FLANGE

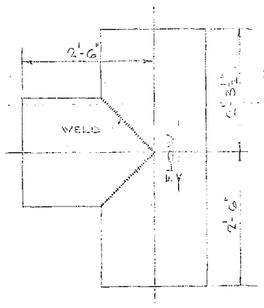




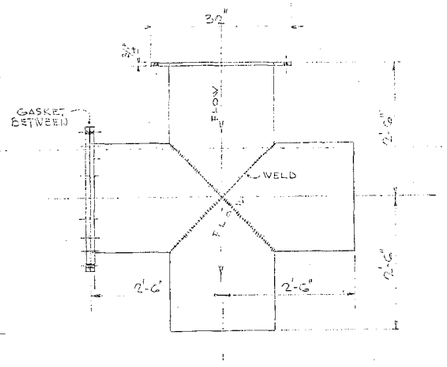
PLAN



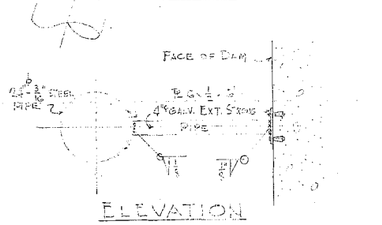
PLAN JOINT "A & J"



SIDE VIEW JOINT "E"



PLAN JOINT "H"



ELEVATION

THRUST PIPE AT JOINTS C, F & G

VAIL COMPANY
LOS ANGELES, CALIFORNIA

VAIL DAM
ON TEMECULA CREEK, RIVERSIDE COUNTY
OUTLET PIPING PROF. & DETAILS

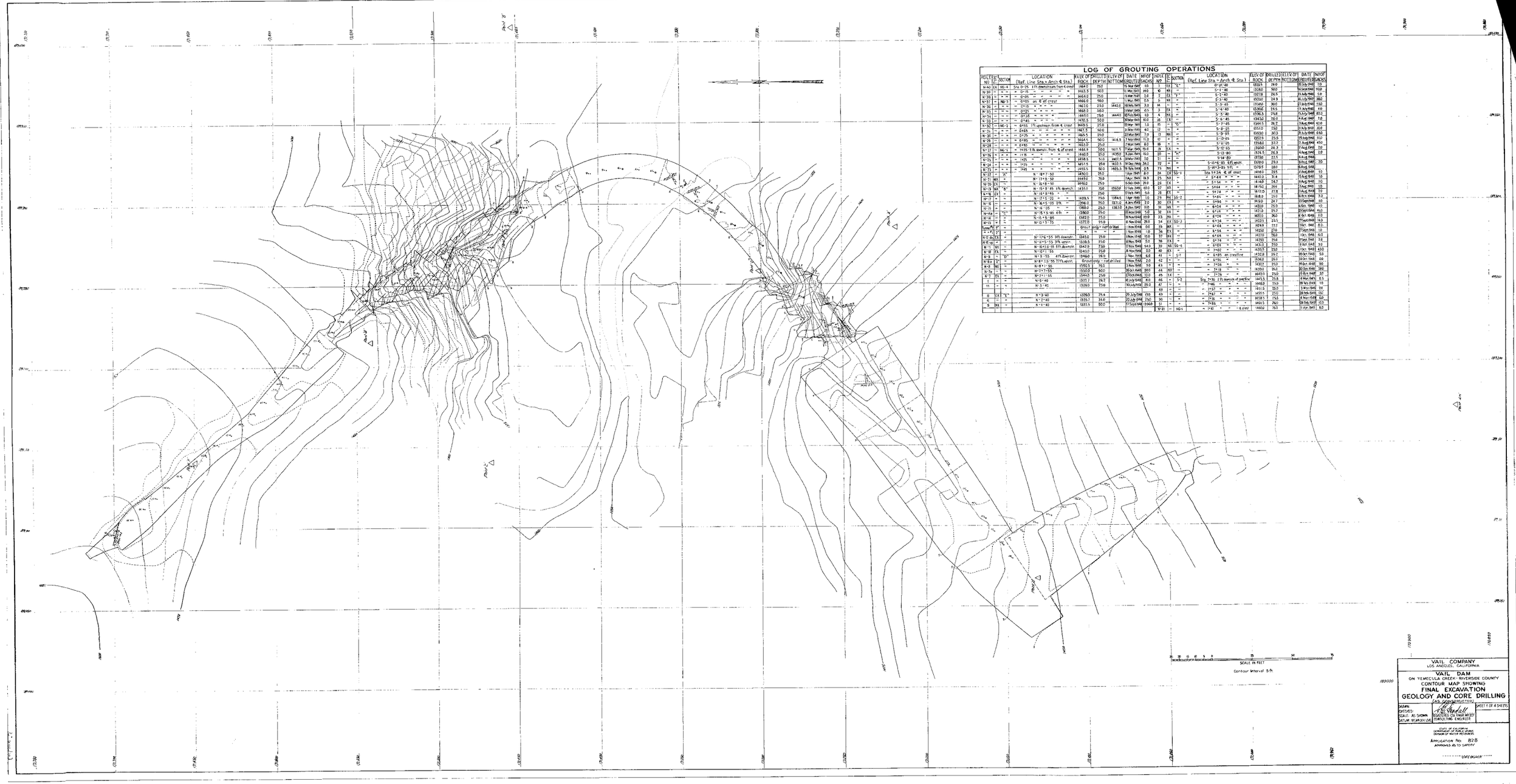
DRAWN BY. F.B.F.
CHECKED BY. J.S.B.
SCALE:
DATUM: U.S.G.S.

L. E. Goodall
REGISTERED CIVIL ENGR.
No 1927 CONSULTING ENGR.

SHEET 2 OF 3 SHEETS

LOG OF GROUTING OPERATIONS

HOLE NO	INC	SECTION	LOCATION (Ref. Line Sta.= Arch ℄ Sta.)	ELEV OF ROCK	DRILLED DEPTH	ELEV OF BOTTOM	DATE GROUTED	NO OF SACKS	HOLE NO	INC	SECTION	LOCATION (Ref. Line Sta.= Arch ℄ Sta.)	ELEV OF ROCK	DRILLED DEPTH	ELEV OF BOTTOM	DATE GROUTED	NO OF SACKS
N-40	24	EC-4	Sta 0+25 1ft downstream from ℄ crest	1464.0	75.0		19 Mar 1941	1.0	2	43	"C"	0+91.40	1335.5	24.0		28 July 1941	1.0
N-39	"	"	" 0+15 " " " " "	1463.5	50.0		6 Mar 1941	14.0	10	NX	"	5+1.46	1328.0	50.0		16 Jan 1941	90.0
N-38	"	"	" 0+05 " " " " "	1464.0	75.0		13 Mar 1941	2.0	2	EX	"B"	5+2.40	1327.8	24.5		23 July 1941	5.0
N-37	"	NG-3	" 0+01 on ℄ of crest	1466.0	50.0		1 May 1941	0.5	5	NX	"	5+3.40	1330.0	24.5		16 July 1941	380
N-36	"	"	" 0+13 " " " "	1467.0	25.0	1442.0	18 Feb 1941	3.0	14	"	"	5+3.40	1334.0	30.0		27 July 1941	250
N-35	"	"	" 0+25 " " " "	1468.0	50.0		1 Mar 1941	0.5	3	EX	"	5+4.40	1330.6	24.5		19 July 1941	4.0
N-34	"	"	" 0+35 " " " "	1469.0	75.0	1444.0	15 Feb 1941	1.0	4	NX	"	5+5.40	1329.3	25.0		15 July 1941	45.0
N-33	"	"	" 0+45 " " " "	1470.5	50.0		28 Mar 1941	10.0	26	EX	"	5+6.45	1334.50	28.0		4 Aug 1941	7.0
N-32	"	NG-2	" 0+55 1% upstream from ℄ crest	1469.5	21.0		19 Apr 1941	1.0	15	"	"D"	5+7.45	1344.5	26.0		3 Aug 1941	410
N-31	"	"	" 0+65 " " " " "	1467.5	50.0		3 May 1941	4.0	12	"	"	5+8.05	1351.0	23.0		31 July 1941	20.0
N-30	"	"	" 0+75 " " " " "	1465.5	21.0		22 May 1941	7.0	13	NX	"	5+9.95	1353.0	30.3		31 July 1941	645
N-29	"	"	" 0+85 " " " " "	1464.5	50.0	1414.5	2 Nov 1940	11.0	17	"	"	5+10.65	1357.9	25.5		29 July 1941	310
N-28	"	"	" 0+95 " " " " "	1463.0	25.0		2 Apr 1941	8.0	18	"	"	5+11.05	1358.0	33.7		2 Aug 1941	410
N-27	"	NG-1	" 1+05 1 ft. downst. from ℄ of crest	1466.5	50.0	1411.5	7 Mar 1941	19.0	19	EX	"	5+12.65	1360.0	28.3		31 Aug 1941	2.0
N-26	"	"	" 1+15 " " " " "	1462.5	21.0	1439.5	8 Jan 1941	18.0	20	"	"E"	5+13.80	1374.5	26.3		6 Aug 1941	2.0
N-25	"	"	" 1+25 " " " " "	1458.5	5.0	1407.5	31 Mar 1941	7.0	21	"	"	5+14.80	1378.0	22.5		6 Aug 1941	
N-24	"	"	" 1+35 " " " " "	1461.5	25.0	1433.5	31 Dec 1940	34.0	22	"	"	5+15.85 Eft upstr.	1378.0	23.0		8 Aug 1941	20
N-23	"	"	" 1+45 " " " " "	1455.5	50.0	1405.5	19 Feb 1941	0.5	23	NX	"	5+15.85 1ft. "	1378.5	28.0		6 Aug 1941	
N-22	"	X"	N - 19+7.50	1459.0	35.0		1 Apr 1941	8.0	24	LET	EG-1	Sta 5+24 ℄ of crest	1404.0	25.5		11 Aug 1941	10
N-21	NH	"	N - 17+9.50	1449.0	75.0		7 Apr 1941	19.5	25	NX	"	" 5+4.4 " " "	1410.0	30.8		13 Aug 1941	10
N-20	EX	"	N - 16+8.50	1446.0	25.0		5 Feb 1941	21.0	26	EX	"	" 5+5.4 " " "	1414.0	24.7		14 Aug 1941	10
N-19	NX	"A"	N - 15+9.95 1ft downst.	1431.0	75.0	1350.0	17 Feb 1941	18.0	27	NX	"	" 5+6.4 " " "	1414.50	28.4		21 Aug 1941	10
N-18	EX	"	N - 14+9.45 " "		25.0		27 Feb 1941	0.5	28	EX	"	" 5+7.4 " " "	1417.0	27.8		15 Aug 1941	20
N-17	"	"	N - 13+9.20 " "	1409.5	75.0	1384.5	1 Apr 1941	7.0	29	NX	EG-2	" 5+8.4 " " "	1418.0	29.0		16 Aug 1941	10
N-16	"	"	N - 16+5.05 2ft. "	1396.0	75.0	1321.0	4 Jan 1941	2.0	30	EX	"	" 5+9.4 " " "	1419.0	24.7		25 Sept 1941	10
N-15	"	"	N - 11+.05 " "	1388.0	25.0	1363.0	4 Jan 1941	11.0	31	NX	"	" 6+0.4 " " "	1420.0	25.9		6 Oct 1941	10
N-14a	"	"C"	N - 5+5.4 abt. Eft. "		23.0		8 Nov 1940	5.0	32	EX	"	" 6+1.4 " " "	1421.0	26.7		25 Sept 1941	40
N-14	"	"	N - 0+5.5 BC	1382.0	25.0		8 Nov 1940	10.0	33	NX	"	" 6+1.9 " " "	1422.0	26.0		6 Oct 1941	10
N-13	EX	"	N - 0+3.5 "S	1377.0	25.0		8 Nov 1940	21.0	34	EX	EG-3	" 6+2.4 " " "	1423.5	25.5		27 Sept 1941	10.0
Sump No 2	"	"	Grout sump - not drilled				1 Nov 1940	0.0	35	NX	"	" 6+4.4 " " "	1424.0	23.2		1 Oct 1941	8.0
N-7	EX	"	" " "				1 Nov 1940	1.0	36	EX	"	" 6+5.4 " " "	1425.0	27.6		27 Sept 1941	1.0
N-12	EX	"B"	N - 11+5.55 3ft downstr.	1345.0	25.0		1 Nov 1940	10.0	37	NX	"	" 6+6.4 " " "	1427.0	26.0		1 Oct 1941	10.0
N-8	"	"	N - 8+5.55 3% upstr.	1338.5	21.0		6 Nov 1940	5.0	38	EX	"	" 6+7.4 " " "	1430.0	31.6		1 Oct 1941	7.0
N-11	NX	"	N - 6+5.55 3ft downstr.	1347.0	7.30		7 Nov 1940	54.0	39	NX	EG-4	" 6+8.5 " " "	1431.0	27.0		8 Oct 1941	10
N-10	EX	"	N - 0+1.1 55	1343.0	25.0		8 Nov 1940	5.0	40	EX	"	" 7+0.0 " " "	1433.5	23.0		9 Oct 1941	43.0
N-9	"	"D"	N - 1+.55 4ft downstr.	1348.0	28.0		1 Nov 1940	6.0	41	"	"F"	" 6+8.5 on crestline	1432.8	29.2		9 Oct 1941	5.0
N-33	EX	"	N - 2+1.15 55 77 upstr.				1 Nov 1940	2.0	42	"	"	" 6+9.5 " "	1436.0	26.0		10 Oct 1941	0.0
N-2	NX	"	N - 4+1.55	Grout sump - not drilled			3 Nov 1940	7.0	43	"	"	" 7+0.5 " "	1437.7	27.0		11 Oct 1941	0.0
N-3a	"	"	N - 7+7.55	1350.0	50.0		25 Oct 1940	0.0	44	NX	"	" 7+1.8 " "	1439.0	24.2		30 Oct 1941	3.0
N-7	EX	"	N - 9+7.55	1344.0	21.0		27 Oct 1940	12.0	45	EX	"	" 7+7.9 " "	1440.0	25.0		29 Oct 1941	2.0
1	"	"	N - 0+.40	1337.7	26.7		12 July 1941	8.0	46	"	S-2	Sta 7+36 2 ft downstr of centrline	1445.5	25.8		4 Nov 1941	0.5
11	"	"	N - 5+.40	1328.0	75.0		10 July 1941	29.0	47	"	"	" 7+46 " " "	1444.0	23.0		28 Feb 1941	1.0
									48	"	"	" 7+57 " " "	1451.5	25.0		3 Mar 1941	3.0
8	EX	"E"	N - 3+.40	1328.0	75.4		20 July 1941	13.0	49	"	"	" 7+67 " " "	1455.5	27.0		28 Feb 1941	2.0
6	"	"	N - 1+.40	1325.5	31.0		20 July 1941	7.0	50	"	"	" 7+78 " " "	1458.1	26.5		4 Nov 1941	5.0
9	NX	"	N - 1+.40	1327.5	50.0		17 Sept 1941	13.0	51	"	"	" 7+88 " " "	1461.5	29.0		28 Feb 1941	2.0
									52-A1	"	NG-1	" 7+97 " " " 6 crest	1460.2	19.0		11 Apr 1941	8.0



VAIL COMPANY
LOS ANGELES, CALIFORNIA

VAIL DAM
ON TEMECULA CREEK, RIVERSIDE COUNTY
CONTOUR MAP SHOWING
FINAL EXCAVATION
GEOLOGY AND CORE DRILLING
(AS CONSTRUCTED)

DRAWN:
CHECKED:
SCALE: AS SHOWN
DATUM: MEAN SEA LEVEL

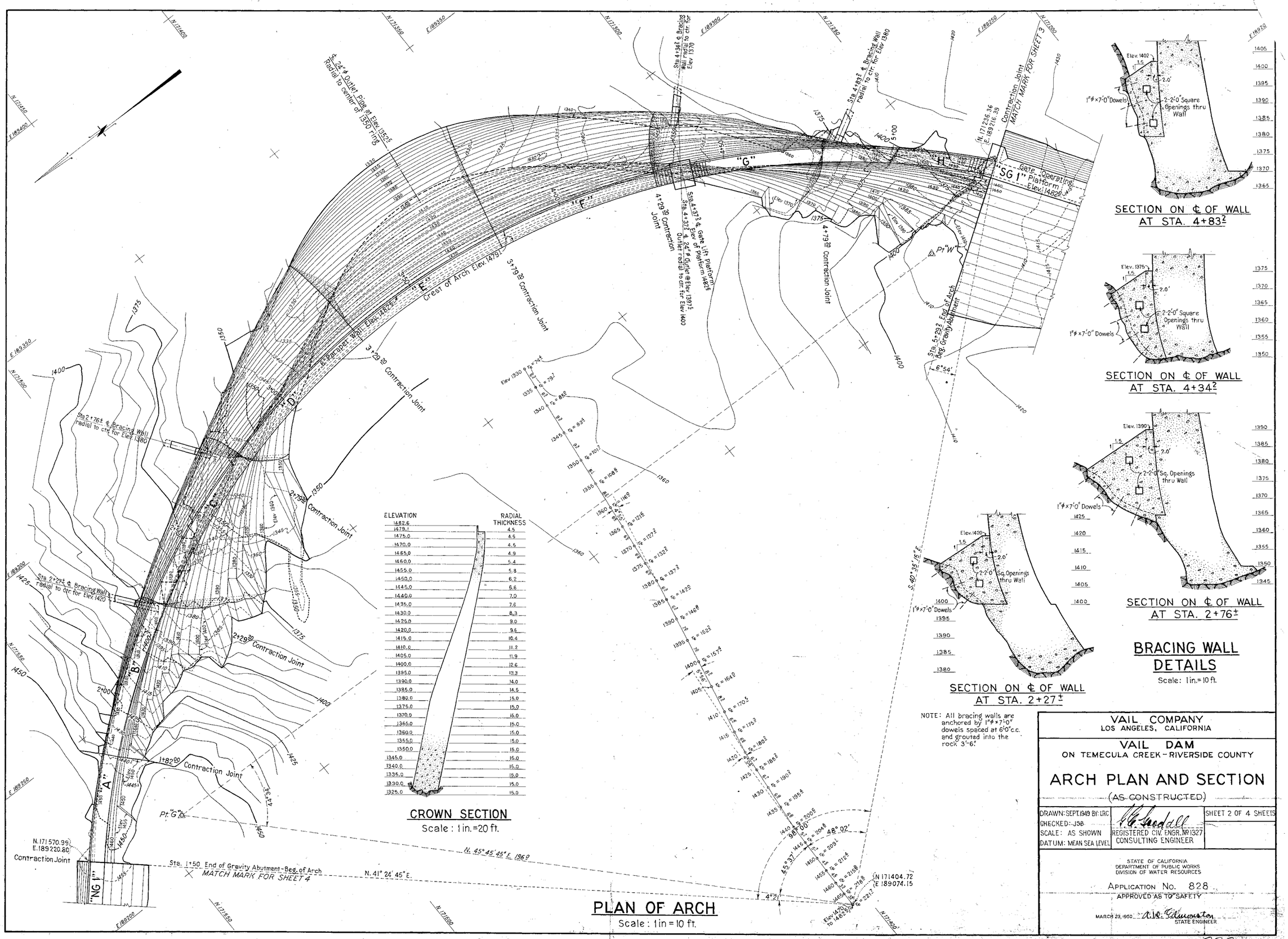
SHEET 1 OF 4 SHEETS

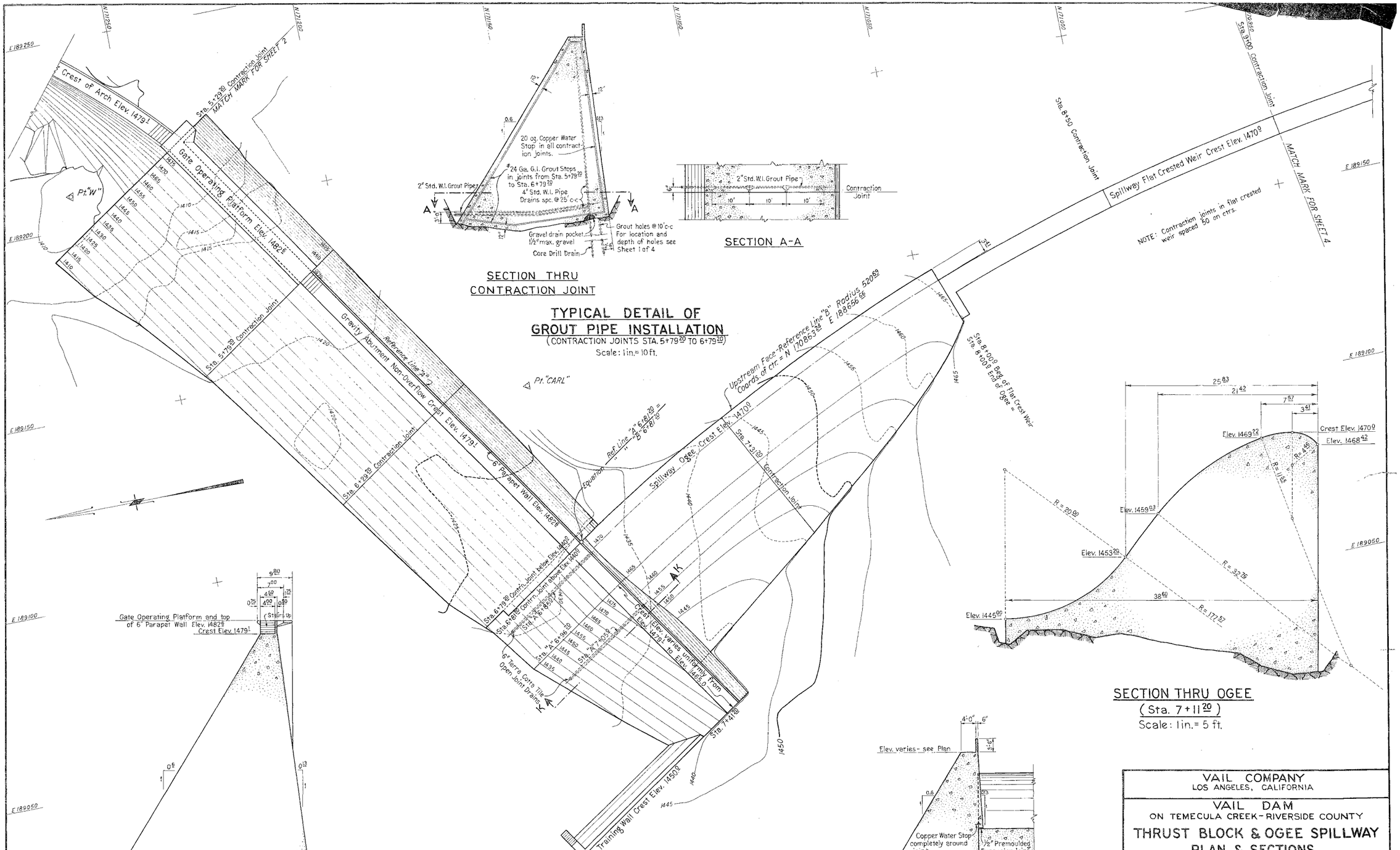
A.E. Woodall
CONSULTING ENGINEER

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER RESOURCES

APPLICATION No. 828
APPROVED AS TO SAFETY

STATE ENGINEER


"A"
"B"
"C"
"D"
"E"
"F"
"G"
"H"
"NG 1"
"SG 1" Gate Operating Platform Elev. 1482.6
Crest of Arch Elev. 1479.1
Parapet Wall Elev. 1482.6
Pt "G"
Pt "W"
24" ϕ Outlet Pipe at Elev. 1352.5 Radial to center of 1350 Tnnl.
Sta. 4+34.2 ℄ Bracing Wall radial to ctr. for Elev. 1370
Sta. 4+18.2 ℄ Bracing Wall radial to ctr. for Elev. 1380
Sta. 4+13.2 ℄ Gate Lift Platform
Sta. 4+10.7 ℄ 24" ϕ Outlet @ Elev. 1391.5 Outlet radial to ctr. for Elev. 1400
4+79.2 Contraction Joint
3+79.2 Contraction Joint
2+79.2 Contraction Joint
2+29.2 Contraction Joint
1+82.00 Contraction Joint
Sta. 2+76.2 ℄ Bracing Wall radial to ctr. for Elev. 1380
Sta. 2+27.2 ℄ Bracing Wall radial to ctr. for Elev. 1420
Sta. 1+50 End of Gravity Abutment-Beg. of Arch
MATCH MARK FOR SHEET 4
Contraction Joint
N. 171570.99 E. 189220.80
Sta. 5+29.2 End of Arch & Gravity Abutment
N. 171236.36 E. 189216.39
MATCH MARK FOR SHEET 3
N. 45° 45' 45" E. 196.0
N. 41° 24' 45" E.
S. 40° 35' 15" E.
N 171404.72 E 189074.15
48° 02'
45° 37'
4° 21'
R = 400'
R = 200'
R = 600'
N. 171400
N. 171350
N. 171300
N. 171250
N. 171200
N. 171450
N. 171500
N. 171550
N. 171600
E. 189400
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SECTION THRU
CONTRACTION JOINT

SECTION A-A

TYPICAL DETAIL OF GROUT PIPE INSTALLATION

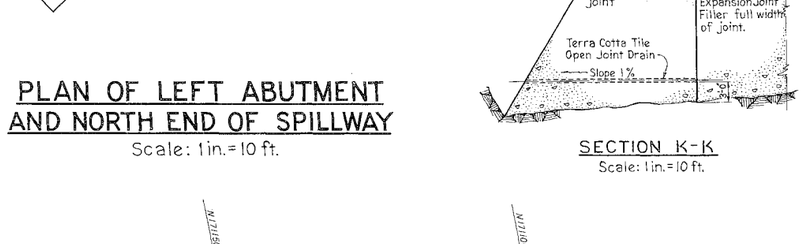
(CONTRACTION JOINTS STA. 5+79.29 TO 6+75.29)

Scale: 1 in. = 10 ft.

SECTION THRU GRAVITY ABUTMENT

(Sta. 5+85.00)

Scale: 1 in. = 10 ft.



SECTION K-K

Scale: 1 in. = 10 ft.

PLAN OF LEFT ABUTMENT
AND NORTH END OF SPILLWAY

Scale: 1 in. = 10 ft.

SECTION THRU OGEE

(Sta. 7+11.20)

Scale: 1 in. = 5 ft.

VAIL COMPANY
LOS ANGELES, CALIFORNIA

VAIL DAM
ON TEMECULA CREEK - RIVERSIDE COUNTY

THRUST BLOCK & OGEE SPILLWAY
PLAN & SECTIONS
(AS CONSTRUCTED)

DRAWN: SEPT. 1949 BY: LRC
CHECKED: JSB
SCALE: AS SHOWN
DATUM: MEAN SEA LEVEL

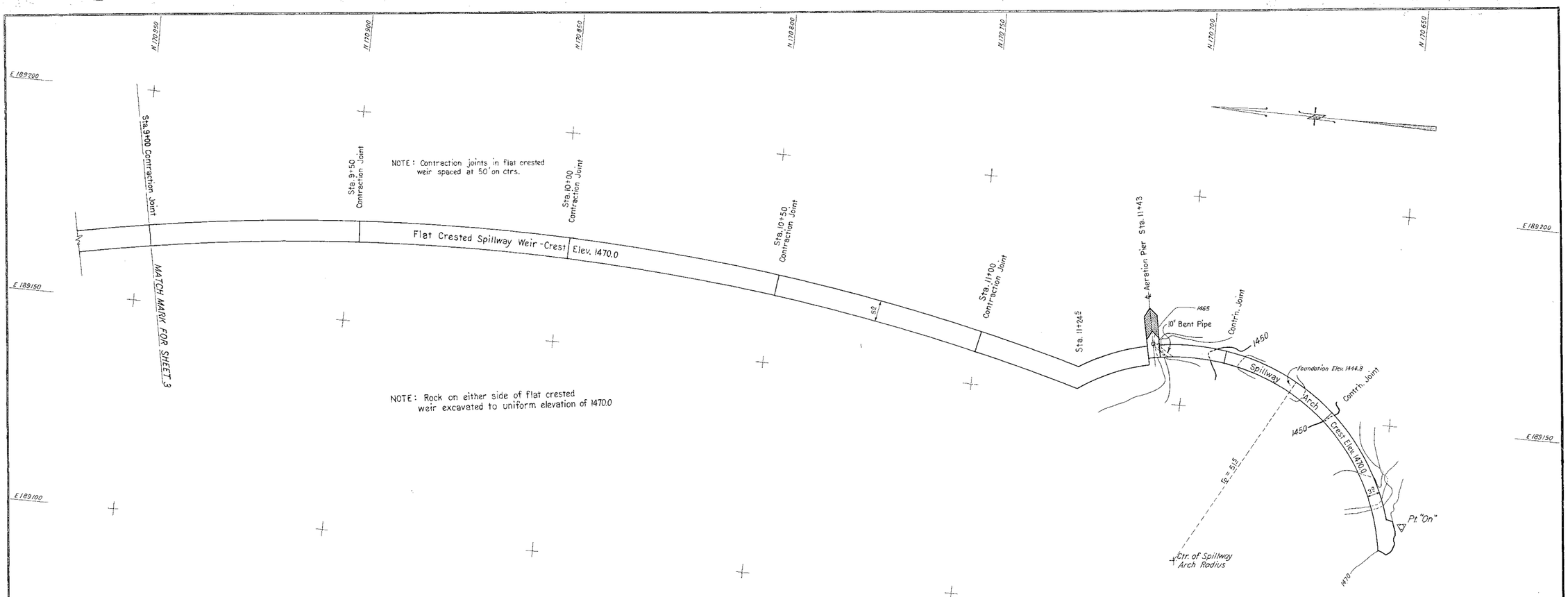
H. B. Woodall
REGISTERED CIV. ENGR. No. 1327
CONSULTING ENGINEER

SHEET 3 OF 4 SHEETS

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER RESOURCES

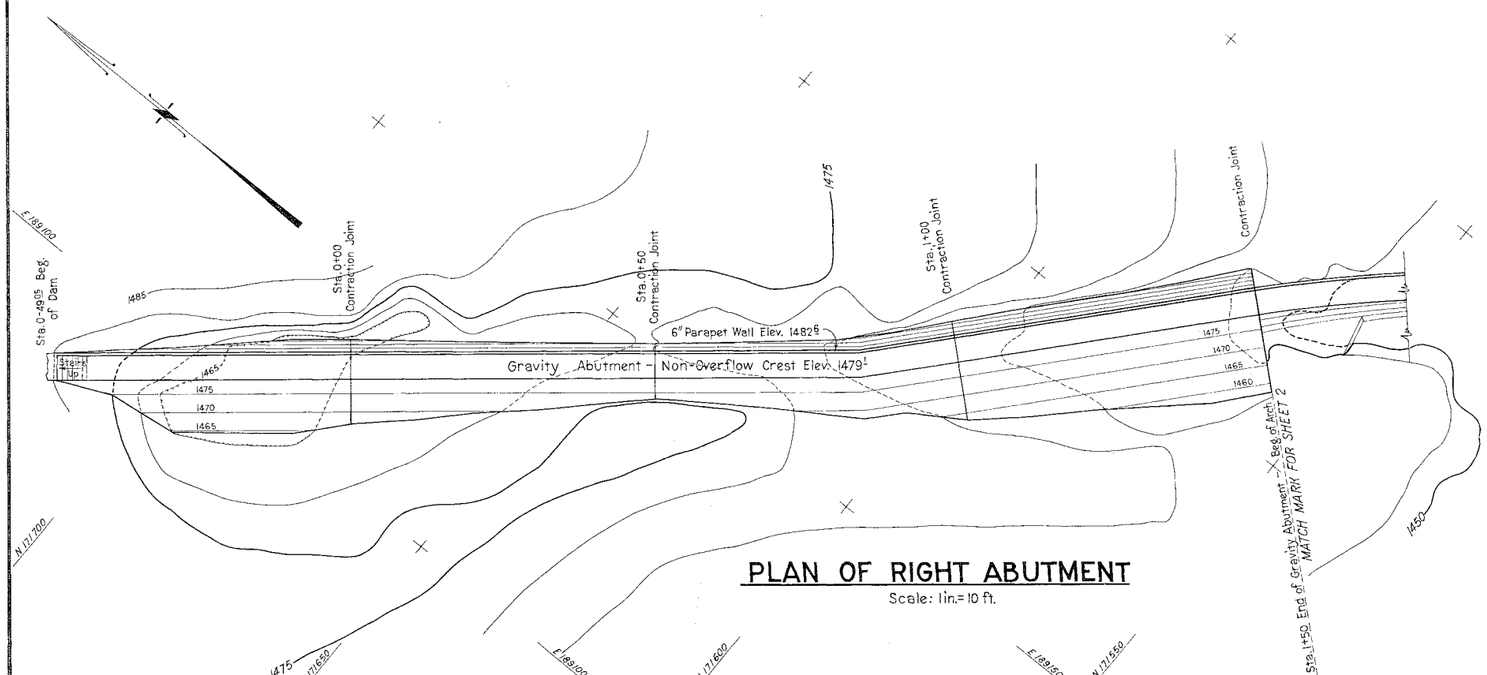
APPLICATION NO. 828
APPROVED AS TO SAFETY

STATE ENGINEER



PLAN OF SOUTH END OF SPILLWAY

Scale: 1 in. = 10 ft.



PLAN OF RIGHT ABUTMENT

Scale: 1 in. = 10 ft.

VAIL COMPANY
LOS ANGELES, CALIFORNIA

VAIL DAM
ON TEMECULA CREEK - RIVERSIDE COUNTY

RIGHT ABUTMENT AND SOUTH END OF SPILLWAY

(AS CONSTRUCTED)

DRAWN: SEPT. 1949 BY: LRC
CHECKED: JSB
SCALE: AS SHOWN
DATUM: MEAN SEA LEVEL

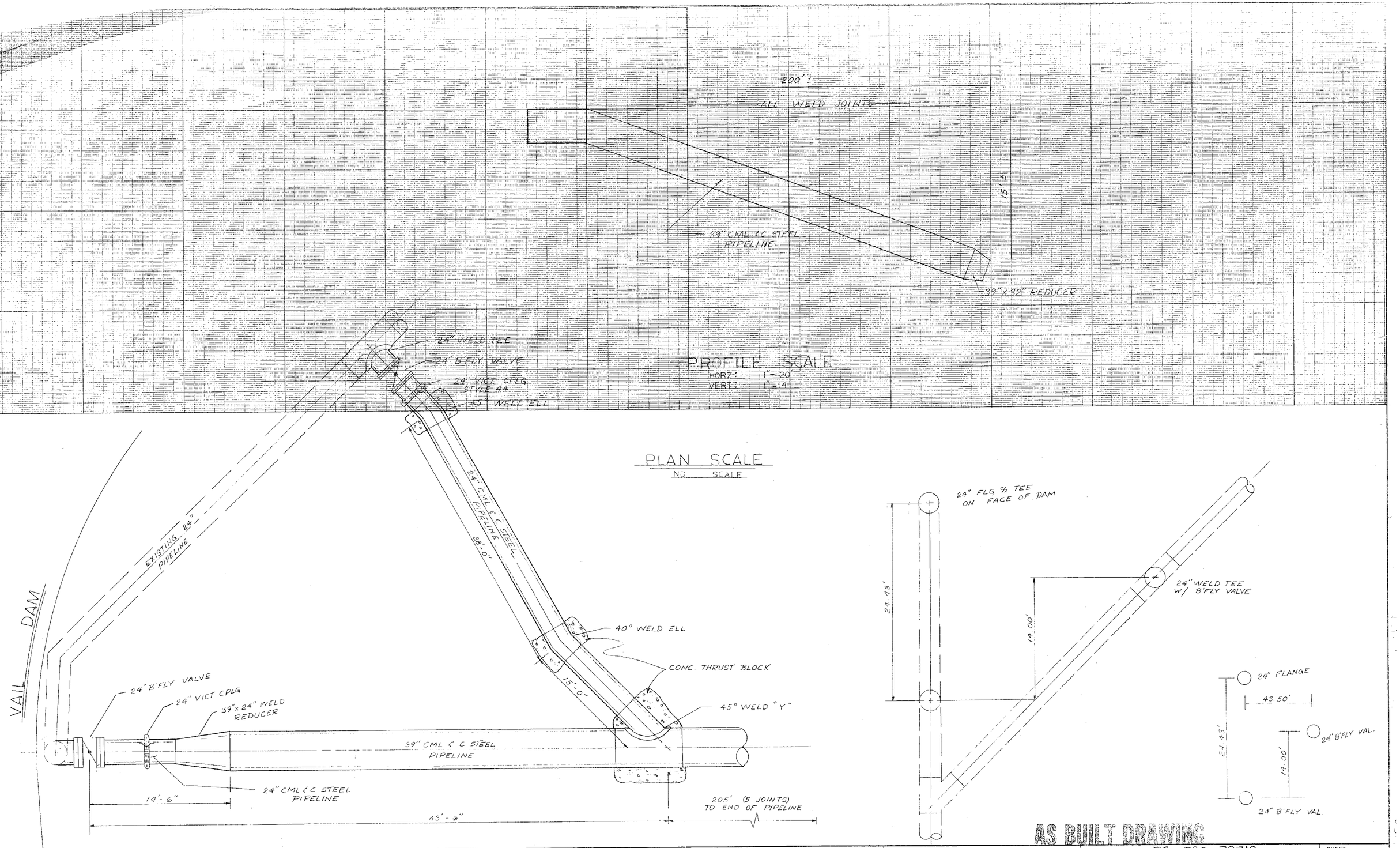
N. B. Goodall
REGISTERED CIV. ENGR. No. 1327
CONSULTING ENGINEER

SHEET 4 OF 4 SHEETS

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER RESOURCES

APPLICATION No. 828
APPROVED AS TO SAFETY

STATE ENGINEER



AS BUILT DRAWING

REV	DATE	BY	DESCRIPTION

SCALE: AS NOTED

DESIGNED

DRAWN: WM R. MOORE

CHECKED

SUBMITTED

Thomas R. McAlister

PROJECT ENGINEER 31 July 80 DATE

JAMES M. MONTGOMERY ENGINEERS R.C.E. DATE

RANCHO CALIFORNIA WATER DISTRICT

APPROVED

GENERAL MANAGER DATE

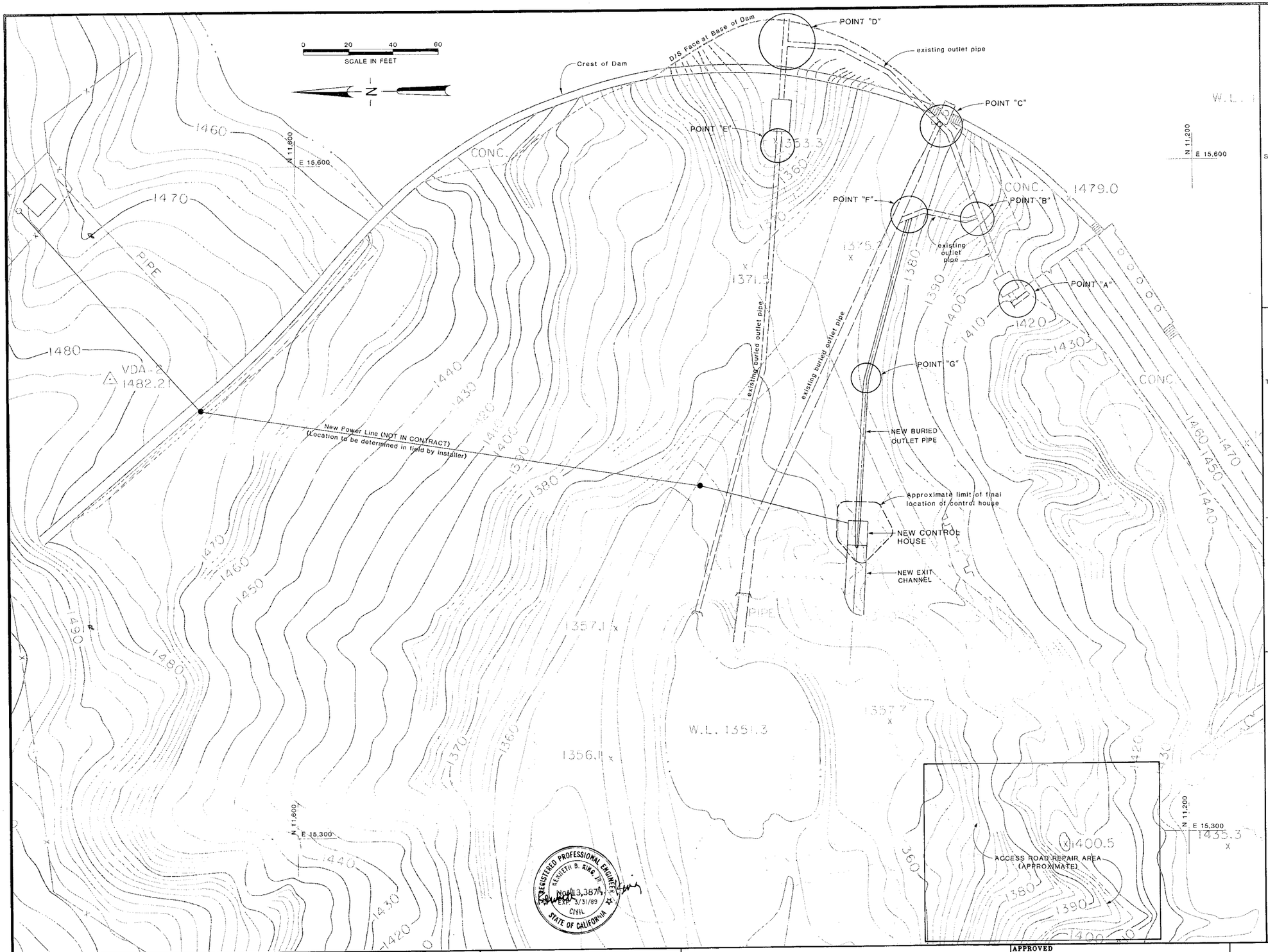
APPROVED

CONSTRUCTION MANAGER DATE

RC-380-70310

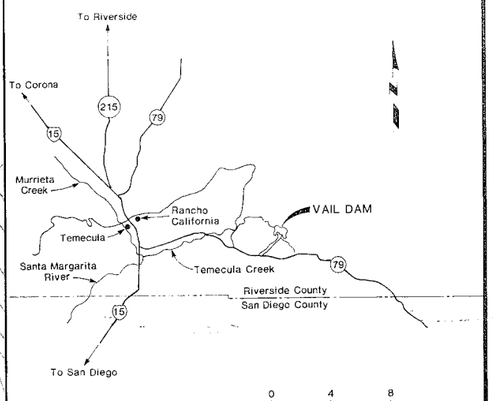
VAIL DAM RELEASE

SHEET 1 OF 1 SHEETS





KEY MAP



PROJECT LOCATION MAP

NOTES:

1. Locations of exposed pipeline are considered to be accurate within 5 feet. Locations of buried portions of pipeline are approximate.

2. The location and orientation shown for the new pipeline to the control house are subject to adjustment during construction depending on obstruction (e.g., bedrock) which may be encountered, or unknown conditions at point "E" other than shown on Sheet 3.

3. Depending on different subsurface conditions encountered during construction, and/or changes in pipeline alignment, location and orientation of the control house may differ from the location shown on this sheet. The final location of the control house is expected to be within the dashed area around the house location shown. An allowance shall be made for a pipe bend in a horizontal as well as vertical direction prior to entry into the control house (see Sheet 4).

4. The Contractor shall install all facilities in accordance with the "Specifications and General Conditions for Rancho California Water District". The complete set of Standard Drawings and Specifications may be obtained from the District office for a fee of $20.00.

AS BUILT DRAWING

REV.	DATE	BY	DESCRIPTION

SCALE: AS SHOWN

DESIGNED — C. T. DARE
DRAWN — R. R. SMITH
CHECKED — K. B. KING

APPROVED Thomas R. McAlister 26 JAN 87
DIRECTOR OF OPERATIONS & MAINTENANCE — DATE

Converse Consultants
Northern California

SUBMITTED
Kenneth B. King — Jan 16, 1987
DATE

Rancho Water

Rancho California Water District
28061 Dias Road • P.O. Box 174 • Temecula, CA 92390 • 714 676-4101

APPROVED
DIRECTOR OF ENGINEERING — 1-23-87 DATE
APPROVED
CONTRACTS MANAGER — 1.17.87 DATE
APPROVED
DESIGN ENGINEERING MANAGER — 1.17.87 DATE

VAIL DAM
OUTLET WORKS MODIFICATIONS

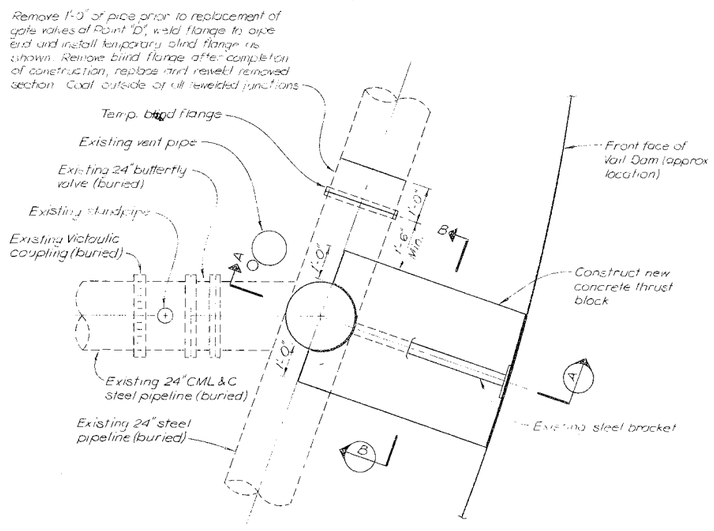
GENERAL PLAN AND LOCATION MAPS

SHEET 1 OF 6 SHEETS

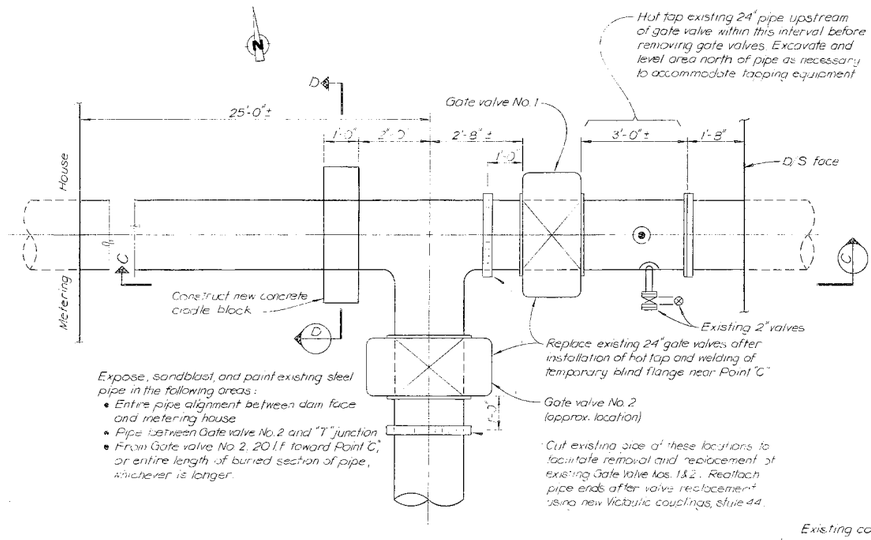
BUREAU OF RECLAMATION SMALL PROJECTS LOAN JOB No. D0155

RC 309 No. DWG.

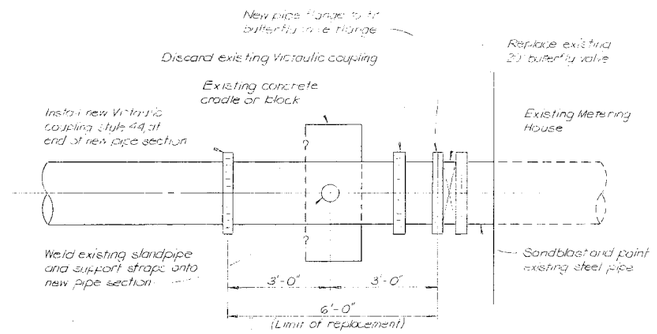
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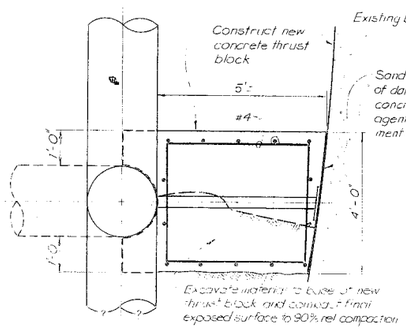
POINT "C"
SCALE 1/2"=1'



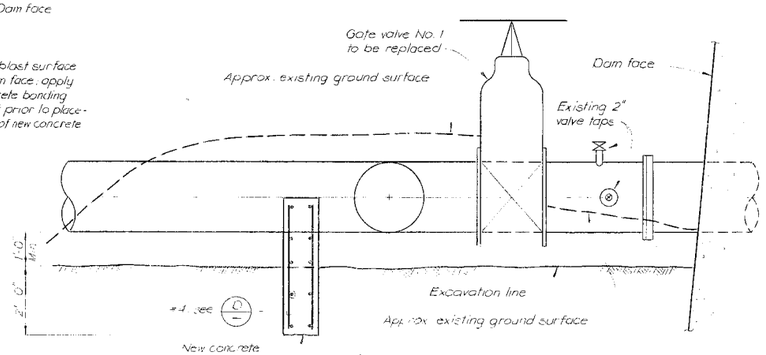
POINT "D"
SCALE 1/2"=1'



POINT "E"
SCALE 1/2"=1'



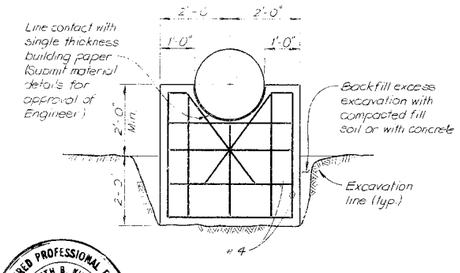
SECTION A
SCALE 1/2"=1'



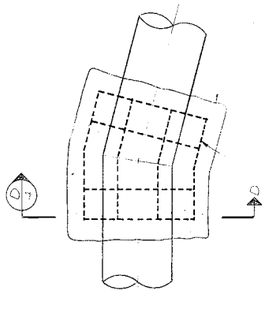
SECTION C
SCALE 1/2"=1'

POINT "F"
NOT TO SCALE

SECTION B
NOT TO SCALE



SECTION D
SCALE 1/2"=1'



POINT "G"
SCALE 1/2"=1'

REGISTERED PROFESSIONAL ENGINEER
KENNETH B. KING
No. 13,387
EXP. 3/31/89
CIVIL
STATE OF CALIFORNIA

AS BUILT DRAWING

REV.	DATE	BY	DESCRIPTION
1	10/19/87	L.G.	AS BUILT

SCALE: AS SHOWN
DESIGNED: C. T. DARE
DRAWN: L. Q. LE
CHECKED: K. B. KING
APPROVED: Thomas R. McWhirter 26 JAN 87 — DIRECTOR OF OPERATIONS & MAINTENANCE — DATE

Converse Consultants Northern California
SUBMITTED: Kenneth B. King — Jan 16, 1987 — DATE

Rancho Water
Rancho California Water District
28061 Diaz Road • P.O. Box 174 • Temecula, CA 92390 • 714 676-4101

APPROVED: [signature] — DIRECTOR OF ENGINEERING — 1-23-87 DATE
APPROVED: [signature] — CONTRACTS MANAGER — 1-17-87 DATE
APPROVED: [signature] — DESIGN ENGINEERING MANAGER — 1-17-87 DATE

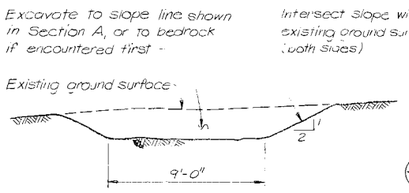
VAIL DAM
OUTLET WORKS MODIFICATIONS

CONSTRUCTION POINTS "C" THROUGH "G"
PLANS AND SECTIONS

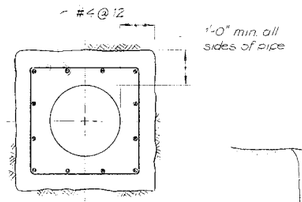
SHEET 3 OF 6 SHEETS

DWG. No. RC-309

BUREAU OF RECLAMATION SMALL PROJECTS LOAN JOB No. D0155

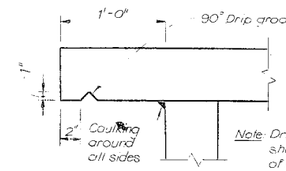


SECTION C
SCALE 1/2" = 1'



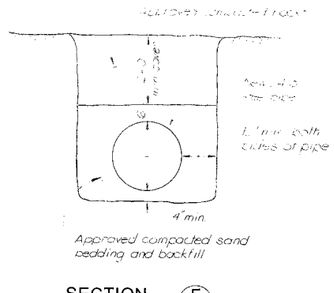
SECTION D
SCALE 1/2" = 1'

See also Points "F" and "G" Sheet 3



Note: Drip groove dimensions shown apply to all sides of roof slab. Overhang is 6" on sides not shown

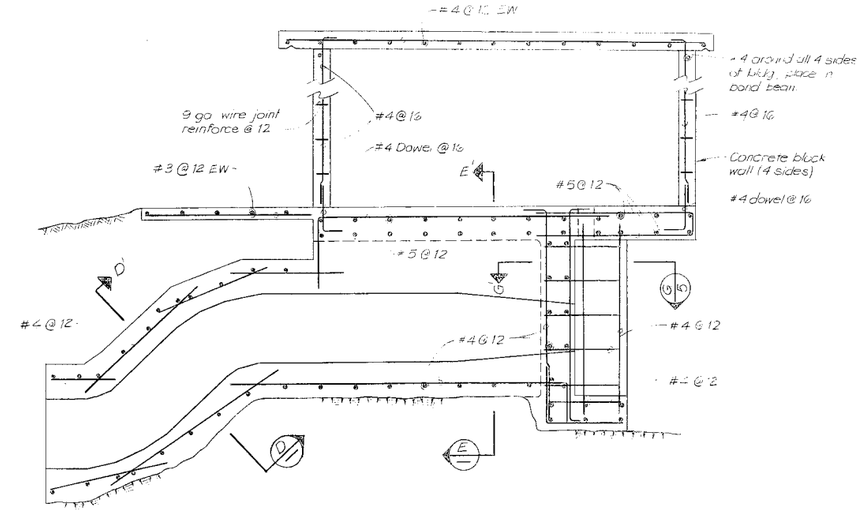
DETAIL 1
SCALE 1-1/2" = 1'



Approved compacted sand bedding and backfill

SECTION F
SCALE 1/2" = 1'

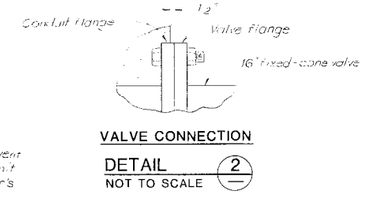
PLAN
SCALE 1/2" = 1'



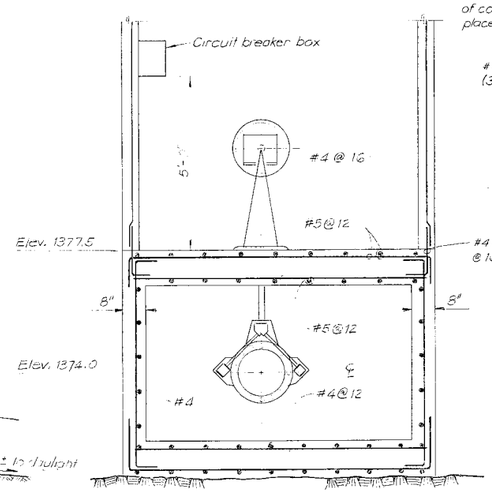
CONCRETE REINFORCEMENT DETAILS

SECTION A
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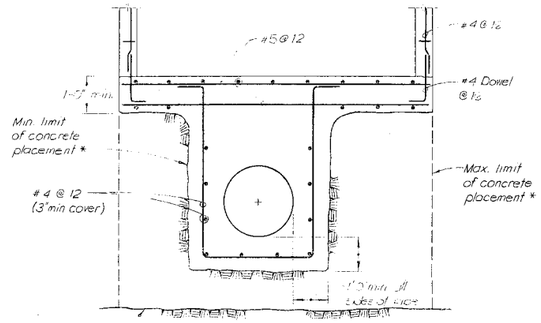
SECTION A
SCALE 1/2" = 1'



VALVE CONNECTION
DETAIL 2
NOT TO SCALE



SECTION B
SCALE 1/2" = 1'



SECTION E
SCALE 1/2" = 1'

* Note: Limit of concrete placement will be determined in field based on requirement that all concrete below the plan limits of the control house building (except for overhang) shall abut or be founded on moderately weathered to unweathered bedrock as per Specs.

NOTES:

1. Total in-place volume of concrete to be placed at the control house (all concrete below Elev. 1377.5, roof slab and entryway slab) is estimated to be 20 cy.
2. Outside dimensions of the control house as shown are approximate since they are based on nominal dimensions of concrete masonry units which differ from actual dimensions of the units.

REGISTERED PROFESSIONAL ENGINEER
KENNETH B. KING
No. 13,387
EXP. 3/31/89
CIVIL
STATE OF CALIFORNIA

AS BUILT DRAWING

REV.	DATE	BY	DESCRIPTION
1	10/16/87	LG	AS BUILT

SCALE: AS SHOWN

DESIGNED C. T. DARE
DRAWN C. RICASATA
CHECKED K. B. KING

APPROVED Thomas R. McAlister 26 JAN 87
DIRECTOR OF OPERATIONS & MAINTENANCE DATE

Converse Consultants Northern California

SUBMITTED Kenneth B. King Jan 16, 1987
DATE

Rancho Water

Rancho California Water District
28061 Diaz Road • P.O. Box 174 • Temecula, CA 92390 • 714 676-4101

APPROVED DIRECTOR OF ENGINEERING	1-23-87	DATE
APPROVED CONTRACTS MANAGER	1-17-87	DATE
APPROVED DESIGN ENGINEERING MANAGER	1-17-87	DATE

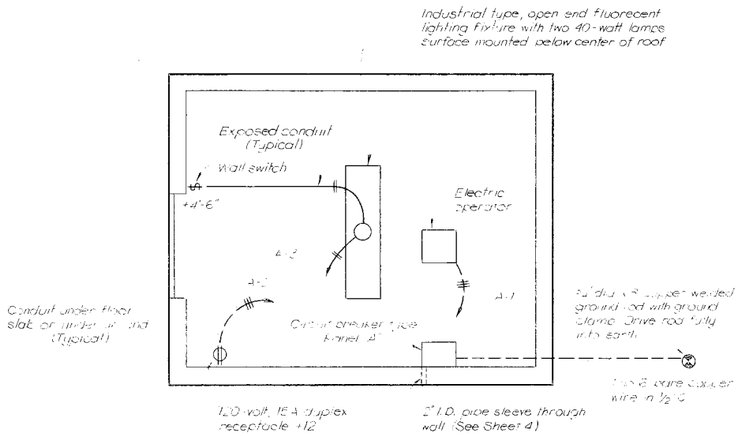
VAIL DAM
OUTLET WORKS MODIFICATIONS

CONTROL HOUSE
PLAN, SECTIONS AND DETAILS (SHEET 1)

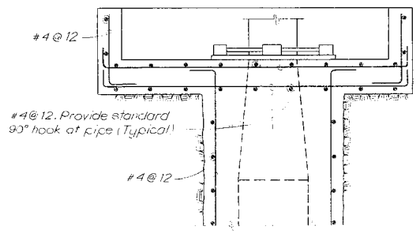
SHEET 4 OF 6 SHEETS

DWG. No. RC 308

BUREAU OF RECLAMATION SMALL PROJECTS LOAN JOB No. D0155

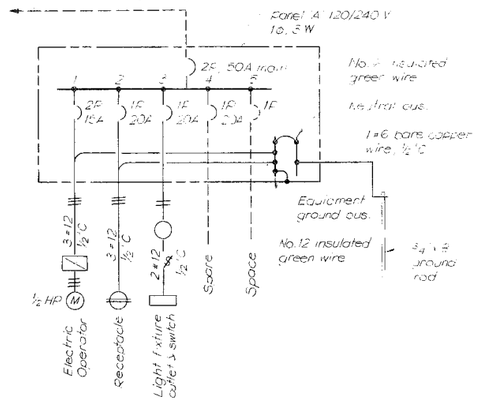


ELECTRICAL PLAN
SCALE 1/2" = 1'



SECTION G
SCALE 1/2" = 1'

Route 1" conduit to outside through 2" pipe sleeve on wall adjacent to panel. Install 3 #6 in 1" conduit. Run conduit underground and connect to utility company's 120/240 V, 1Φ transformer (to be installed by utility).



PANEL "A" – ONE LINE DIAGRAM
NOT TO SCALE

REGISTERED PROFESSIONAL ENGINEER
KENNETH B. KING
No 13,387
EXP. 3/31/89
CIVIL
STATE OF CALIFORNIA

AS BUILT DRAWING

REV.	DATE	BY	DESCRIPTION

SCALE: AS SHOWN

DESIGNED L. T. WAY
DRAWN L. Q. LE
CHECKED K. B. KING

APPROVED Thomas R. McAlister 26 JAN 87
DIRECTOR OF OPERATIONS & MAINTENANCE DATE

Converse Consultants Northern California

SUBMITTED Kenneth B. King Jan 16, 1987
DATE

Rancho Water

Rancho California Water District
28061 Diaz Road • P.O. Box 174 • Temecula, CA 92390 • 714 676-4101

APPROVED 1-23-87
DIRECTOR OF ENGINEERING DATE

APPROVED 1-17-87
CONTRACTS MANAGER DATE

APPROVED 1/23/87
DESIGN ENGINEERING MANAGER DATE

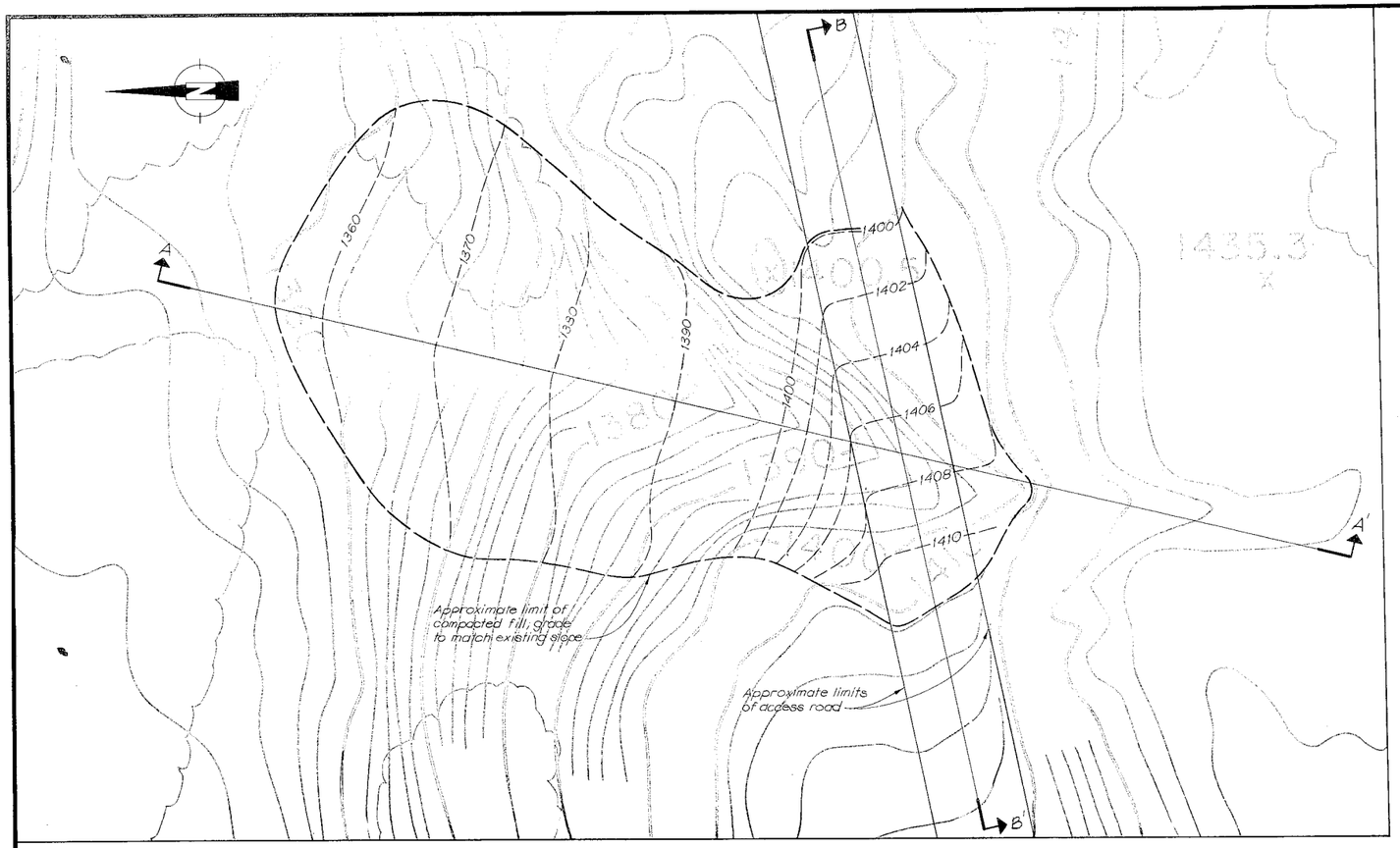
VAIL DAM
OUTLET WORKS MODIFICATIONS

CONTROL HOUSE
PLAN, SECTIONS AND DETAILS (SHEET 2)

SHEET 5 OF 6 SHEETS

DWG. No. RC 309

BUREAU OF RECLAMATION SMALL PROJECTS LOAN JOB No. D0155



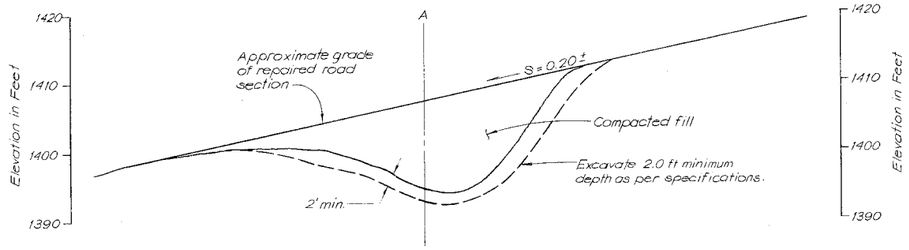
PLAN
SCALE 1" = 10'

LEGEND

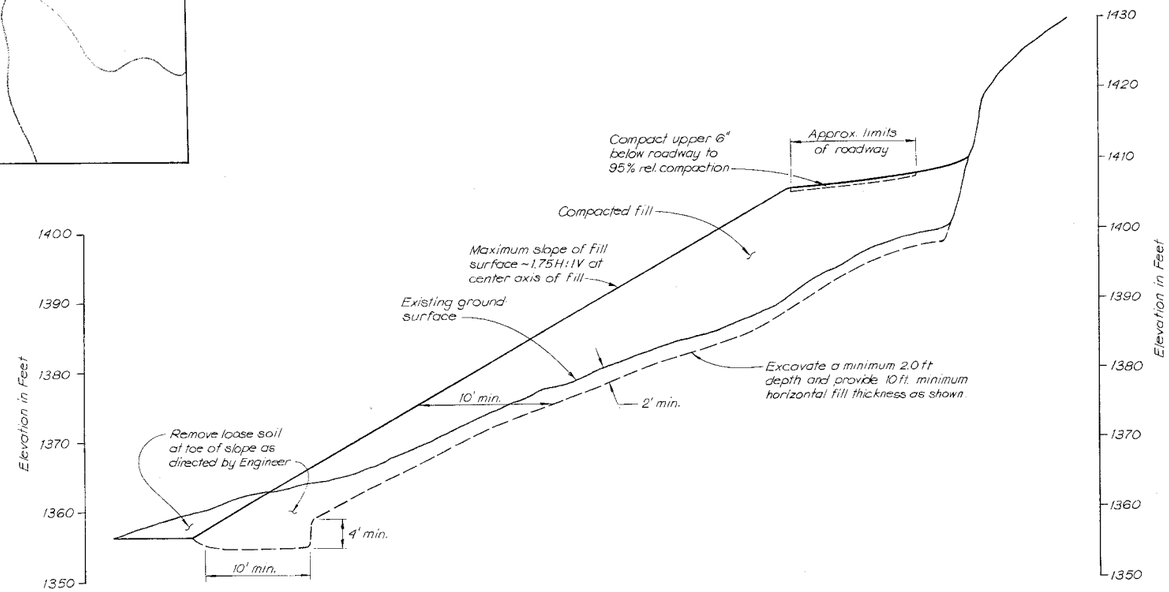
—— 1408 ——' Approximate surface contours of new fill

NOTES

1. The total in-place volume of compacted fill is estimated to be 1850 cy.
2. The toe of the fill should intersect natural ground (after removal of loose material at the bottom of the slope) between Elevation 1354 and 1358.
3. Material for compacted fill shall be obtained from the spillway channel downstream of the spillway weir crest.



SECTION (B)
SCALE 1" = 10'



SECTION (A)
SCALE 1" = 10'

REGISTERED PROFESSIONAL ENGINEER
KENNETH B. KING
No. 13,387
EXP. 3/31/89
CIVIL
STATE OF CALIFORNIA

AS BUILT DRAWING

REV	DATE	BY	DESCRIPTION

SCALE: AS SHOWN
DESIGNED: C. T. DARE
DRAWN: L. Q. LE
CHECKED: K. B. KING
APPROVED: Thomas R. McAlister 26 Jan 87
DIRECTOR OF OPERATIONS & MAINTENANCE — DATE

Converse Consultants Northern California
SUBMITTED: Kenneth B. King — Jan 16, 1987 — DATE

Rancho Water
Rancho California Water District
28061 Diaz Road • P.O. Box 174 • Temecula, CA 92390 • 714 676-4101

APPROVED: 1-23-87 — DIRECTOR OF ENGINEERING — DATE
APPROVED: 1.17.87 — CONTRACTS MANAGER — DATE
APPROVED: 1/27/87 — DESIGN ENGINEERING MANAGER — DATE

VAIL DAM
OUTLET WORKS MODIFICATIONS

ACCESS ROAD REPAIR
PLAN, PROFILE AND SECTION

SHEET 6 OF 6 SHEETS

RANCHO CALIFORNIA WATER DISTRICT
VAIL DAM REPAIR
(PROJECT NO. D1313)

LIST OF DRAWINGS

GENERAL

G-1 TITLE SHEET, LIST OF DRAWINGS, VICINITY MAP & LOCATION MAP

G-2 FACILITY LAYOUT

CIVIL

DC-1 DOWNSTREAM PIPING REPLACEMENT - CIVIL - DEMOLITION PLAN

C-1 DOWNSTREAM PIPING REPLACEMENT - CIVIL - PLAN & PROFILE

MECHANICAL

GM-1 UPSTREAM INTAKE WORKS REPLACEMENT - MECHANICAL - NOTES AND DETAILS

DM-1 UPSTREAM INTAKE WORKS REPLACEMENT - MECHANICAL - DEMOLITION

M-1 UPSTREAM INTAKE WORKS REPLACEMENT - MECHANICAL - INTAKE PROFILE

M-2 UPSTREAM INTAKE WORKS REPLACEMENT - MECHANICAL - INTAKE SECTION & DETAILS

M-3 UPSTREAM INTAKE WORKS REPLACEMENT - MECHANICAL - TRASH RACK FABRICATION TYPE TR1

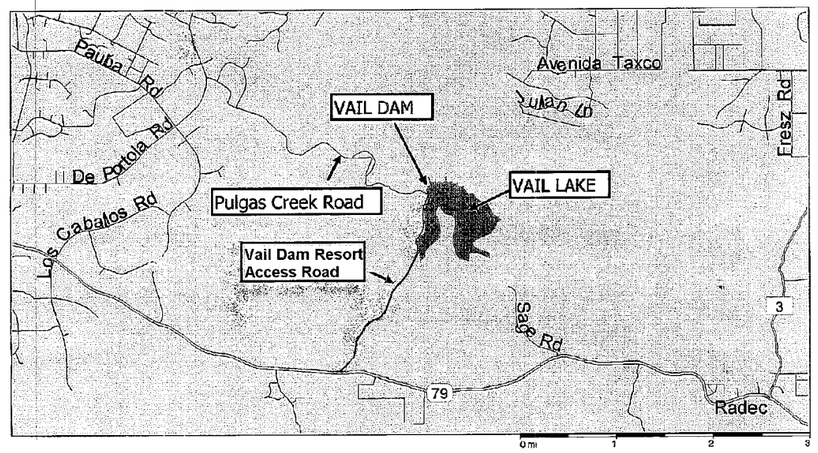
M-4 UPSTREAM INTAKE WORKS REPLACEMENT - MECHANICAL - TRASH RACK FABRICATION TYPE TR2

M-5 UPSTREAM INTAKE WORKS REPLACEMENT - MECHANICAL - TRASH RACK MOUNTING DETAILS, TYPE TR1

M-6 UPSTREAM INTAKE WORKS REPLACEMENT - MECHANICAL - TRASH RACK MOUNTING DETAILS, TYPE TR2

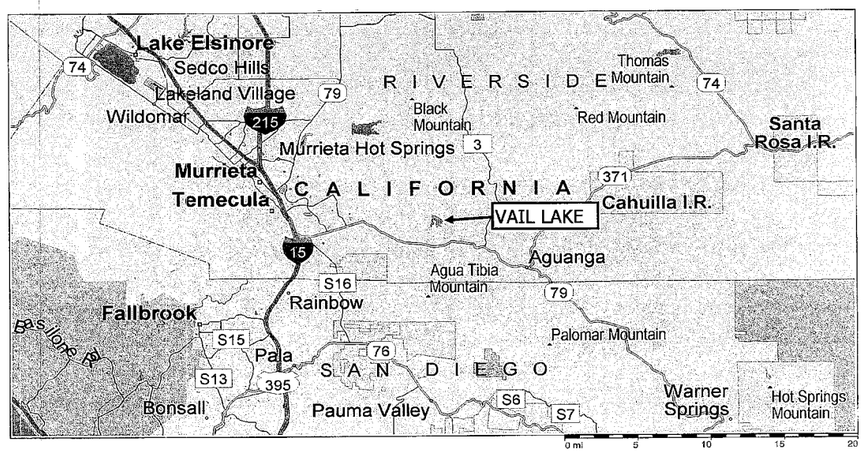
M-7 UPSTREAM INTAKE WORKS REPLACEMENT - MECHANICAL - SLUICE GATE DETAILS

M-8 UPSTREAM INTAKE WORKS REPLACEMENT - MECHANICAL - INTAKE 8



VICINITY MAP

NOTE:
ACCESS TO VAIL DAM, THROUGH LOCKED DISTRICT GATES, WILL REQUIRE ADVANCE NOTIFICATION AND APPROVAL BY THE DISTRICT.



LOCATION MAP

MWH
DENVER
COLORADO

REVISIONS			
NUMBER	DATE	INITIALS	DESCRIPTION
0	SEP 07	MFR	ISSUED FOR BIDDING

SCALE: NTS
DESIGNED BY: J. COOK
DRAWN BY: J. COOK
CHECKED BY: D. FURRY
FILE NAME: VDR_G_1

SEAL: REGISTERED PROFESSIONAL ENGINEER, MICHAEL F. ROGERS, NO. C060262, EXP. 12/31/08, CIVIL, STATE OF CALIFORNIA

Rancho Water
Rancho California Water District
42135 Winchester Road
Temecula, CA 92590
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RANCHO CALIFORNIA WATER DISTRICT
APPROVED FOR CONSTRUCTION
GENERAL MANAGER — DATE 9/28/07

ENGINEERING/DATE	CONTRACTS/DATE	OPERATIONS/DATE	MAINTENANCE/DATE
CFW 9/16/07	Kml/ge 9/19/07	CE 9.21.07	TW 9.21.07

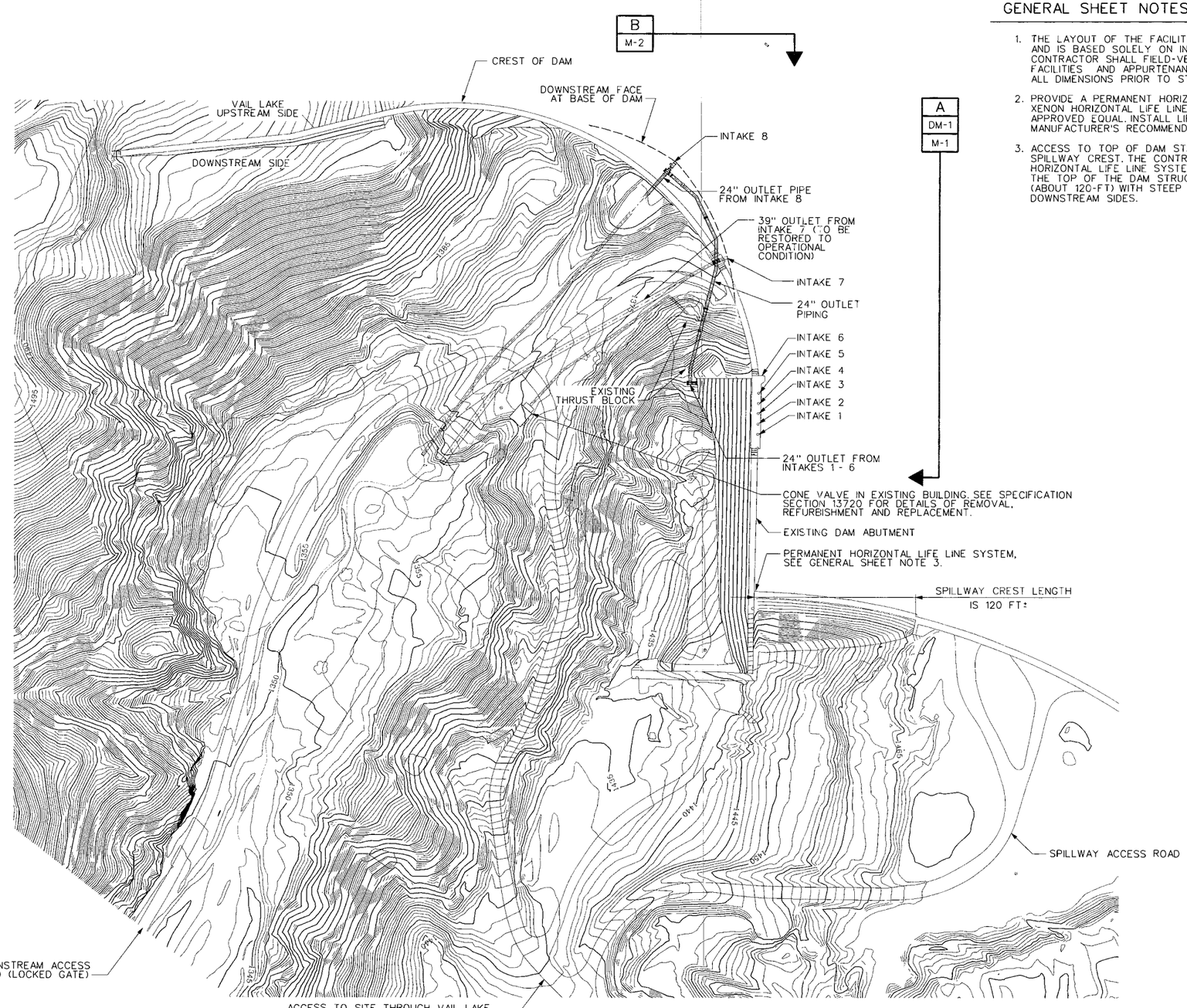
VAIL DAM REPAIR (PROJECT NO. D1313)

TITLE SHEET, LIST OF DRAWINGS, VICINITY MAP & LOCATION MAP

SHEET G-1

As-Built Drawing No.

File: VDR_G_1.dgn Model: MWHSymb DesignScript: MWH_Metr_Pentable_V85.tbl PlotScale: 1:0.00 '' / IN.



GENERAL SHEET NOTES

1. THE LAYOUT OF THE FACILITIES ON THIS DRAWING IS APPROXIMATE AND IS BASED SOLELY ON INFORMATION FROM RECORD DRAWINGS. CONTRACTOR SHALL FIELD-VERIFY EXACT LOCATION OF SHOWN FACILITIES AND APPURTENANCES. CONTRACTOR SHALL ALSO VERIFY ALL DIMENSIONS PRIOR TO STARTING ANY WORK.
2. PROVIDE A PERMANENT HORIZONTAL LIFE LINE SYSTEM - SOLL - XENON HORIZONTAL LIFE LINE ALONG THE SPILLWAY CREST OR APPROVED EQUAL. INSTALL LIFE LINE ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.
3. ACCESS TO TOP OF DAM STRUCTURE IS ACROSS THE TOP OF THE SPILLWAY CREST. THE CONTRACTOR SHALL INSTALL AND USE THE HORIZONTAL LIFE LINE SYSTEM (SECTION 05500) FOR ACCESS TO THE TOP OF THE DAM STRUCTURE. INSTALL LIFELINE ONLY IN AREA (ABOUT 120-FT) WITH STEEP DROP OFF ON UPSTREAM AND DOWNSTREAM SIDES.

MWH
DENVER COLORADO

REVISIONS			
NUMBER	DATE	INITIALS	DESCRIPTION
0	SEP 07	MFR	ISSUED FOR BIDDING

SCALE: 1" = 40'-0"
DESIGNED BY: A. AJAYI
DRAWN BY: A. AJAYI
CHECKED BY: D. FURRY
FILE NAME: VDR_G_2

SEAL: REGISTERED PROFESSIONAL ENGINEER, MICHAEL F. ROBERTS, NO. C056052, EXP. 12/31/08, STATE OF CALIFORNIA

Rancho Water
Rancho California Water District
42135 Winchester Road
Temecula, CA 92590
Phone: (951) 296-6900 Fax: (951) 296-6869

RANCHO CALIFORNIA WATER DISTRICT
APPROVED FOR CONSTRUCTION

ENGINEERING MANAGER	DATE
	9/17/07

ENGINEERING/DATE	CONTRACTS/DATE	OPERATIONS/DATE	MAINTENANCE/DATE
CFW 9/16/07	9/19/07	CE 9.21.07	TW 9.21.07

VAIL DAM REPAIR (PROJECT NO. D1313)

FACILITY LAYOUT

SHEET G-2

As-Built Drawing No.

File: VDR_G_2.dgn Model: Default DesignScript: MWH_Mstn_Printable_V85.tbl PlotScale 40.0 :1" / IN.

DOWNSTREAM FACE AT BASE OF DAM

DEMO LIMITS

24" OUTLET PIPE TO BE DEMOLISHED

PIPE SUPPORTS TO REMAIN (TYP)

DEMO LIMITS

EXISTING VERTICAL STILL WELL TO BE DEMOLISHED (~120' TALL) (18" DIA). CUT ALL SUPPORTS FLUSH W/ DAM CONCRETE.

CUT EXISTING PIPE TO ADD COUPLING AS SHOWN ON DRAWING C-1

ABOVE GRADE METER VAULT (TO REMAIN IN PLACE)

REMOVE AND REPLACE THE EXISTING CONCRETE THRUST BLOCK

CREST OF DAM (CONCRETE)

1355 1360 1365 1370

ABOVE GRADE

BELOW GRADE

EXISTING SUPPORT TO REMAIN (TYP 3 LOCATIONS)

EXISTING VALVE (TO REMAIN IN PLACE)

EXISTING THRUST BLOCK TO REMAIN

24" OUTLET PIPE

24" OUTLET PIPE TO BE DEMOLISHED

EXISTING 24" STEEL OUTLET PIPE (TO REMAIN IN PLACE)

1375

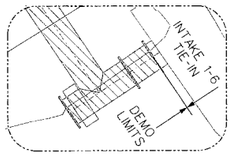
EXISTING 39" BURIED OUTLET PIPE (TO REMAIN IN PLACE)

REMOVE AND REPLACE UPPER SECTION OF EXISTING CONCRETE THRUST BLOCK

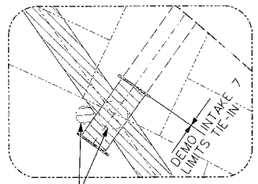
24" BURIED OUTLET PIPE (TO REMAIN IN PLACE)

1370 1375 1380 1385

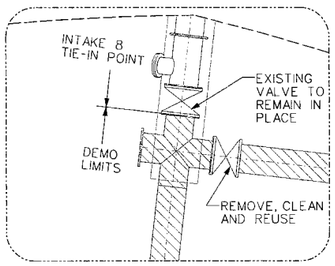
1380 1385 1390 1395 1400 1405 1410 1415 1420 1425 1430 1435



DETAIL 1 / NTS -



DETAIL 2 / NTS -



DETAIL 3 / NTS -

NOTE:
1. DEMO VERTICAL 18" DIA. STILLING WELL PIPE. DEMO VERTICAL 24" DIA. OUTLET PIPE UP TO HORIZONTAL OUTLET FROM DAM.

5 0 5 10 20
SCALE

As-Built Drawing No.

MWH
DENVER COLORADO

REVISIONS			
NUMBER	DATE	INITIALS	DESCRIPTION
0	SEP 07	MFR	ISSUED FOR BIDDING

SCALE: 1" = 10'-0"
DESIGNED BY: L. FOX
DRAWN BY: L. FOX
CHECKED BY: D. FURRY
FILE NAME: VDR-C-1

SEAL: REGISTERED PROFESSIONAL ENGINEER MICHAEL F. RIDDEN NO. C060352 EXP. 12/31/09 STATE OF CALIFORNIA

Rancho Water
Rancho California Water District
42135 Winchester Road
Temecula, CA 92590
Phone: (951) 296-6900 Fax: (951) 296-6869

RANCHO CALIFORNIA WATER DISTRICT
APPROVED FOR CONSTRUCTION

ENGINEERING MANAGER — DATE 9/10/07

ENGINEERING/DATE	CONTRACTS/DATE	OPERATIONS/DATE	MAINTENANCE/DATE
CFW 9/16/07	9/19/07	CE 9.21.07	TW 9.21.07

VAIL DAM REPAIR (PROJECT NO. D1313)

DOWNSTREAM PIPING REPLACEMENT
CIVIL
DEMOLITION PLAN

SHEET
DC-1

File: VDR_DC_01.dgn Model: Default DesignScript: MWH_Mstn_Pentable_V85.tb' PlotScale=10.0 '1" / IN.

GENERAL SHEET NOTES

1. THE LAYOUT OF THE FACILITIES ON THIS DRAWING IS APPROXIMATE AND ARE BASED SOLELY ON INFORMATION FROM RECORD DRAWINGS. CONTRACTOR SHALL FIELD VERIFY EXACT LOCATION OF SHOWN FACILITIES AND APPURTENANCES. CONTRACTOR SHALL ALSO VERIFY ALL DIMENSIONS PRIOR TO STARTING ANY WORK.
2. CONTRACTOR SHALL DEMOLISH EXISTING ANCHOR BOLTS BY CUTTING THEM FLUSH WITH CONCRETE SURFACE OF DAM.
3. EXISTING INTAKE 8 IS BURIED IN SEDIMENT. CONTRACTOR TO FIELD-VERIFY LOCATION AND CONDITION.

SHEET KEYNOTES

(A) DEMOLISH EXISTING PEDESTAL LIFT GATE.

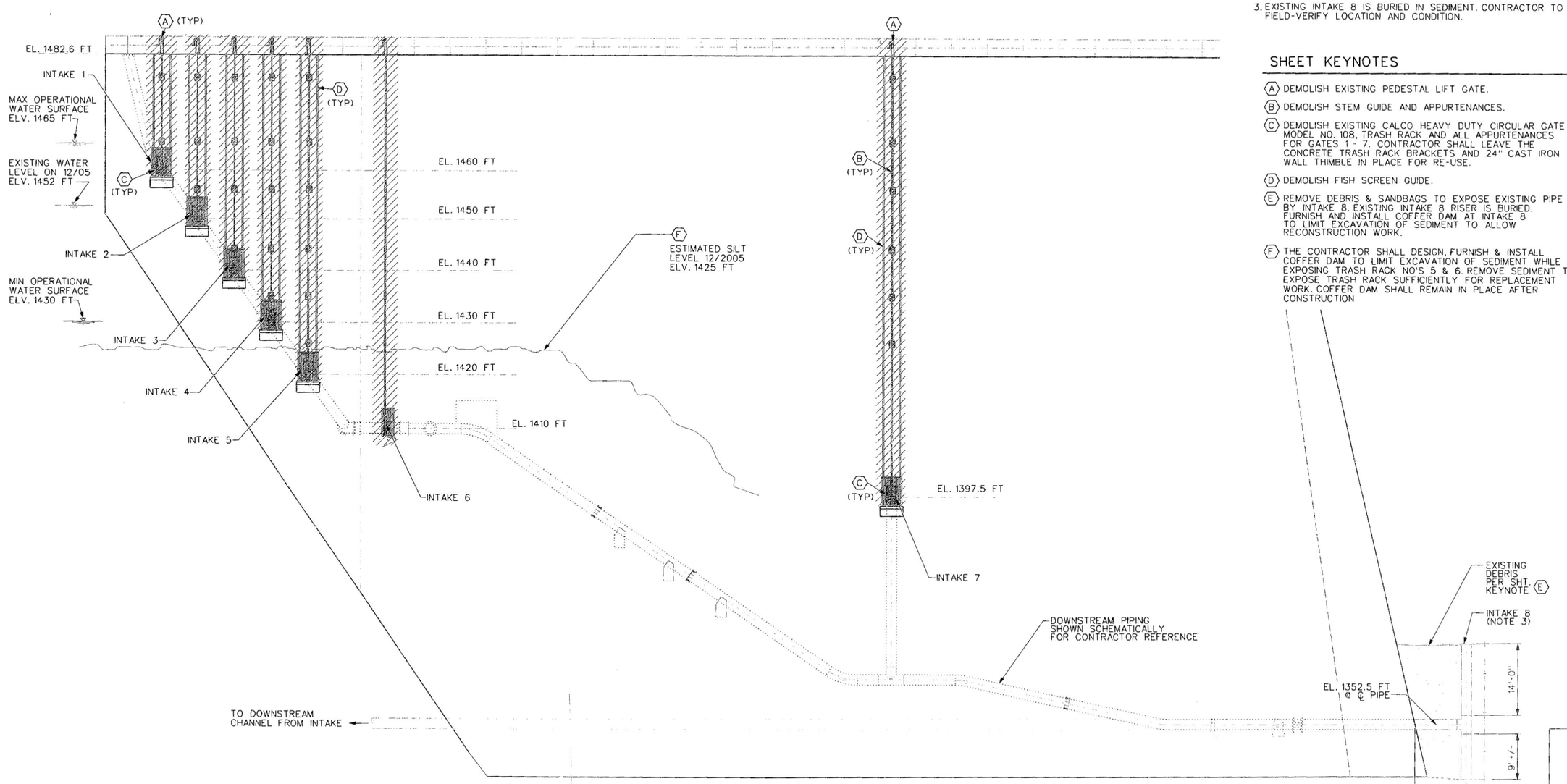
(B) DEMOLISH STEM GUIDE AND APPURTENANCES.

(C) DEMOLISH EXISTING CALCO HEAVY DUTY CIRCULAR GATE MODEL NO. 108, TRASH RACK AND ALL APPURTENANCES FOR GATES 1 - 7. CONTRACTOR SHALL LEAVE THE CONCRETE TRASH RACK BRACKETS AND 24" CAST IRON WALL THIMBLE IN PLACE FOR RE-USE.

(D) DEMOLISH FISH SCREEN GUIDE.

(E) REMOVE DEBRIS & SANDBAGS TO EXPOSE EXISTING PIPE BY INTAKE 8. EXISTING INTAKE 8 RISER IS BURIED. FURNISH AND INSTALL COFFER DAM AT INTAKE 8 TO LIMIT EXCAVATION OF SEDIMENT TO ALLOW RECONSTRUCTION WORK.

(F) THE CONTRACTOR SHALL DESIGN, FURNISH & INSTALL COFFER DAM TO LIMIT EXCAVATION OF SEDIMENT WHILE EXPOSING TRASH RACK NO'S 5 & 6. REMOVE SEDIMENT TO EXPOSE TRASH RACK SUFFICIENTLY FOR REPLACEMENT WORK. COFFER DAM SHALL REMAIN IN PLACE AFTER CONSTRUCTION



SECTION A
UPSTREAM FACE G-2

As-Built Drawing No.

MWH
DENVER COLORADO

REVISIONS			
NUMBER	DATE	INITIALS	DESCRIPTION
0	SEP 07	MFR	ISSUED FOR BIDDING

SCALE: 1" = 10'-0"
DESIGNED BY: A. AJAYI
DRAWN BY: A. AJAYI
CHECKED BY: D. FURRY
FILE NAME: VDR_DM_1

SEAL: REGISTERED PROFESSIONAL ENGINEER MICHAEL F. ROSETTO NO. C058962 EXP. 12/31/08 STATE OF CALIFORNIA

Rancho Water
Rancho California Water District
42135 Winchester Road
Temecula, CA 92590
Phone: (951) 296-6900 Fax: (951) 296-6869

RANCHO CALIFORNIA WATER DISTRICT
APPROVED FOR CONSTRUCTION

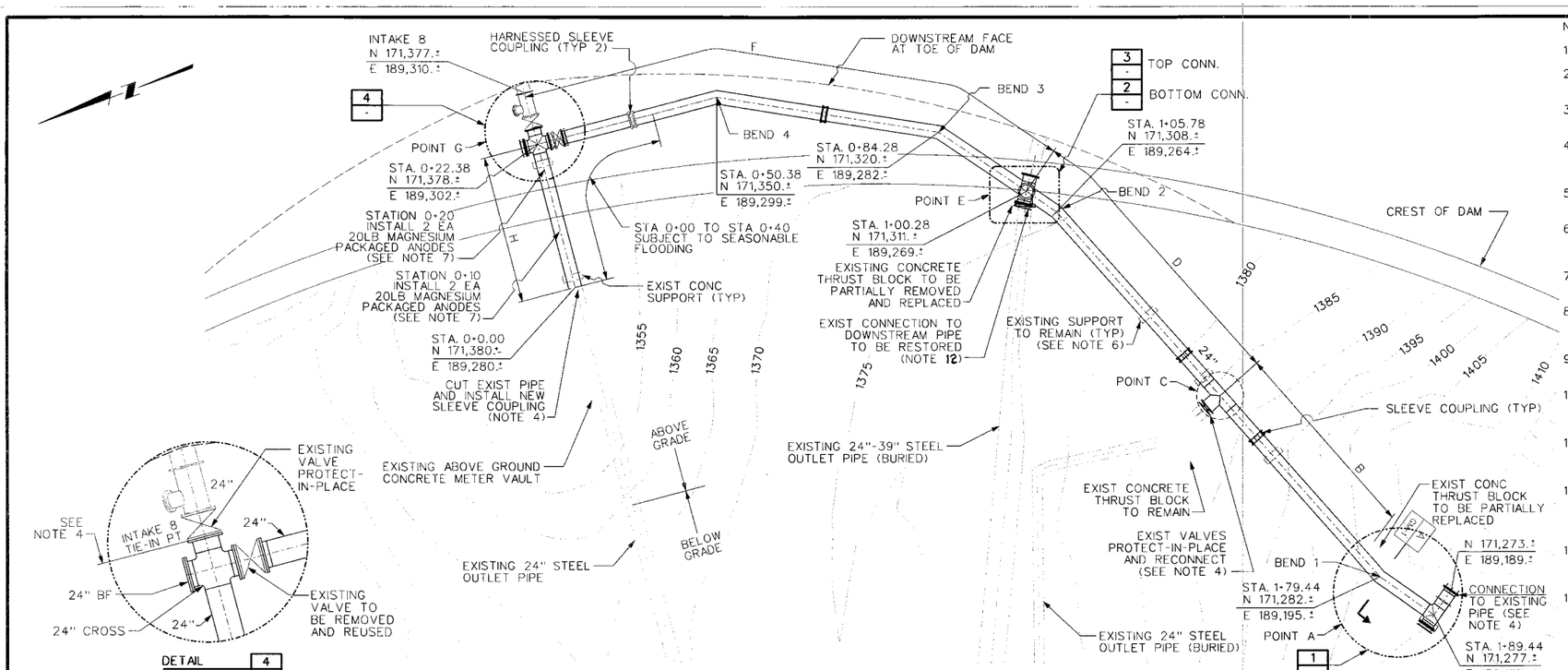
ENGINEERING MANAGER	DATE				
	9/19/07				
CFW 9/16/07	ENGINEERING/DATE	CONTRACTS/DATE	CE 9.21.07	OPERATIONS/DATE	TW 9.21.07 MAINTENANCE/DATE

VAIL DAM REPAIR (PROJECT NO. D1313)

UPSTREAM INTAKE WORKS REPLACEMENT
MECHANICAL
DEMOLITION

SHEET
DM-1

File: VDR_DM_1.dgn Model: Default DesignScript: MWH_Mstn_Pentable_V85.tbl PlotScale: 10:0 1" / IN.



NOTES:

1. ALL REPLACEMENT PIPING SHALL BE WELDED STEEL, MORTAR LINED.
2. EXPOSED PIPING SHALL BE EPOXY-COATED, AS SPECIFIED IN SECTION 09800 OF THE SPECIFICATIONS.
3. UNDERGROUND PIPING SHALL BE MORTAR-COATED, AS SPECIFIED IN SECTION 09800 OF THE SPECIFICATIONS.
4. ATTACH TO EXISTING PIPE USING FLANGED x FLANGED CONNECTION WITH AN INSULATING FLANGE WHERE PIPE CONNECTS TO NEW PIPING (SEE SECTION 05500).
5. ALL COORDINATES ARE APPROXIMATE AND ARE TO BE FIELD VERIFIED BY CONTRACTOR PRIOR TO CONSTRUCTION.
6. NEW ABOVE GROUND PIPE SHALL BE INSTALLED ON EXISTING SUPPORTS. NEW BURIED PIPE SHALL BE INSTALLED PER STANDARD WATER DISTRICT DETAILS AND SPECIFICATIONS.
7. INSTALL ANODES PER SPECIFICATION, SPECIAL PROVISIONS SECTION 4, PARAGRAPH T.
8. POINT A (DAM OUTLET PIPE):
   REPLACE ALL EXISTING PIPING FROM THRUST BLOCK WITH SAME SIZE COMPONENTS. (SEE DETAIL 1).
9. LENGTH B:
   REPLACE ALL EXISTING PIPING WITH SAME SIZE, COMPONENTS AND CONFIGURATION.
10. POINT C (T-CONNECTION):
    REPLACE EXISTING TEE WITH SAME SIZE TEE. CONNECT TO EXISTING 24" VALVE AND AIR VALVE WITH INSULATING FLANGE PER SECTION 05500.
11. LENGTHS D AND F:
    REPLACE ALL EXISTING PIPING WITH SAME SIZE COMPONENTS AND CONFIGURATION.
12. POINT E (INTAKE 7):
    REPLACE ALL EXISTING STEEL PIPING COMPONENTS USING SAME CONFIGURATION. RECONSTRUCT RISER PIPE PER PROFILE AND DETAILS 2 & 3. RE-CONNECT TO EXISTING DOWNSTREAM-HEADING BURIED PIPE **WITH 24"x 30" FABRICATED TRANSITION.**
13. POINT G (INTAKE 8):
    REPLACE ALL EXISTING 24" STEEL PIPING WITH SAME SIZE, COMPONENTS AND CONFIGURATION, INCLUDING CROSS UP TO EXISTING 24" GATE VALVE.
14. LENGTH H:
    REPLACE ALL EXISTING 24" STEEL PIPING WITH SAME SIZE, COMPONENTS AND CONFIGURATION UP TO NEW 24" COUPLING.

MWH
DENVER
COLORADO

REVISIONS			
NUMBER	DATE	INITIALS	DESCRIPTION
0	SEP 07	MFR	ISSUED FOR BIDDING

SCALE: 1" = 10'-0"
DESIGNED BY: K COURSON
DRAWN BY: K COURSON
CHECKED BY: D. FURRY
FILE NAME: VDR_C_02

SEAL: REGISTERED PROFESSIONAL ENGINEER, MICHAEL F. HORSTMAN, NO. C059052, EXP. 12/31/08, CIVIL, STATE OF CALIFORNIA

Rancho Water
Rancho California Water District
42135 Winchester Road
Temecula, CA 92590
Phone: (951) 296-6900 Fax: (951) 296-6869

RANCHO CALIFORNIA WATER DISTRICT
APPROVED FOR CONSTRUCTION
ENGINEERING MANAGER — DATE 9/10/07

ENGINEERING/DATE	CONTRACTS/DATE	OPERATIONS/DATE	MAINTENANCE/DATE
CFW 9/16/07	9/19/07	CE 9.21.07	TW 9.21.07

VAIL DAM REPAIR (PROJECT NO. D1313)

DOWNSTREAM PIPING REPLACEMENT
CIVIL
PLAN & PROFILE

SHEET C-1

As-Built Drawing No.

File: VDR_C_01.dgn Model: Default DesignScript: MWH_MstrPentable_V8S.tb PlotScale: 10.00 '/ IN.

GENERAL SHEET NOTES

1. THE LAYOUT OF THE FACILITIES ON THIS DRAWING IS APPROXIMATE AND ARE BASED SOLELY ON INFORMATION FROM RECORD DRAWINGS. CONTRACTOR SHALL FIELD-VERIFY EXACT LOCATIONS OF SHOWN FACILITIES AND APPURTENANCES. CONTRACTOR SHALL ALSO VERIFY ALL DIMENSIONS PRIOR TO STARTING ANY WORK.

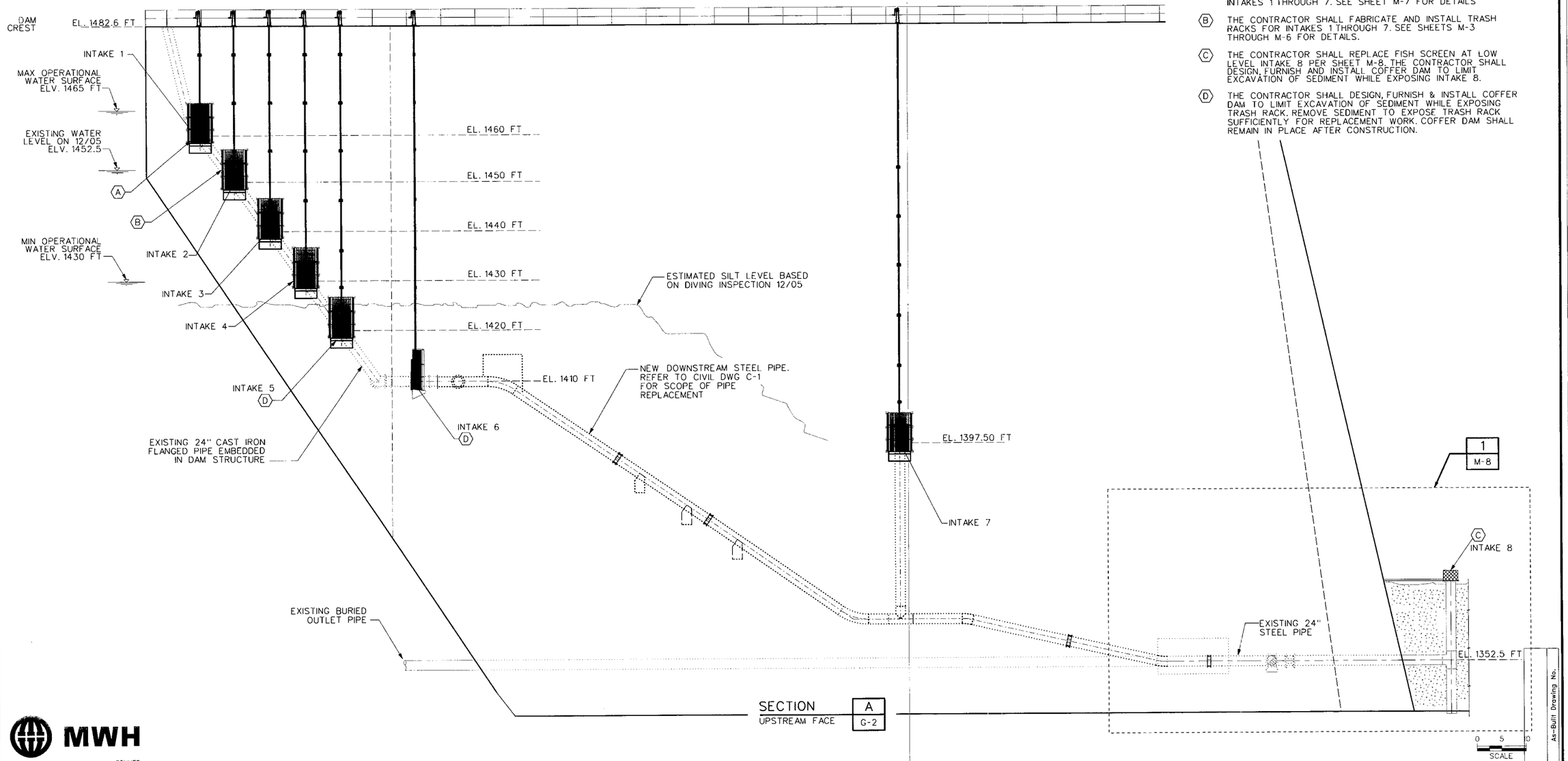
SHEET KEYNOTES

(A) THE CONTRACTOR SHALL PROVIDE GATES INCLUDING GATE OPERATORS, THE GATE STEM AND GATE GUIDES, THE GATE ASSEMBLY, SLIDE GATE FIXTURES AND APPURTERANCES FOR INTAKES 1 THROUGH 7. SEE SHEET M-7 FOR DETAILS

(B) THE CONTRACTOR SHALL FABRICATE AND INSTALL TRASH RACKS FOR INTAKES 1 THROUGH 7. SEE SHEETS M-3 THROUGH M-6 FOR DETAILS.

(C) THE CONTRACTOR SHALL REPLACE FISH SCREEN AT LOW LEVEL INTAKE 8 PER SHEET M-8. THE CONTRACTOR SHALL DESIGN, FURNISH AND INSTALL COFFER DAM TO LIMIT EXCAVATION OF SEDIMENT WHILE EXPOSING INTAKE 8.

(D) THE CONTRACTOR SHALL DESIGN, FURNISH & INSTALL COFFER DAM TO LIMIT EXCAVATION OF SEDIMENT WHILE EXPOSING TRASH RACK. REMOVE SEDIMENT TO EXPOSE TRASH RACK SUFFICIENTLY FOR REPLACEMENT WORK. COFFER DAM SHALL REMAIN IN PLACE AFTER CONSTRUCTION.



MWH
DENVER COLORADO

REVISIONS			
NUMBER	DATE	INITIALS	DESCRIPTION
0	SEP 07	MFR	ISSUED FOR BIDDING

SCALE: 1" = 10'-0"
DESIGNED BY: A AJAYI
DRAWN BY: A AJAYI
CHECKED BY: D FURRY
FILE NAME: VDR_M_1

SEAL: REGISTERED PROFESSIONAL ENGINEER MICHAEL F. ROGERS NO. C056062 EXP 12/31/08 STATE OF CALIFORNIA

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42135 Winchester Road
Temecula, CA 92590
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RANCHO CALIFORNIA WATER DISTRICT
APPROVED FOR CONSTRUCTION
ENGINEERING MANAGER — DATE 9/12/07

ENGINEERING/DATE	CONTRACTS/DATE	OPERATIONS/DATE	MAINTENANCE/DATE
CFW 9/16/07	9/19/07	CE 9-21-07	TW 9.21.07

VAIL DAM REPAIR (PROJECT NO. D1313)

UPSTREAM INTAKE WORKS REPLACEMENT
MECHANICAL
INTAKE PROFILE

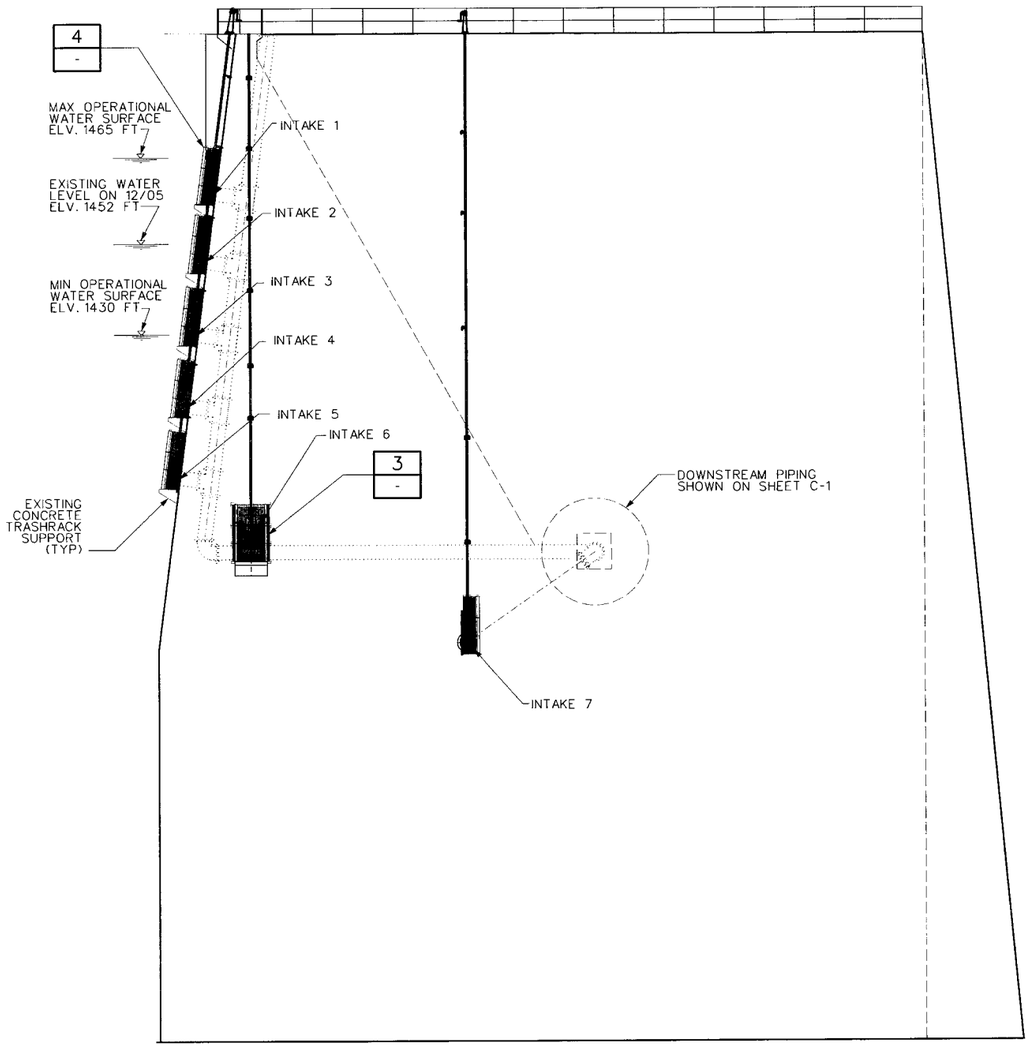
SHEET M-1

As-Built Drawing No.

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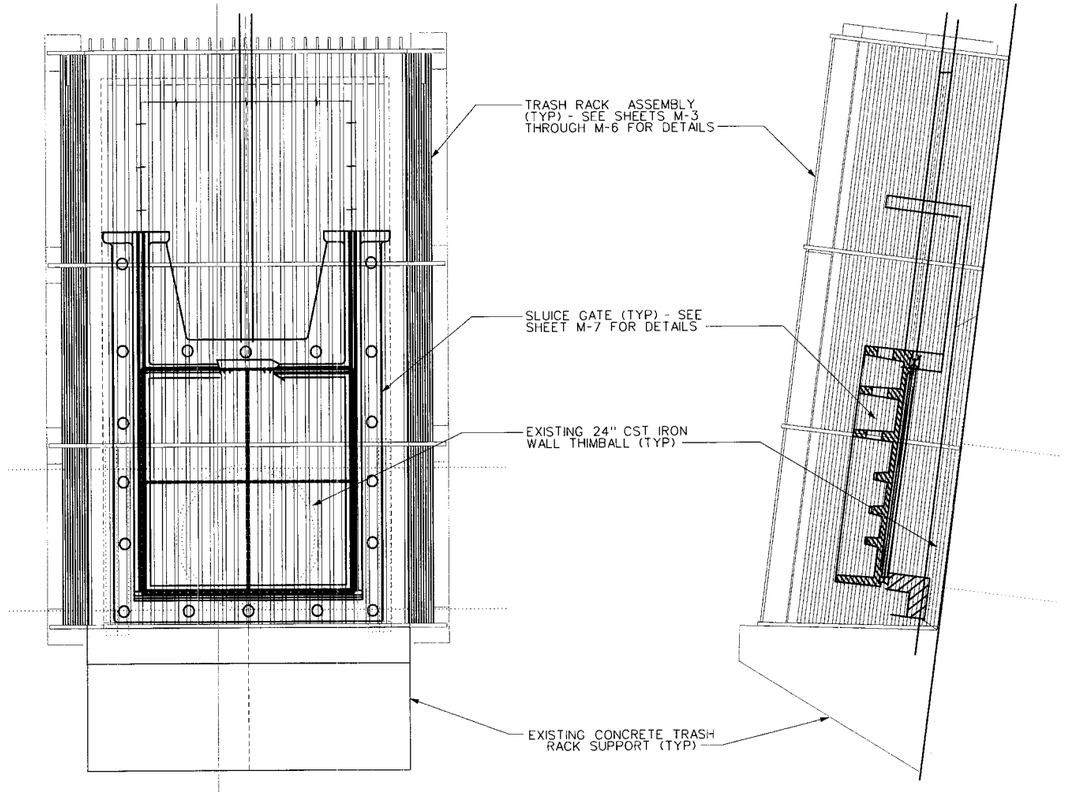
GENERAL SHEET NOTES

1. THE LAYOUT OF THE FACILITIES ON THIS DRAWING IS APPROXIMATE AND ARE BASED SOLELY ON INFORMATION FROM RECORD DRAWINGS. CONTRACTOR SHALL FIELD-VERIFY EXACT LOCATION OF SHOWN FACILITIES AND APPURTENANCES. CONTRACTOR SHALL ALSO VERIFY ALL DIMENSIONS PRIOR TO STARTING ANY WORK.



SECTION B / SCALE: 1"=10'0" G-2

0 5 10
SCALE



DETAIL 3 / SCALE: 1"=1'0" -

DETAIL 4 / SCALE: 1"=1'0" -

0 ½ 1
SCALE

As-Built Drawing No.

MWH
DENVER COLORADO

REVISIONS			
NUMBER	DATE	INITIALS	DESCRIPTION
0	SEP 07	MFR	ISSUED FOR BIDDING

SCALE: AS NOTED
DESIGNED BY: A AJAYI
DRAWN BY: A AJAYI
CHECKED BY: D FURRY
FILE NAME: VDR_M_2

SEAL
REGISTERED PROFESSIONAL ENGINEER MICHAEL F. RUGGERI NO. C056062 EXP. 12/31/08 STATE OF CALIFORNIA

Rancho Water
Rancho California Water District
42135 Winchester Road
Temecula, CA 92590
Phone: (951) 296-6900 Fax: (951) 296-6869

RANCHO CALIFORNIA WATER DISTRICT
APPROVED FOR CONSTRUCTION

ENGINEERING MANAGER — DATE 9/17/07

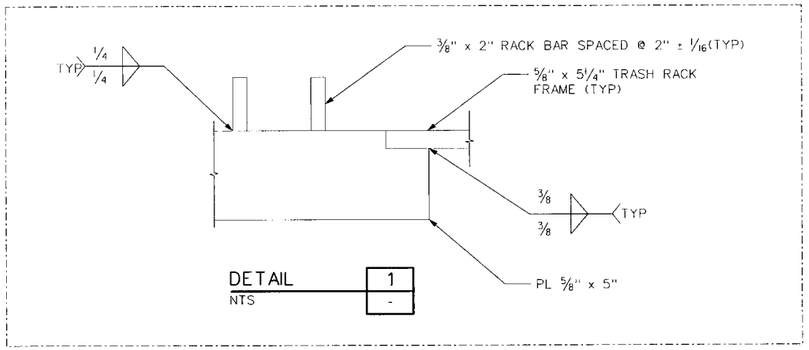
ENGINEERING/DATE	CONTRACTS/DATE	OPERATIONS/DATE	MAINTENANCE/DATE
CFW 9/16/07	9/19/07	CE 9-21-07	TW 9-21-07

VAIL DAM REPAIR (PROJECT NO. D1313)

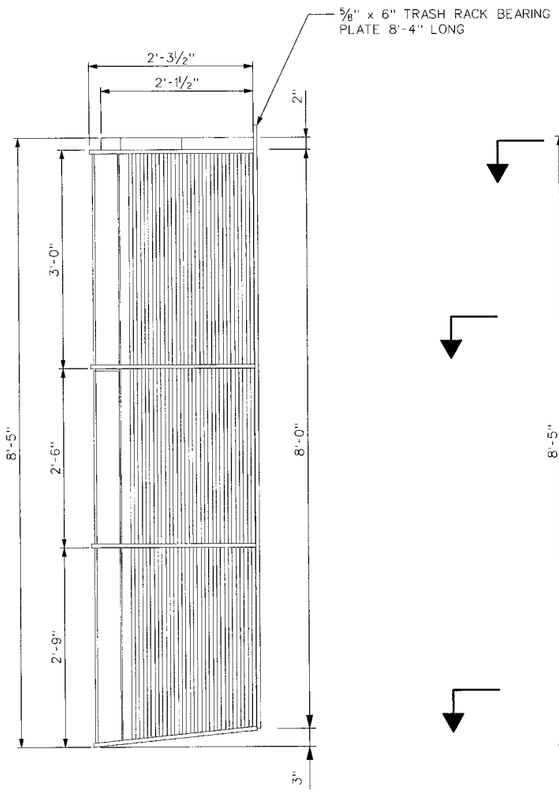
UPSTREAM INTAKE WORKS REPLACEMENT
MECHANICAL
INTAKE SECTION & DETAILS

SHEET
M-2

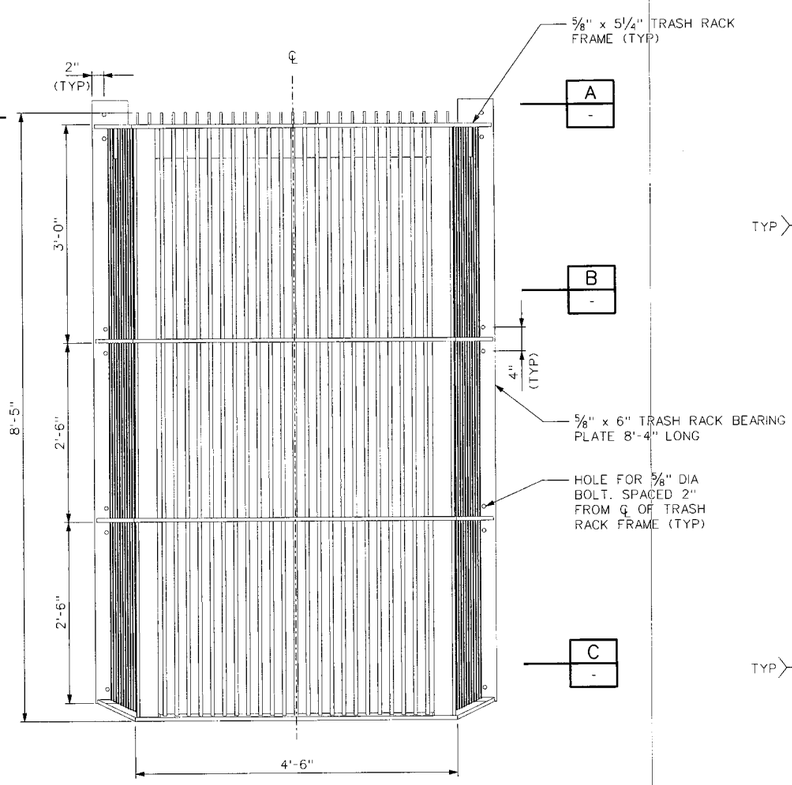
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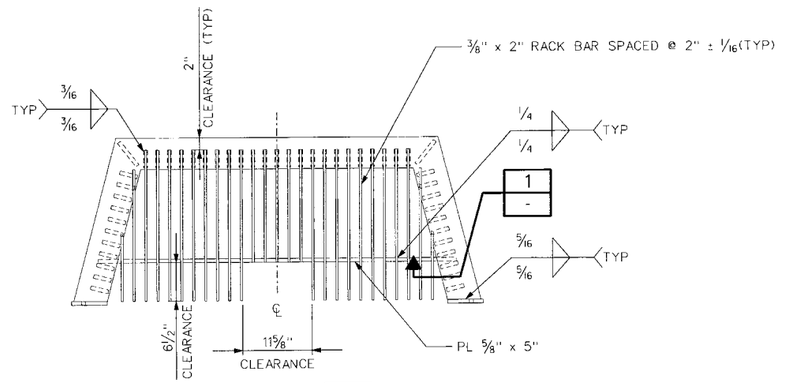
DETAIL 1 / NTS -



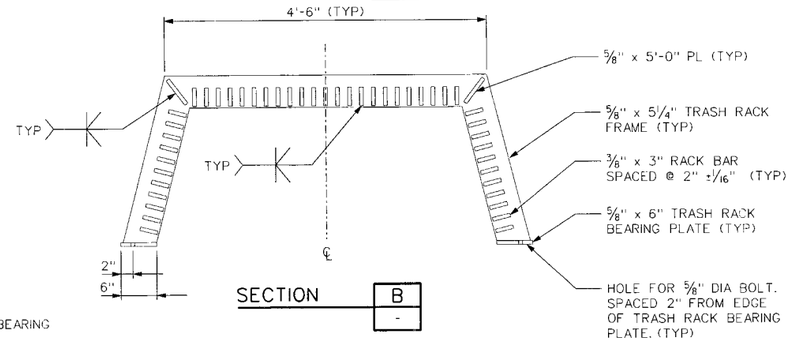
TRASH RACK SIDE VIEW



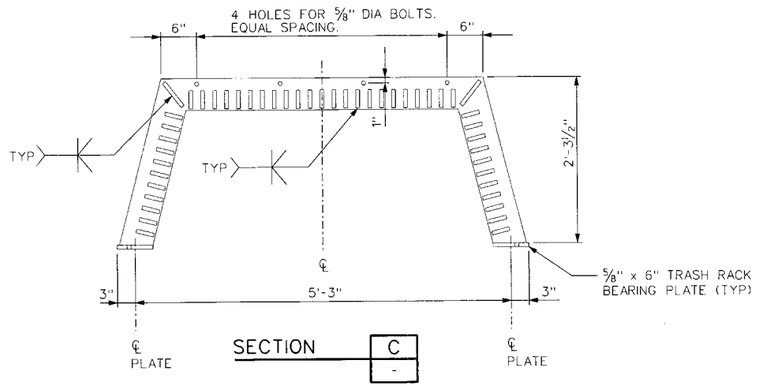
TRASH RACK FRONT VIEW



SECTION A -



SECTION B -



SECTION C -

0 ½ 1 SCALE

As-Built Drawing No.

TR-1 TRASH RACK FABRICATION DETAILS

MWH
DENVER COLORADO

REVISIONS			
NUMBER	DATE	INITIALS	DESCRIPTION
0	SEP 07	MFR	ISSUED FOR BIDDING

SCALE: 1" = 1'0"
DESIGNED BY: J COOK
DRAWN BY: J COOK
CHECKED BY: D FURRY
FILE NAME: VDR_M_3

SEAL: REGISTERED PROFESSIONAL ENGINEER MICHAEL F. ROGERS NO. C056962 EXP. 12/31/08 STATE OF CALIFORNIA

Rancho Water
Rancho California Water District
42135 Winchester Road
Temecula, CA 92590
Phone: (951) 296-6900 Fax: (951) 296-6869

RANCHO CALIFORNIA WATER DISTRICT
APPROVED FOR CONSTRUCTION

ENGINEERING MANAGER — DATE 9/17/07

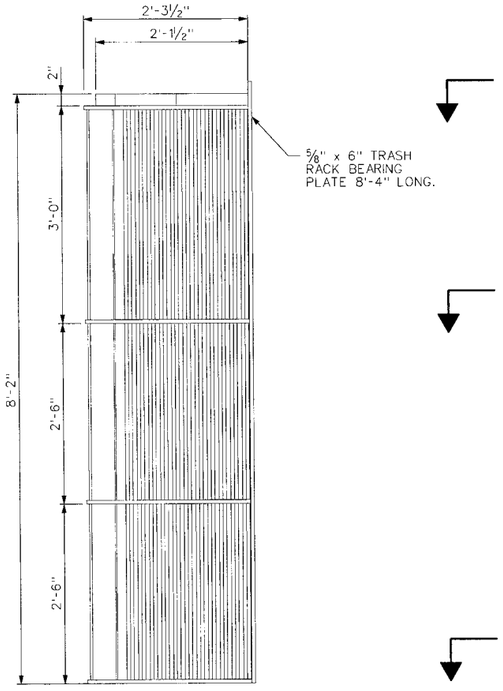
ENGINEERING/DATE	CONTRACTS/DATE	OPERATIONS/DATE	MAINTENANCE/DATE
CFW 9/16/07	Kim Coyne 9/19/07	CE 9.21.07	TW 9.21.07

VAIL DAM REPAIR (PROJECT NO. D1313)

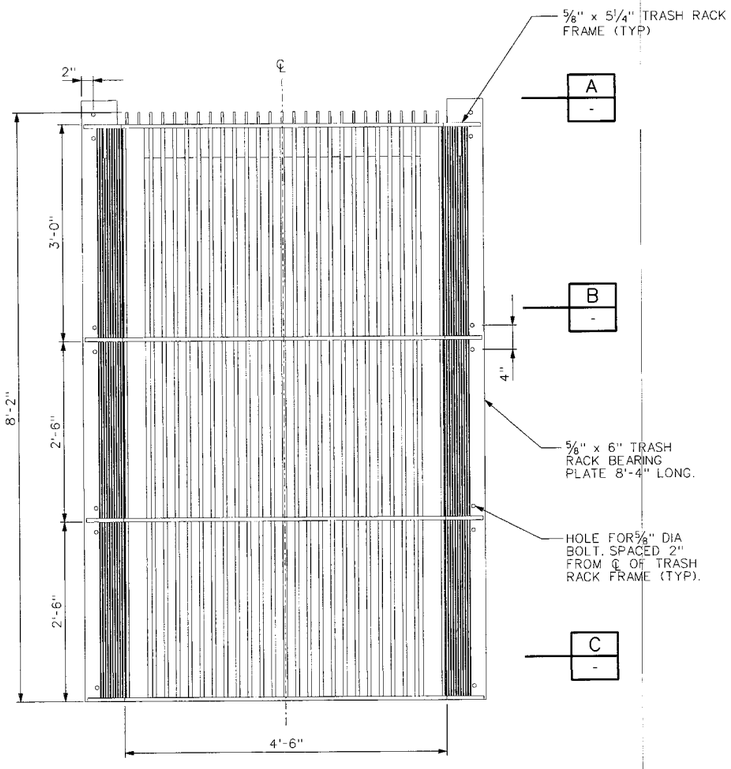
UPSTREAM INTAKE WORKS REPLACEMENT
MECHANICAL
TRASH RACK FABRICATION TYPE TR1

SHEET
M-3

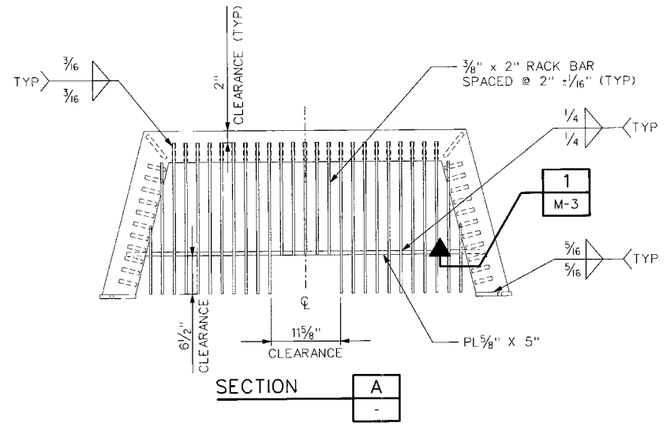
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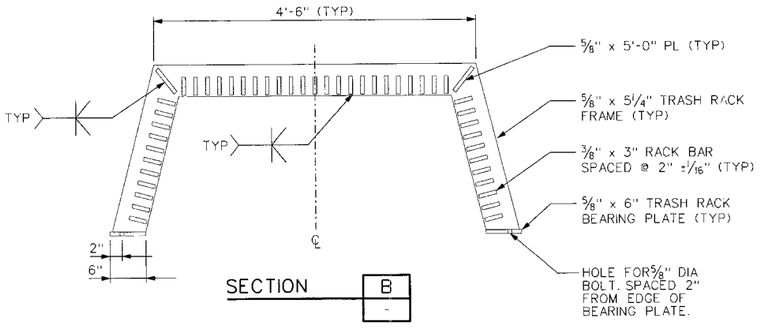
TRASH RACK SIDE VIEW



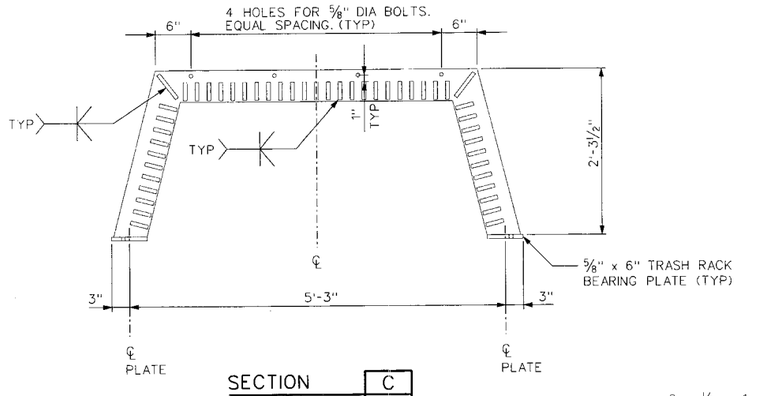
TRASH RACK FRONT VIEW



SECTION A -



SECTION B -



SECTION C -

0 ½ 1
SCALE

As-Built Drawing No.

TR-2 TRASH RACK FABRICATION DETAILS

MWH
DENVER COLORADO

REVISIONS			
NUMBER	DATE	INITIALS	DESCRIPTION
0	SEP 07	MFR	ISSUED FOR BIDDING

SCALE:	1" = 1'0"
DESIGNED BY:	J COOK
DRAWN BY:	J COOK
CHECKED BY:	D FURRY
FILE NAME:	VDR_M_4

SEAL: REGISTERED PROFESSIONAL ENGINEER — MICHAEL F. ROBERTS — NO. C052062 — EXP. 12/31/08 — STATE OF CALIFORNIA

Rancho Water
Rancho California Water District
42135 Winchester Road
Temecula, CA 92590
Phone: (951) 296-6900 Fax: (951) 296-6869

RANCHO CALIFORNIA WATER DISTRICT
APPROVED FOR CONSTRUCTION

ENGINEERING MANAGER — DATE 9/17/07

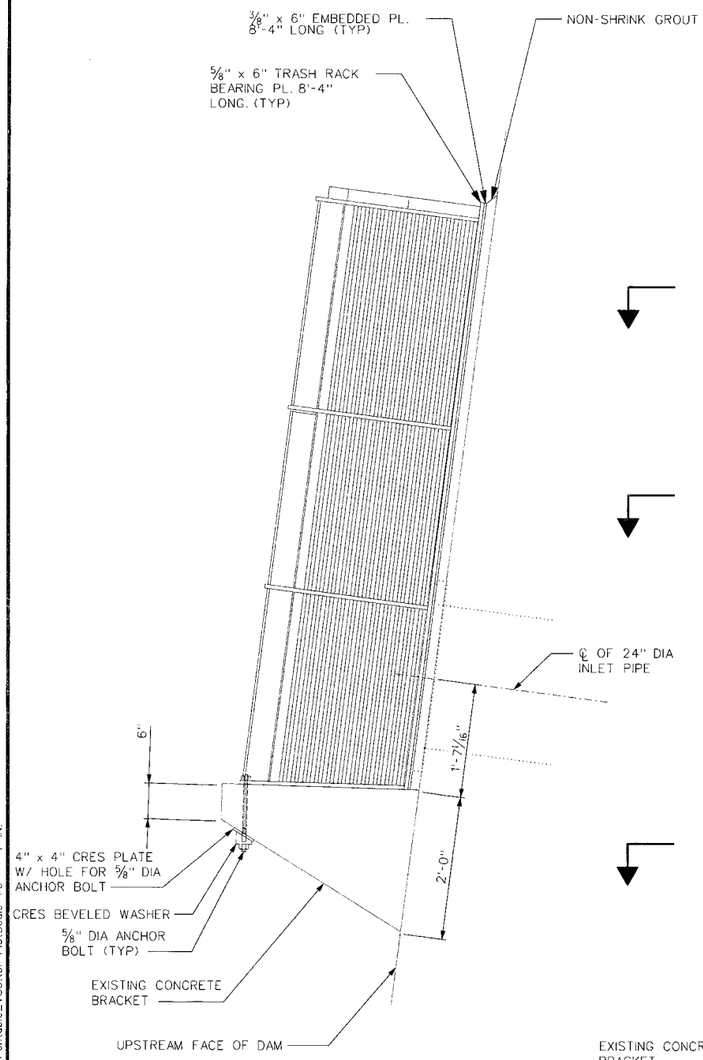
ENGINEERING/DATE	CONTRACTS/DATE	OPERATIONS/DATE	MAINTENANCE/DATE
CFW 9/16/07	9/19/07	CE 9-21-07	9.21.07

VAIL DAM REPAIR (PROJECT NO. D1313)

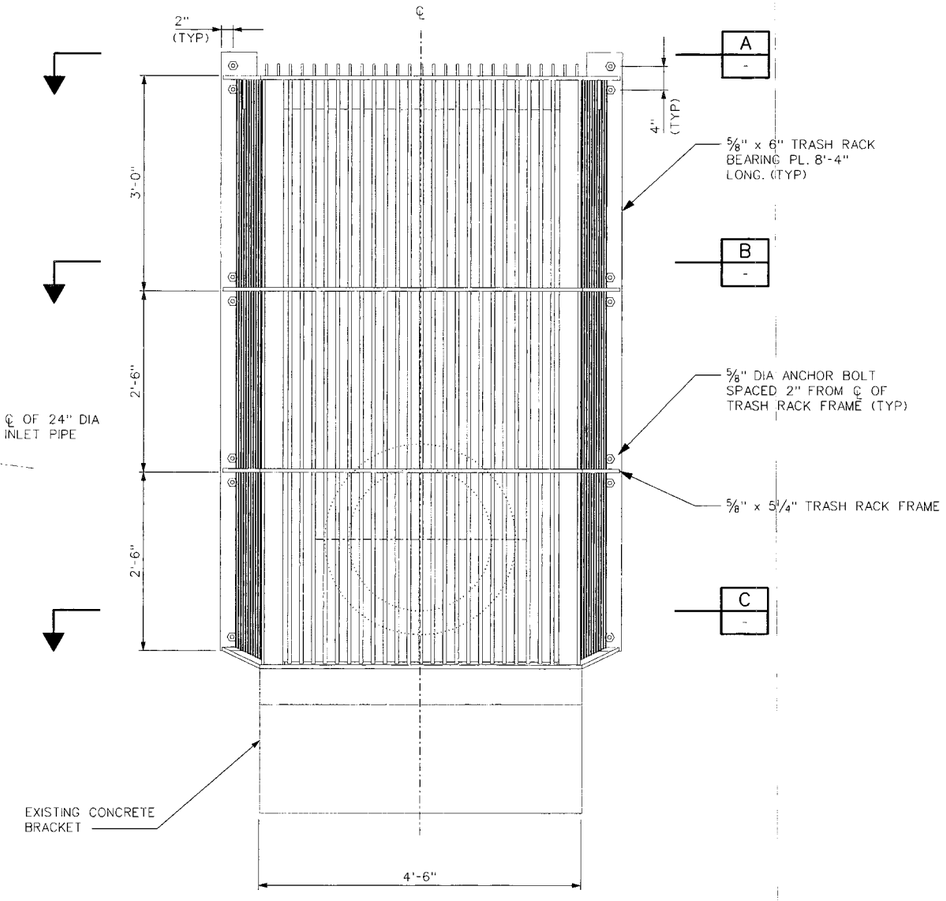
UPSTREAM INTAKE WORKS REPLACEMENT
MECHANICAL
TRASH RACK FACILITY TYPE TR2

SHEET
M-4

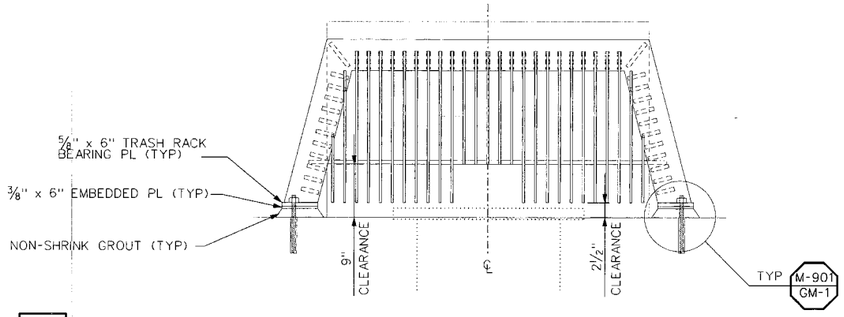
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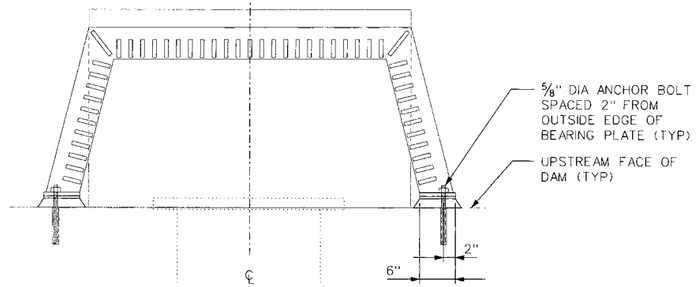
TRASH RACK SIDE VIEW



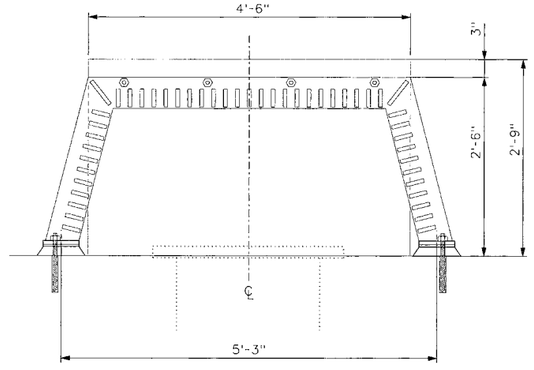
TRASH RACK FRONT VIEW



SECTION A



SECTION B



SECTION C

MWH
DENVER COLORADO

TR-1 TRASH RACK MOUNTING DETAILS

(SLUICE GATE NOT SHOWN FOR CLARITY)

0 ½ 1
SCALE

As-Built Drawing No.

REVISIONS				SCALE:	1" = 1'0"
NUMBER	DATE	INITIALS	DESCRIPTION	DESIGNED BY:	J COOK
0	SEP 07	MFR	ISSUED FOR BIDDING	DRAWN BY:	J COOK
				CHECKED BY:	D FURRY
				FILE NAME:	VDR_M_5

SEAL: REGISTERED PROFESSIONAL ENGINEER MICHAEL F. ROBERTS NO. C056052 EXP 12/31/09 STATE OF CALIFORNIA

Rancho Water

Rancho California Water District
42135 Winchester Road
Temecula, CA 92590
Phone: (951) 296-6900 Fax: (951) 296-6869

RANCHO CALIFORNIA WATER DISTRICT
APPROVED FOR CONSTRUCTION

ENGINEERING MANAGER — DATE 9/17/07

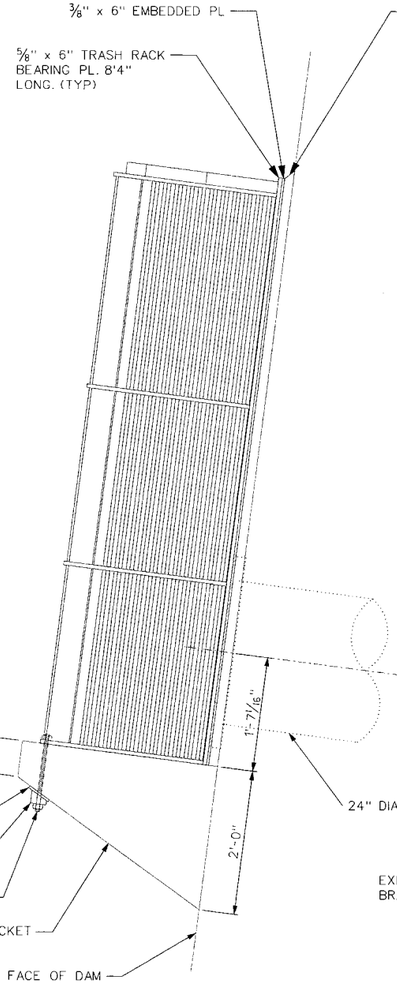
ENGINEERING/DATE	CONTRACTS/DATE	OPERATIONS/DATE	MAINTENANCE/DATE
CFW 9/16/07	9/19/07	CE 9-21-07	TW 9-21-07

VAIL DAM REPAIR (PROJECT NO. D1313)

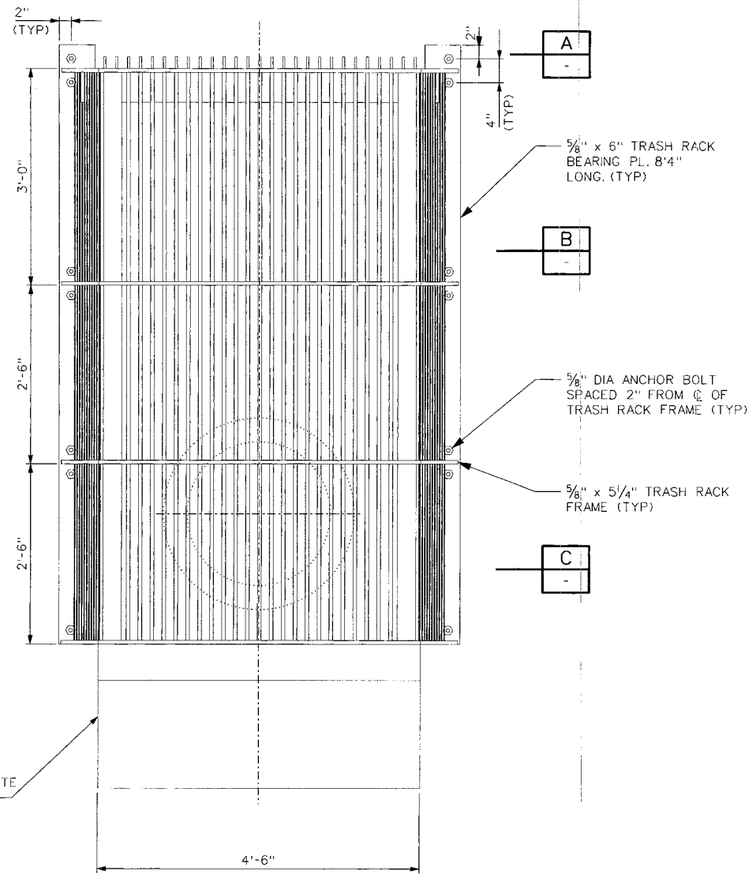
UPSTREAM INTAKE WORKS REPLACEMENT
MECHANICAL
TRASH RACK MOUNTING DETAILS, TYPE TR1

SHEET
M-5

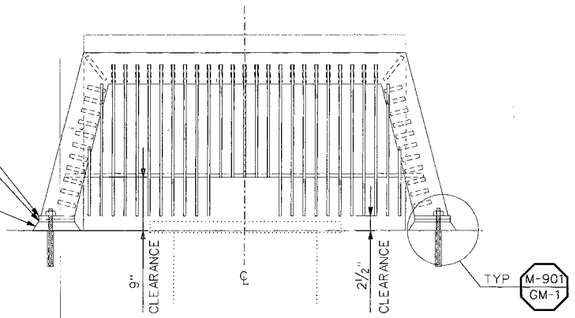
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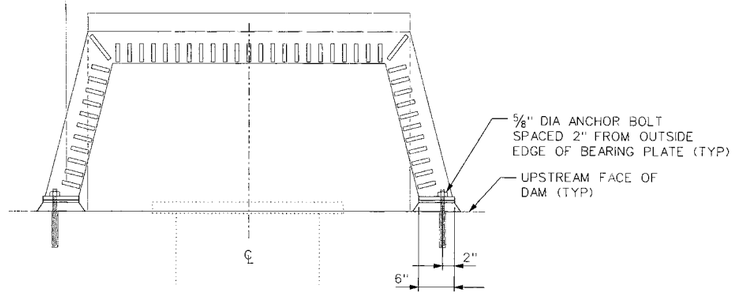
TRASH RACK SIDE VIEW



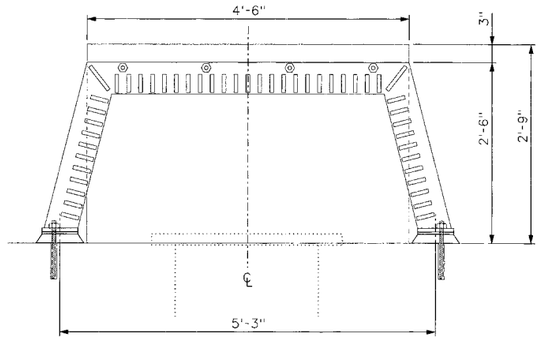
TRASH RACK FRONT VIEW



SECTION A - -



SECTION B - -



SECTION C - -

TR-2 TRASH RACK MOUNTING DETAILS

(SLUICE GATE NOT SHOWN FOR CLARITY)

0 1/2 1
SCALE

As-Built Drawing No.

MWH
DENVER COLORADO

REVISIONS			
NUMBER	DATE	INITIALS	DESCRIPTION
0	SEP 07	MFR	ISSUED FOR BIDDING

SCALE:	1" = 1'0"
DESIGNED BY:	J COOK
DRAWN BY:	J COOK
CHECKED BY:	D. FURRY
FILE NAME:	VDR_M_6

SEAL: REGISTERED PROFESSIONAL ENGINEER — MICHAEL F. ROGERS — NO. C056062 — EXP. 12/31/08 — STATE OF CALIFORNIA — CIVIL

Rancho Water
Rancho California Water District
42135 Winchester Road
Temecula, CA 92590
Phone: (951) 296-6900 Fax: (951) 296-6869

RANCHO CALIFORNIA WATER DISTRICT
APPROVED FOR CONSTRUCTION

ENGINEERING MANAGER — DATE 9/17/07

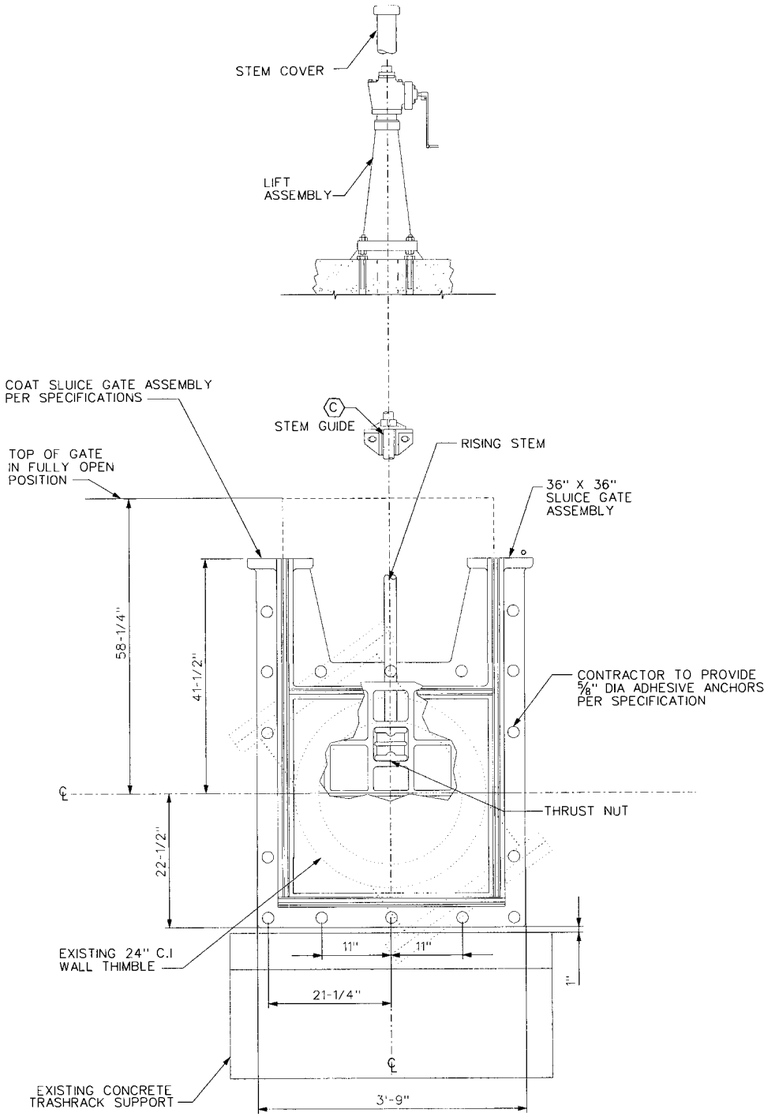
ENGINEERING/DATE	CONTRACTS/DATE	OPERATIONS/DATE	MAINTENANCE/DATE
CFW 9/17/07	Ken Cope 9/19/07 CE	9-21-07 TW	9-21-07

VAIL DAM REPAIR (PROJECT NO. D1313)

UPSTREAM INTAKE WORKS REPLACEMENT
MECHANICAL
TRASH RACK MOUNTING DETAILS, TYPE TR2

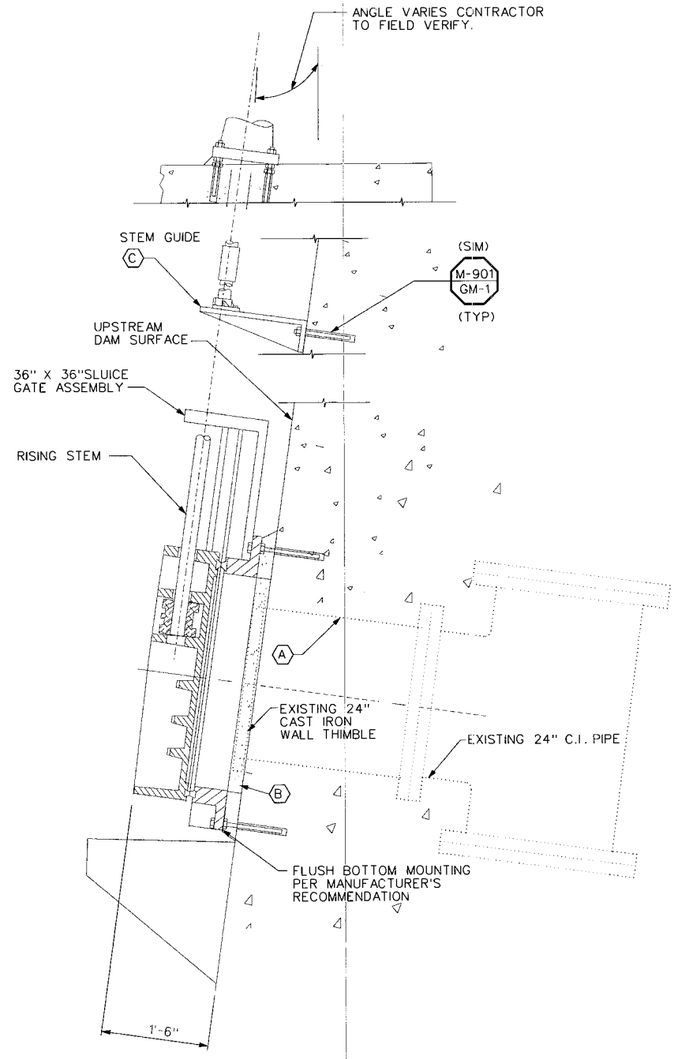
SHEET
M-6

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SLUICE GATE FRONT VIEW

(TRASH RACK NOT SHOWN FOR CLARITY)



SLUICE GATE SIDE VIEW

(TRASH RACK NOT SHOWN FOR CLARITY)

GENERAL SHEET NOTES

1. THE LAYOUT OF THIS FACILITIES ON THIS DRAWING IS APPROXIMATE AND ARE BASED SOLELY ON INFORMATION FROM AS BUILT DRAWINGS. CONTRACTOR SHALL FIELD-VERIFY EXACT LOCATION OF SHOWN FACILITIES AND APPURTENANCES. CONTRACTOR SHALL ALSO VERIFY ALL DIMENSIONS BEFORE STARTING ANY WORK.
2. THE CONTRACTOR SHALL PROVIDE SEVEN 36 X 36 WATERMAN MODEL S-5000 SLUICE GATES OR APPROVED EQUIVALENTS. GATE SHALL BE COATED IN ACCORDANCE WITH SECTION 09800 OF THE SPECIFICATIONS.
3. THE CONTRACTOR SHALL PROVIDE THE LIFT ASSEMBLY, GATE STEM AND STEM GUIDE, GATE ASSEMBLY, SLUICE GATE FIXTURES AND APPURTENANCES RECOMMENDED BY THE MANUFACTURER FOR ALL GATE FIXTURES.
4. THE SEATING HEAD ON THE EQUIPMENT SCHEDULE (ON SHEET GM-1) IS THE VERTICAL DISTANCE MEASURED FROM THE CREST OF THE DAM (ELEV. 1482.6 FT).

SHEET KEYNOTES

- (A) EXISTING WALL PIPE SHALL BE BRUSH CLEANED AND WILL REMAIN IN PLACE.
- (B) AREA BEHIND GATE FRAME SHALL BE FILLED APPROX. 1½" WITH NON- SHRINK GROUT.
- (C) CONTRACTOR SHALL PROVIDE AND INSTALL ADJUSTABLE STEM GUIDE AND COUPLING AS RECOMMENDED BY THE MANUFACTURER. ADJUSTABLE STEM GUIDES SHALL BE 10 FT ON CENTER MAXIMUM.

As-Built Drawing No.

MWH
DENVER COLORADO

REVISIONS			
NUMBER	DATE	INITIALS	DESCRIPTION
0	SEP 07	MFR	ISSUED FOR BIDDING

SCALE: N.T.S.
DESIGNED BY: A AJAYI
DRAWN BY: A AJAYI
CHECKED BY: D FURRY
FILE NAME: VDR_M_7

SEAL: REGISTERED PROFESSIONAL ENGINEER, MICHAEL F. ROGERS, NO. C056062, EXP. 12/31/08, STATE OF CALIFORNIA

Rancho Water
Rancho California Water District
42135 Winchester Road
Temecula, CA 92590
Phone: (951) 296-6900 Fax: (951) 296-6869

RANCHO CALIFORNIA WATER DISTRICT
APPROVED FOR CONSTRUCTION

ENGINEERING MANAGER — DATE 9/17/07

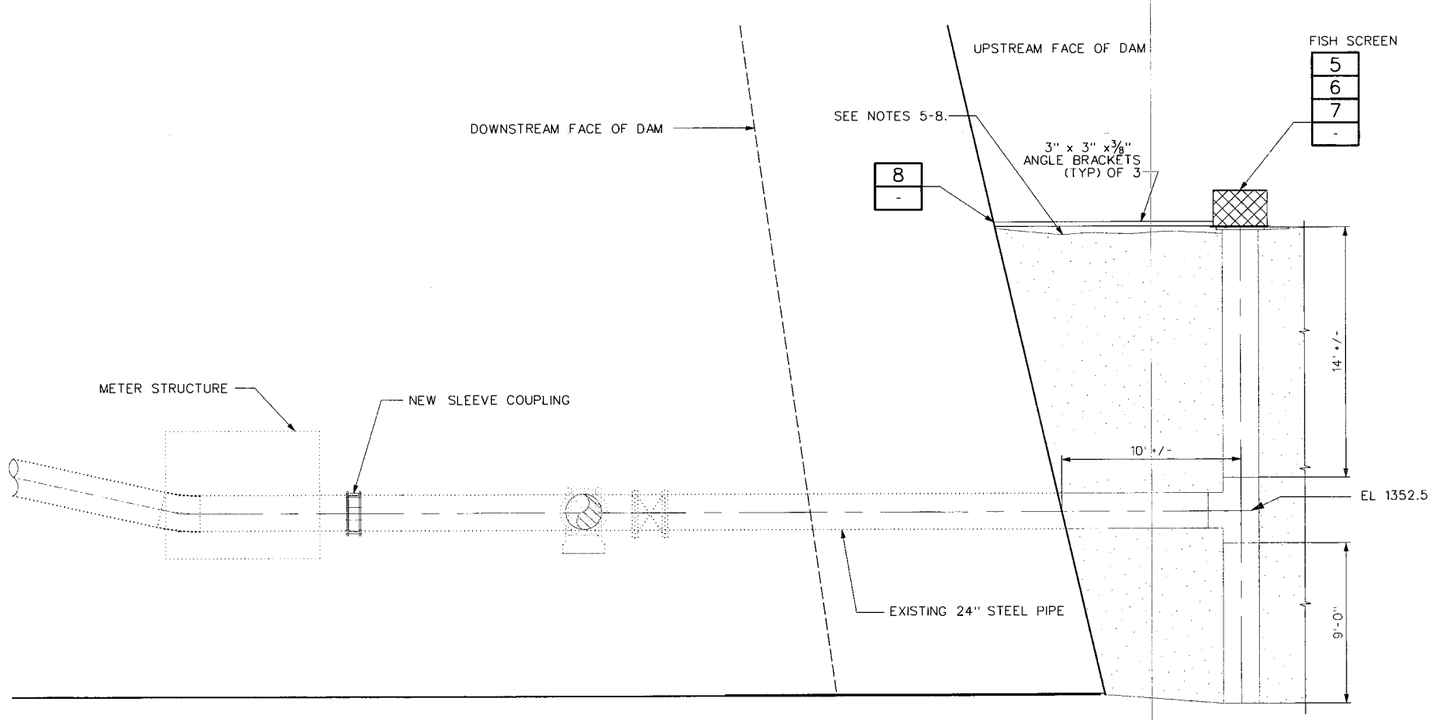
ENGINEERING/DATE	CONTRACTS/DATE	OPERATIONS/DATE	MAINTENANCE/DATE
CFW 9/16/07	9/19/07	CE 8-21-07	TW 8.21.07

VAIL DAM REPAIR (PROJECT NO. D1313)

UPSTREAM INTAKE WORKS REPLACEMENT
MECHANICAL
SLUICE GATE DETAILS

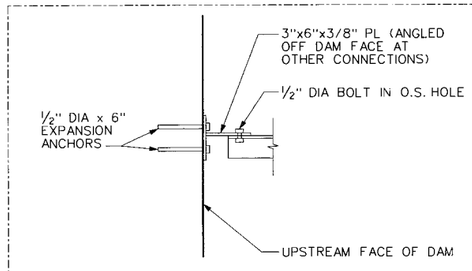
SHEET
M-7

File: VDR_M_7.dgn Model: Default DesignScript: MWH_Mstn_Pentable_V85.tbl PlotScale: 1:0 '-1" / IN.

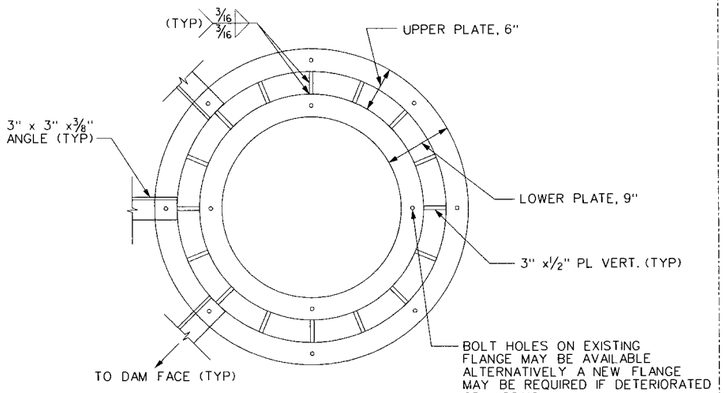


GENERAL SHEET NOTES

1. FISH SCREEN AND BRACKET COMPONENTS SHALL CONSIST OF ASTM A36 MILD STAINLESS STEEL WITH AMINECURED EPOXY IN ACCORDANCE WITH SECTION 09800 OF THE SPECIFICATIONS, APPLIED AT SHOP. PRODUCE SHOP DRAWINGS FOR APPROVAL BEFORE FABRICATION.
2. ANCHOR AND OTHER BOLTS SHALL CONFORM TO ASTM A307
3. SCREEN ASSEMBLY SHALL BE PRE-ASSEMBLED IN SHOP PRIOR TO UNDERWATER INSTALLATION. EXISTING SCREEN, CHANNEL SUPPORTS AND RETAINER RING SHALL BE REMOVED PRIOR TO INSTALLATION OF NEW SCREEN ASSEMBLY.
4. IF EXISTING BOLT HOLES ON THE EXISTING FLANGE ARE USED, THE NUMBER AND LOCATION OF HOLES MUST BE VERIFIED IN THE FIELD.
5. DESIGN, FURNISH AND INSTALL COFFER DAM TO LIMIT EXCAVATION OF SEDIMENT WHILE EXPOSING PIPE.
6. EXISTING TOP OF PIPE IS REPORTED TO BE AT OR NEAR TOP OF EXISTING SEDIMENT LAYER.
7. REMOVE SEDIMENT TO EXPOSE PIPE SUFFICIENTLY TO ATTACH FISH SCREEN AS INDICATED.
8. COFFER DAM SHALL REMAIN IN PLACE AFTER CONSTRUCTION.

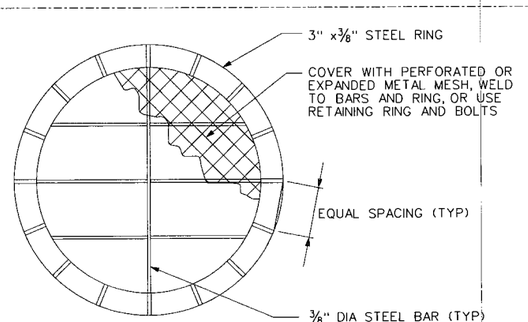


TYPICAL CONNECTION AT DAM FACE — 8 / -
SCALE: NTS

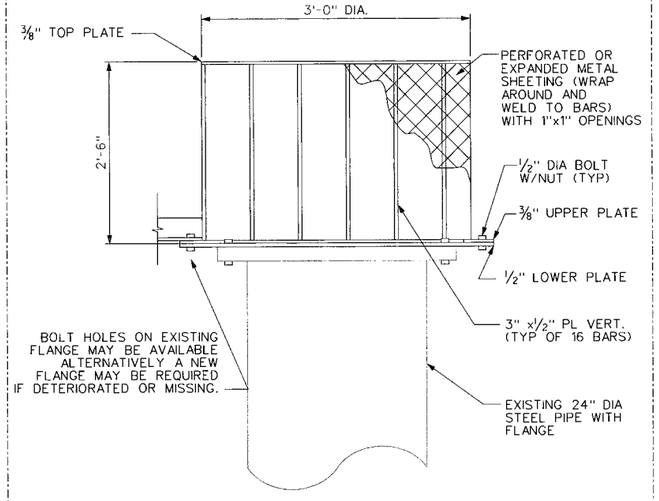


PLAN VIEW OF FISH SCREEN (BOTTOM PLATES) — 5 / -
SCALE: NTS

SECTION 1 / M-1



TOP PLATE DETAIL — 6 / -
SCALE: NTS



PROFILE VIEW OF FISH SCREEN — 7 / -
SCALE: NTS

As-Built Drawing No.

MWH
DENVER COLORADO

REVISIONS			
NUMBER	DATE	INITIALS	DESCRIPTION
0	SEP 07	MFR	ISSUED FOR BIDDING

SCALE: 1/4" = 1'0"
DESIGNED BY: J COOK
DRAWN BY: J COOK
CHECKED BY: D FURRY
FILE NAME: VDR_M_8

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Rancho Water
Rancho California Water District
42135 Winchester Road
Temecula, CA 92590
Phone: (951) 296-6900 Fax: (951) 296-6869

RANCHO CALIFORNIA WATER DISTRICT
APPROVED FOR CONSTRUCTION

ENGINEERING MANAGER	DATE			
	9/19/07			
ENGINEERING/DATE	CONTRACTS/DATE	OPERATIONS/DATE	MAINTENANCE/DATE	
OFW 9/16/07	9/19/07	CE 9-21-07	TW 9-21-07	

VAIL DAM REPAIR (PROJECT NO. D1313)

UPSTREAM INTAKE WORKS REPLACEMENT
MECHANICAL
INTAKE 8

SHEET
M-8

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Appendix B

Previous Geologic/Geotechnical Investigations

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CALIFORNIA INSTITUTE OF TECHNOLOGY

Pasadena 4

January 6, 1947

Mr. A. L. Sonderegger
Consulting Engineer
923 Central Building
Los Angeles 14, California

Dear Mr. Sonderegger:

NIGGER CANYON DAMSITE ON VAIL RANCH

In the company of Mr. H. M. Hall and Mr. William Roripaugh I made another visit to this damsite on January 4, 1947, for the purpose of examining the rock in the north or right abutment. It is now quite well exposed as the result of considerable excavation. Because of the possible difficulty in obtaining nearby an adequate supply of earthfill or rockfill materials it has been hoped that an arch dam can be built on this site, but that will of course require first class geologic conditions. The left or south abutment appears quite favorable, but the north side of the canyon displayed a number of open fissures. Aside from their unfavorable effect on the north abutment as openings there was some fear that they might indicate that landsliding or creep has occurred in the north wall of the canyon and that the abutment would hence be weak against the thrust of an arch dam and possibly unstable. After my last visit to the site on October 18, 1946, I suggested that the north abutment be stripped of all its broken and loose material and that after that was done it might be desirable to run a horizontal coyote hole back into the canyon side to determine what the nature of the fissures might be back within the ridge.

STRIPPING OF NORTH ABUTMENT

Nigger Canyon trends roughly east-west at the damsite. The north abutment has been stripped to a horizontal depth of roughly 25 feet from the original surface of the canyon side. This is at an elevation of about 12 feet above creek level. The east-west width of the excavation is about 50 feet. The excavation shallows upward, so that at about 2/3 of the distance up the canyon side to the knob above, which is at elevation 1459, the depth of stripping is about 3 feet and it converges to a point just below the knob.

Part of the material is said to have been blown off by placing powder in open cracks, but the bulk of the rock was removed by drilling and shooting two horizontal rows of holes drilled some 15 feet into the face. The holes in the lower row were horizontal and those in the upper row were pointed upward. Much of the rock came off in large blocks, with long dimensions up to several feet. This rock waste accumulated on the creek bottom below the excavation and its top was levelled off at an elevation of about 12 feet above the creek bed. This was accomplished largely by shoving much of the material downstream with a bulldozer. The stripping has exposed the rock inside the canyon wall excellently and has given a very good opportunity to reach a judgment regarding the adequacy of the formation as an abutment for an arch dam. No stripping has been done in recent years on the south side of the canyon, and no further exploration of the projected spillway site on the ridge south of the damsite has been carried out since my last visit.

GEOLOGIC CONDITIONS REVEALED

The formation at the damsite consists of quartzite, somewhat schistose. It is a dark gray rock, often bluish, made mainly of quartz grains with varying amounts of black mica. The rock is highly crystalline, hard, essentially impervious, and very strong when fresh and unweathered. The mica in it tends to lie in layers with the mica flakes parallel to the thin layers, and this gives the rock a foliated or schistose structure, which is rather characteristic of old metamorphic rocks of this type. It originated as horizontal sandstone strata deposited on the bottom of the sea in very remote geological times--probably in pre-Cambrian times and of the order of about one billion years ago. Thousands of feet of later sediments were deposited on top of these sandstone beds and under the tremendous pressure of that load and with the higher temperatures resulting from deep burial the sandstone recrystallized to form quartzite. Some time later, as a result of mountain-making movements, the strata were tilted from their horizontal to the vertical position at which they now stand. Their extensions upward were eroded away, so that we now see only their bevelled edges. Those edges trend or strike about North 15 degrees West; this means that the individual beds run across the canyon as vertical strata nearly at right angles to the canyon walls. This is a favorable condition for dam construction.

The surface rock on the north abutment, before stripping, was extensively jointed; it was rather badly broken up. The stripping to a depth of about 25 feet reveals that the rock improves quite rapidly with depth. The rock in the back of the excavation is only sparsely jointed and is made up mainly of large solid masses. There are at that

depth still patches of shattered rock which would have to be removed. The rock is fresh, hard, and unweathered, and has great bearing strength.

There were four fissures in the canyon side in the area now excavated. They were open and up to 6 or 8 inches in width. These same fissures at the back of the excavation are closed. It was feared originally that they were caused by tension--that they had been pulled open by rock movement in the canyon wall. At the back of the excavation they are seen to be vertical master-joints--cracks--which extend from the top of the canyon wall down to below stream level, down which surface water, carrying oxygen and carbon dioxide, has moved each winter, weathering the two sides of the virtually closed crack. As a consequence a seam of white partially decayed rock follows each joint; this seam is from 3 to 6 inches in width. It is material grading from fresh quartzite to thoroughly decayed rock approaching clay in nature, but the soft clay is a very small fraction of the seams. The material is layered somewhat, parallel to the vertical walls of the joint. Most of it is quite firm, firm enough so that open cracks persist in it. It is not gouge, and is too firm for erosion by seepage water passing around the end of a dam. It can be solidified by grouting. There are no typical slickensides in these weathered bands, but there is some evidence of squeezing and slight movement, and some small pieces show curved slip surfaces like those so commonly seen in serpentine. There has been little or no fault movement on any of these four vertical master joints; this is indicated by the lack of offset in other joints which cut across the master joints at right angles. These four master joints formed open fissures at the surface because the weathered material along them is removed by erosion much more rapidly than the unweathered rock on the two sides of the joint is worn away. Apparently the open part of the

fissure extends back into the canyon side only a matter of 10 feet or thereabouts, and farther back it is not open but filled with the partially decayed rock. This filling will doubtless become progressively firmer the deeper the excavation is carried into the canyon wall. The cross sectional area of these four bands of material along the master joints forms only a small percentage of the area of the back of the excavation, and properly grouted they will not constitute serious flaws in the abutment.

Probably somewhat similar master joints with narrow bands of partially decayed rock along them will be found in the opposite abutment.

CONCLUSIONS

The open fissures seen on the original surface of the canyon side are not gaping tension fractures indicating movement of the rock by landsliding or creep. They are not faults. They are normal master joints such as occur in crystalline rocks quite frequently and which are normally quite tight. Weathering from the surface downward by rainwater has decayed the rock a bit on both sides of each master joint, giving a band of somewhat softer but still fairly firm material, only a little of it soft enough to be erodable by water seeping around a dam. Grouting can solidify it. There is then no reason to believe that the north abutment of the proposed damsite is rock which has moved recently or is unstable now.

Taken as a whole the rock now exposed in the excavation in the north abutment is adequate in quality for, or at least already closely approaches the condition required for, the abutment of an arch dam. Some patches of broken rock should still be removed, and probably the

face should be cut back somewhat further, to give still better rock, but this could be done in excavating a keyway in the face when the exact location of the dam is decided upon.

It is quite probable that an arch dam can be safely built on this side, and the probability certainly warrants further stripping on both sides of the canyon to expose the rock condition and to aid at the same time in preparing the site.

RECOMMENDATIONS

It no longer seems necessary to put a coyote hole or small horizontal tunnel back into the north abutment.

It would be desirable to strip back the canyon side to about the same 25 foot horizontal depth for an additional width of about 20 feet upstream from the present excavation in the north abutment. The middle and upper part of the present and the new stripping should be carried to about the same depth as the lower part, unless excellent rock is encountered at less depth.

Should there be any doubt regarding the strength of the rock to resist the horizontal thrust of an arch dam it may be desirable to flare the ends of the dam to double or treble width, thereby reducing the bearing pressures in inverse ratio; excavating areas of abutment wider than the expectable thickness of the dam will facilitate doing this.

From a geological standpoint it would be preferable to have the axis of the dam roughly at right angles to the canyon; that would direct the thrust of the arch most nearly end on to the edges of the quartzite layers exposed on the canyon walls. This fact would point to the desirability of having the south end of the dam rest against the face of the

bold rocky bluff opposite the present excavation, rather than to have the dam more oblique to the channel and rise up the canyon side east of the bold bluff on the south side. In the latter case the south end of the dam would be considerably farther upstream than the north end. In that case also the dam would have a continuous abutment to its full crest height, if it is to be built up to about 1459, the elevation of the knob above the north abutment excavation. If the south end of the dam is to rest against the bold bluff opposite the present excavation and is to rise to about 1459 it would presumably be necessary to construct a heavy gravity wall along the top of the ridge southward from the top of the bold bluff, the end of the wall to serve as an abutment for the upper rings of the arch. The thrust at the south end of the upper rings would not be parallel to the wall if it is to be built parallel to the crest of the ridge, but perhaps that can be worked out in design. This arrangement would make for a considerably shorter dam and smaller concrete quantities. If the design is feasible the geological conditions would apparently be more favorable for an abutment in the bold bluff.

If there is probability that this design--utilizing the face of the bold bluff--can be adopted, I suggest that the south abutment in the bold bluff be stripped like the north abutment, from a point some ten feet west of the large oak tree to which short boards were nailed to give protection from the gauging station cable, to a point perhaps forty feet to the east of the tree, and from the bottom of the bluff to the top. The width of the excavation would of course decrease upward. This stripping will reveal the geological conditions, which must be good

if an arch dam is to be built. The stripping would have to be done later in any case if an arch dam is to be constructed in that position.

Altogether the conditions thus far determined appear to be favorable for the construction of a concrete arch dam.

Very sincerely yours,

(signed) John P. Buwalda

John P. Buwalda,
Consulting Geologist

JPB:R

CALIFORNIA INSTITUTE OF TECHNOLOGY

Pasadena
4

September 7, 1946

Mr. A. L. Sonderegger
Consulting Engineer
923 Central Building
Los Angeles 14, California

NIGGER CANYON DAMSITE ON VAIL RANCH

In your company, and with Mr. Mahlon Vail, Mr. H. M. Hall, Mr. J. E. Roripaugh, and other associates I examined this damsite on September 4, 1946. It is on the Vail Ranch, at the upstream end of Nigger Canyon, on Temecula Creek. Nigger Canyon is upstream from Temecula Valley, and the site is about 10 miles due east of the town of Temecula.

The purpose of the Vail Ranch in the construction of the dam will be to conserve the winter flow of Temecula Creek for summer use on ranch lands. The height of the dam would be between 100 and 200 feet.

Topography. Nigger Canyon, perhaps 3 miles long, is a narrow gorge cutting through a ridge separating Nigger Valley above from Temecula Valley downstream from it. It is up to 300 feet in depth. At most places its inner walls are very steep, but it opens out above, and it has numerous areas flat or of only gentle slope extending back from the rim of the steep inner gorge. The bottom of the canyon is filled to shallow depth by a strip of sand and gravel 100 to 150 feet wide. A small stream of water was flowing over this fill at the time of my examination. Upstream from this narrow gorge for several miles Temecula Creek has excavated a rather wide valley with rolling or slightly hilly floor. With narrow gorge and rather wide valley above it the topography

is manifestly favorable for a dam and reservoir. With Arroyo Seco and several other tributary valleys the drainage basin is quite large.

Geology. The rocks at the damsite at the upper end of Nigger Canyon are of the general nature of schists, and they may belong to a group of rocks known in this part of southern California as the Julian schists. They are gray, old, highly crystalline, and strong rocks. They were originally sedimentary strata, laid down on the bottom of the sea as sandstone and shale or mud, but deeply buried since, and, subjected to mountain-making crustal forces and much heat, they have been recrystallized and greatly changed, so that they are now nearly as dense, impervious, and strong as granites. At the damsite the original stratification of these rocks has been largely obliterated during their recrystallization or metamorphism, but a half mile downstream, on the northeast side of the canyon, it can still be plainly seen, the individual strata having been turned up by mountain-making folding to a virtually vertical position.

The surface parts of the schist, to a depth of 2 or 3 feet, have been weathered and decayed, and are porous and commonly broken somewhat into fragments. This weathered mantle is usually not deep, however, as may be seen on the southwest side of the damsite, where some exploratory stipping, reportedly done by Mr. Schuyler, an engineer who investigated this site some 40 years ago, reveals rather solid rock at depths of less than 3 feet.

Schist is a foliated rock, and this foliation, which consists of alternation of layers of different minerals such as quartz, feldspar, and hornblende, may be parallel to the original stratification or may be at

any angle to it. At the damsite the foliation and original stratification appear to be parallel and stand very steeply, often practically vertical. The foliation planes trend about North 10 degrees West, and as the canyon trends about North 80 degrees West at this point, the planes of foliation, and original bedding, strike across the canyon nearly at right angles. This is a favorable structural condition, from the standpoint both of the strength of the abutments to resist the pressures of the ends of the dam and of tightness of the abutments against water tending to pass around the ends of the dam.

The strength of a dam abutment depends not only on the inherent strength of the rock, as seen in a hand specimen or large chunk, but also upon the extent to which the rock in the abutment has been fractured or shattered in past geologic periods by mountain making forces. While the schist in the damsite under consideration is a strong type of rock it has unfortunately been somewhat fractured, especially on the northeast or right abutment. Nearly vertical fractures spaced from 10 to 40 feet apart and roughly parallel to the foliation, cut the schist into a series of nearly verticle slices. Some of the fractures are open fissures, especially near the surface, where weathering has apparently widened them considerably, and they continue from stream level to the top of the bluff. They are commonly several inches wide, and at some places are up to 8 or 10 inches in width. It is not probable that they are more than an inch or two in width farther back in the bluff, but their continuity and straightness suggests strongly that they are not superficial structures but that they continue back into the bluff for quite long and indefinite distances and while they may be much tighter farther

back they can scarcely be expected to close up and disappear. They are especially evident on the northeast side of the canyon, but while they are not so conspicuous on the southwest wall because the exposures are less bare, it is clear that somewhat similar fractures exist there also, to judge from the sharp lines cutting the schist there in various places.

While these fractures are unfavorable structures in that they facilitate the movement of water in abutments, they have had one other unfortunate effect on the rock. The slices between the fractures, particularly on the northeast side of the canyon, are somewhat shattered. Minor joint planes cut these slices in all directions. The rock is not crushed or mashed like it sometimes is along a fault, but is merely broken into many angular masses still fitting rather tightly together, with no fine pulverized material or open spaces separating them. But rock of this type is obviously not as tight as unshattered rock, and it cannot be expected to resist without yielding, as well as solid or unbroken rock, such pressures as might be transmitted to it by certain types of dams.

The suggestion has been made that because the rock is somewhat more fractured and shattered on the northeast side of the canyon than on the southwest, a fault passes down the canyon, beneath the gravel fill. While the writer has not examined the middle and lower parts, the canyon is not the straight type usually associated with faulting and one does not see the expectable fault trenches cutting spurs or ridges where the canyon turns. While this question should doubtless be looked into further before the dam is built, the preliminary examination does not suggest that a fault passes down the canyon.

From the damsite upstream for at least several miles, and underlying both sides of Nigger Valley and the valley itself, is a second formation. It consists of yellow, brown and white Tertiary sedimentary strata. Because these beds are relatively soft and weak to erosion, a wide valley has been cut in them while only a narrow gorge has been excavated by Temecula Creek as Nigger Canyon in the hard bedrock. These sedimentary strata were not deposited in the sea but as landlaid materials, much as waste is being deposited in Temecula Valley, San Jacinto Valley, and other inland basins today. They accumulated some millions of years ago and to a thickness of at least many hundreds of feet, and with time and pressure from the overlying strata they become quite firmly compacted. Subsequently they have been partially re-excavated by streams like Temecula Creek, and we see them in vertical sections. They not only underlie Nigger Valley but they also rest in considerable thicknesses as patches on the shoulders above the rim of Nigger Canyon. The strata consist mainly of sandstone with some beds of gravel and of clay. While they do not come into the area of the damsite itself they form the upper part of the ridge extending southwestward from the left abutment of the damsite, through which it is proposed to construct the spillway, and they underlie the upper part, but not the lower part, of the area down through which the spillway would discharge.

A third geologic unit at the damsite comprises the Quaternary and Recent alluvium on the floor of the canyon and the valley. This consists mainly of sand and gravel, derived in part from the weathering of the bedrock parts of the drainage basin and in part from the disintegration of the Tertiary strata, which of course consist of sand, gravel and

clay. At the damsite the fill is reported to be about 20 feet in depth, and the conformation of the canyon walls suggests that the fill does not greatly exceed that thickness. Before a dam is built its depth should of course be determined by drilling, unless dependable records from earlier exploration of the site are available.

Quality of Damsite. The crystalline schist forming the damsite is a strong rock, and if it were solid and unfractured the site would be suitable for an arch dam. The narrow width and steep walls of the canyon would also be favorable for this type of dam. But on the right abutment especially the rock is cut by fractures, has some open fissures, and is somewhat shattered. It does not appear that it would withstand without yielding the horizontal thrust of the ends of an arch dam, and the fractured condition of the rock would apparently permit leakage along the short path of percolation around the narrow end of an arch dam. If the fractures and shattered condition of the rock go deep into the bluff no feasible amount of stripping would yield a satisfactory abutment for an arch dam; if the condition of the rock is a superficial effect of sliding or creep in the bluff it is still unfavorable for an arch dam, as such instability in the abutment might be disastrous to an arch dam in time. Altogether it appears therefore, that while deep stripping or one or more "coyote hole" exploration tunnels might reveal more favorable rock conditions in the abutments than are suggested by present surface outcrops, the site is probably not favorable for an arch dam.

The site is satisfactory for an earth or rock fill dam. Obviously the rock is strong enough to support that type of dam and prevent its sinking into its foundation, as the Lafayette dam did, east of San Francisco Bay. As to leakage the abutments are manifestly not in ideal condition.

But it is probable that they would be satisfactory if over the areas against which the tight blanket portion of the dam would rest all the weathered rock and surface shattered rock were stripped, any remaining open joints or fissures were grouted with cement, and if it seemed desirable, the rock surface were gunnited with cement before the tight material was rolled upon or against it. Fortunately the rock of the abutments is hard and not erodable, and is not soluble, so leakage would not increase by enlargement of channels. All the foregoing comments apply of course equally to the foundation of the dam.

If cost and other factors are equal, comparing an earth or rock fill dam with a concrete arch dam where some leakage through abutments possibly cannot be avoided, the latter is of course not erodable, but the earth or rock fill dam has percolation paths around its ends which are many times longer than those around arch dams.

Spillway. For earth or rock fill dams more than a few tens of feet in height it is desirable to have the spillway removed from the dam in order to avoid the possibility of erosion and destruction of the dam by water escaping through a broken spillway.

The topography and geology are quite favorable at the proposed site for a separate spillway. On the southwest abutment the crystalline bedrock rises to a knob on the ridge; then the ridge crest drops a few feet and continues as a saddle 200 to 300 feet in width measured along the crest. The depth of the wide cut across this saddle that would be required for a spillway would of course be determined by the height of the dam. Sedimentary material forms the crest of the ridge and appears to extend continuously down the downstream side and under the flat area

lying above the rim of the canyon to the northwest, but the sediments apparently extend only about 10 feet in elevation down the upstream side of the ridge. It is probable that they have a thickness of 15 to 20 feet under the crest of the ridge in the middle of the saddle, and thin toward the ends of the saddle. If the depth of excavation of the spillway is to be 30 or 40 feet it is quite certain that it will be in bedrock throughout its entire width.

Probably an earth fill or rock fill dam would extend downstream in the main canyon to a point near or beyond where the tributary into which the spillway would discharge joins the canyon; it would therefore presumably be necessary to cut a channel for the lower end of the spillway across the small ridge between the first and second tributary canyons downstream from the dam, so that the spillway would discharge into the canyon down the second tributary gulch at a safe distance from the downstream toe of the dam.

Reservoir. Dams, abutments, and foundations may be tight and yet reservoirs may fail to store water because of escape through narrow ridge walls or down to a low water table beneath the country.

The ridges at the dam site, the ends of which form the abutments, are not narrow and constitute no leakage hazard as ridges. There are no low divides around the perimeter of the watershed, which could be narrow enough to permit escape. The water table beneath the reservoir is near the surface, for water flows in places in the bed of Temecula Creek. It appears therefore that the reservoir site is safe against lateral leakage through its walls and against downward escape through its floor.

Construction Materials. For a concrete arch dam abundant sand would be available in the bed of Temecula Creek above the damsite. For aggregate it would probably be necessary to quarry some part of the old schist series downstream from the damsite and crush it. It is possible enough gravel of good enough quality could be screened out of the sand in the bed of Temecula Creek above the damsite, and perhaps crushed for aggregate.

Coarse rock for a rock fill dam could be had by quarrying some part of the old bedrock schist series downstream from the damsite, but it would doubtless be much less expensive to build an earth fill dam, using the abundant sand and gravel in the creek bed above the damsite. This is mostly coarse sand with some gravel, but probably without many large boulders.

The problem may be to find enough compactible material for the tight core of the dam. The bedrock schist series of course does not contain such material, and the layers in the Tertiary stratified sediments containing enough clay to be compactible are few in number, not very thick, and interbedded with thick sandstone layers, so that thick overburden would have to be removed or the clayey layers would have to be mined, which would be impracticable. The most promising source for clayey material is in the flat meadow land 1/2 to 1 mile upstream from the damsite. These areas are flat enough to retain the fine particles swept in from the surrounding hills, and the soil is wet or damp, permitting the decay of the feldspar particles in the soil to form clay.

Water is available at the damsite or nearby during the entire season.

Conclusion. The damsite on Temecula Creek at the upper end of Nigger Canyon is suitable for an earth fill dam but probably not for a concrete arch dam, although extensive stripping or exploration might reveal that it could be used for the latter type of structure. The rock in the abutments, especially the right abutment, and probably also the foundation, is cut by vertical minor fractures 10 to 40 feet apart, and the intervening slices are somewhat shattered. The portion of the abutments against which the tight part of the dam would rest should be thoroughly stripped of weathered and superficial shattered rock and the fractures sealed as far as practicable with concrete; probably that surface should also be gunnited to prevent water in the abutment from entering the material of the dam. The topography and the geological conditions appear favorable for a separate spillway through the ridge extending southwest from the left abutment of the dam. Construction materials for the outer thirds of an earth fill dam are readily available, but there is some doubt as to a supply of compactible material.

The damsite is in a seismically active region. The Agua Caliente fault, on which vigorous earthquakes have occurred in recent times, lies only a mile or two northeast of the damsite. A dam on this site will almost certainly experience one or more strong earthquakes in the next century, and account should be taken of this expectation in determining upon upstream and downstream slopes of an earth fill or rock fill dam. The probability of future earthquakes also should not be ignored in the design of an arch dam at this site.

Recommendations. (1) It would be quite desirable to run an exploration tunnel into the right abutment of the proposed dam, along one of the open fissures, to determine the habit of these fractures--whether they close rapidly when followed from the face back into the bluff or whether they are persistent openings which continue long distances back into the ridge. What is found out along one of them would establish a probability for the behavior of the others. Such a tunnel would also show whether the shattering of the rock decreases rapidly back from the bluff face, i.e., whether the rock improves with depth from the surface. The tunnel might well be located at a convenient elevation above stream bed, where it would not be filled with sand and gravel by the first flood.

(2) On the crest of the ridge southwest of the damsite, on the site considered for the spillway, the two pits put down many years ago should be cleaned out and carried down through the gravel to the schist bedrock. A third pit should be put down near the southwest side of the saddle, considerably southwest of the two existing pits. These three openings will give information as to the kind of material beneath the saddle and its thickness. This information will be needed in planning the design and excavation of the spillway.

(3) A search should be made for clayey compactible materials for the tight core of an earth fill dam. Some 4-inch or 6-inch posthole auger holes might well be put down to depths of 15 or 20 feet in the grassy meadow areas in the two valleys 1/2 to 1 mile upstream from the damsite. If the materials brought up by the auger are laid out in a line with increasing distance from the hole as they are pulled up they can be inspected or sampled later if desired.

Very sincerely yours

(signed) John P. Buwalda

John P. Buwalda, Consulting Geologist

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INVESTIGATION AND REANALYSIS OF VAIL DAM RANCHO CALIFORNIA

Conducted for

KAISER AETNA
Rancho California
Riverside County, California

Project No. 75-088-AEH
July 30, 1975

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July 30, 1975

Kaiser Aetna
Rancho California Community Development
P.O. Box 755
Temecula, California 92350

Attention: Legal Department

Subject: Investigation and Reanalysis of Vail Dam
Rancho California

Gentlemen:

We are pleased to submit our report on the "Investigation and Reanalysis of Vail Dam, Rancho California." The report presents the results of our stress reanalysis of Vail Dam, and based on that analysis our conclusion on the safe operating level of the dam and reservoir.

The investigation and reanalysis was performed by Dr. Y.S. Lou, Senior Engineer, assisted by Mr. C. Marshall Payne, Senior Geologist, and Mr. James A. Doolittle, Project Engineer. Mr. Jack S. Barrish, Consulting Civil and Structural Engineer, served as consultant to our firm during the course of the study.

We would like to thank you for the opportunity to perform this study. We will be available to discuss the conclusions of this investigation and reanalysis with you at any time.

Respectfully submitted,

CONVERSE DAVIS DIXON ASSOCIATES

By 
Schaefer J. Dixon,
Executive Vice President

SJD/YSL:beh

VAIL DAM STRESS ANALYSIS

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APPENDICES

Appendix A - Field Investigation

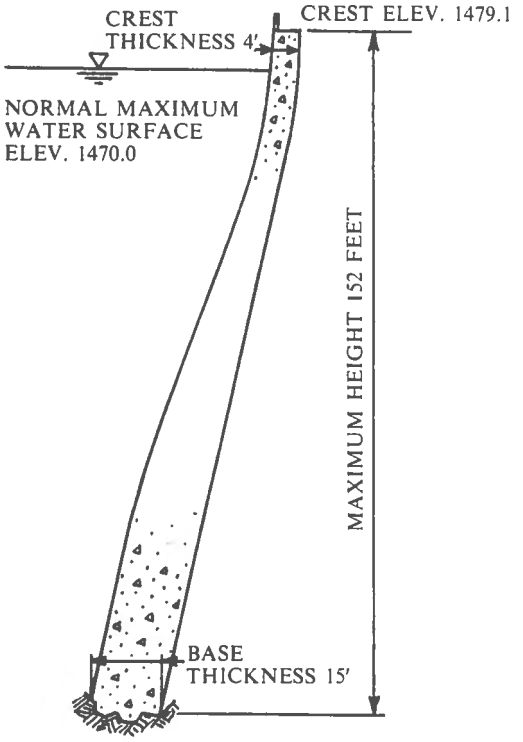
Appendix B - Laboratory Investigation

Appendix C - Faulting and Seismicity

Appendix D - Report of Mr. Jack S. Barrish

VAIL DAM AND RESERVOIR





CROWN SECTION

GENERAL INFORMATION

Location:	Temecula Creek, Riverside County, California
Owner:	Rancho California
Date Constructed:	1949
Purpose:	Irrigation, Water Supply, Recreation
Original Designer:	George E. Goodall, Consulting Engineer
Contractor:	Bent Construction Company
Original Cost:	$999,320.80

Type:	Variable Radius Arch
Height:	152 feet
Dam Length:	788 feet
Volume Concrete:	30,360 cubic yards
Storage Capacity:	51,000 acre-feet
Drainage Area:	319 square miles

1. INTRODUCTION

Vail Dam was originally designed and constructed in 1947-1948 using certain assumptions concerning the mechanical properties of the rock foundations which were not based on measurements or tests of those properties. Further, no consideration of earthquake stresses is mentioned in the recorded design data of the arches.

When the foregoing was brought to the attention of Kaiser Aetna, the preparation of this report was authorized--for the prime purpose of evaluating the safe operating level of the dam and reservoir based on a reanalysis of the design stresses using measured rock properties and newly determined earthquake loadings.

The report contains records of the field, laboratory and engineering efforts needed to obtain the pertinent mechanical properties of rock foundations; the studies made to establish realistic pseudo-static seismic loads; and the development of analysis methods incorporating both the measured rock characteristics and seismic loadings into a usable program. The report records the stress reanalyses which were made and concludes with an evaluation of the safe operating level based on the results of this study.

Appendix D presents the concluding letter report of Mr. Jack S. Barrish, Consulting Civil and Structural Engineer.

2. FIELD AND LABORATORY INVESTIGATION

2.1 Field Exploration

The prime objective for the field exploration was to obtain representative fresh samples of the foundation materials of the dam. Rock core samples were used for determining modulus of elasticity and Poisson's ratio in the laboratory. In addition, the core samples were examined to determine the similarity of rock materials throughout the foundation area of the dam. This information, together with laboratory test data and RQD (Rock Quality Designation) were used to evaluate the in-situ physical properties of foundation rock materials.

Geologic mapping was performed to evaluate surficial deposits in the immediate vicinity of the dam site. The geologic map and a description of the materials observed are presented in Appendix A.

Three core borings were drilled immediately downstream of Vail Dam. Borings were drilled vertically to depths ranging from 50 to 69 feet. An NX core barrel was utilized to drill, log and sample the rock at the three locations. Logging included a description of the recovered rock core, recording drilling rates and circulation losses of drilling fluids, and RQD (Rock Quality Designation) determinations. These data are presented on the logs shown in Appendix A.

2.2 Laboratory Testing

A number of undisturbed rock samples were tested in the laboratory to evaluate the engineering properties of the foundation rock pertinent to this dam reanalysis study.

Unconfined compression tests were used for the evaluation of the modulus of elasticity and Poisson's ratio of the rock cores. In this test, 4-inch long samples of rock were compressed axially in a constant rate of strain manner. Strain gages were used for axial and diametral strain measurements. A total of 12 tests were made, and four of the specimens were loaded to failure.

The modulus of elasticity and Poisson's ratio evaluated from the stress-strain curves shown in Appendix B are summarized as follows:

MODULUS OF ELASTICITY (psi)

Minimum	Maximum	Average	Standard Deviation
320,000	8,400,000	4,600,000	3,100,000

POISSON'S NUMBER (RATIO)

Minimum	Maximum	Average	Standard Deviation
8.3 (0.12)	5.0 (0.20)	5.9 (0.17)	0.9 (0.03)

2.3 In-situ Modulus of Elasticity and Poisson's Ratio for Foundation Rock

Large scale field tests have shown that the modulus of elasticity of a rock mass is lower than the static modulus of laboratory specimens. While a laboratory specimen may adequately represent the rock materials, it does not include the various rock defects such as joints and faults which have a profound effect on the deformation characteristics of a rock mass. Therefore, the modulus of elasticity obtained from laboratory

testing must be modified to obtain the in-situ modulus to be used in an analysis such as this. A discussion of the RQD method used in modifying the laboratory results is given in Appendix B.

The reduced mean or average value in-situ physical constants for the foundation rock materials are;

Modulus of Elasticity, E_R = 600, 000 psi

Poisson's Number, M = 5.9

Since the foundation rock was fractured and jointed, there was a relatively wide variation in the measured physical constants. Therefore the possible effects of such variation on the dam arch stresses was also studied. The following two additional in-situ physical constants were used in the analyses:

	Upper Limit	Lower Limit
Modulus of Elasticity, E_R	1,000,000 psi	200,000 psi
Poisson's Number, M	5.0	6.7

3. SUMMARY OF SEISMICITY INVESTIGATION

3.1 General

The purpose of the seismicity investigation was to evaluate the maximum horizontal bedrock acceleration that may reasonably be expected to occur at the site during the lifetime of the dam. This value was then incorporated into the dam stress reanalysis.

The selection of maximum acceleration was based on geologic factors, including study of local and regional faulting, instrumental (1934 - 1973) and pre-instrumental (1800 - 1933) earthquake data and local site conditions. The following briefly describes the source of

the earthquake data, their formulation and limitations. A more detailed description of regional faulting and statistical seismicity analyses is presented in Appendix C.

3.2 Instrumental Earthquake Data (1934 - 1973)

Recent instrumental earthquake data for 39 years, from 1934 to 1973, was obtained from the California Institute of Technology Seismological Laboratory. These data are considered complete and accurate and well suited for statistical analysis, although the 39-year record represents a relatively short time in geologic history.

A complete listing of instrumental earthquakes exceeding Magnitude 4.0 which have occurred within 100 miles of the site from 1934 to 1973 is given in Appendix C. This list includes the date, location and magnitude of each event, epicentral distance to the site and calculated maximum peak bedrock and firm ground accelerations at the site.

3.3 Pre-Instrumental Earthquake Data (1800 - 1934)

Pre-instrumental earthquake data for 134 years, from 1800 to 1934, was obtained from Wood and Heck as revised by Eppley (1966). These data must be regarded as approximate and incomplete in several respects. Many of the smaller (and probably several larger) earthquakes which have occurred are missing, maximum Modified Mercalli intensities were reported in lieu of instrumental measurements (Richter magnitude), and reported epicentral locations are only approximate. The value of this 134-year pre-instrumental record is that it represents a time period more than three times longer than the 39-year instrumental period.

A list of the recorded earthquakes exceeding Magnitude 4.0 which have occurred within 100 miles of the site from 1800 to 1934 is given in Appendix C. This list includes the date and location of each event, estimated magnitude, epicentral distance to the site and calculated maximum peak bedrock and firm ground accelerations at the site.

3.4 Discussion of Statistical Seismicity

Seismicity represents a measure of past seismic activity or the effects of same in the site region or at the site. Such measures including the recurrence of magnitude, intensity, and bedrock or firm ground acceleration. The bedrock and firm ground accelerations are useful indicators of the effects of ground shaking and are significant parameters in engineering design for earthquake loadings.

The statistical recurrence or probability of occurrence of various levels of ground motion based on past seismic activity can be determined using several sources of earthquake data and various methods of analysis. No single source of data or method of calculation has gained wide acceptance in practice since each procedure has certain limitations. It is not yet possible to predict the future occurrence of earthquakes in time or space from past records of seismic activity. Statistical seismicity analyses can provide a quantitative basis for selecting design earthquakes corresponding to a particular level of ground shaking and an acceptable degree of risk.

3.5 Maximum Ground Acceleration for Reanalysis

Based on the result of this study, it is concluded that a maximum horizontal ground acceleration of 0.2g can reasonably be expected during the lifetime of the dam and, therefore, a pseudo-static seismic coefficient of 0.2g would be appropriate for use in computing the earthquake induced stresses for reanalyzing Vail Dam. As described in Appendix C, 0.2g represented an expected average return period of 60 years and approximate probability of occurrence during that period of 62 percent. A value of 0.1g corresponds to what was normal engineering practice in design of dams in earthquake regions in the 1940's.

Current professional opinion, however, varies as to the appropriate psuedo-static seismic coefficient appplicable for design analyses of dams. As a consequence, a value of 0.4g was also used in the analysis presented in Section 4. An acceleration of 0.4g, in our opinion, represents a major earthquake event, which, although highly unlikely during the life of the dam, can be reasonably postulated from known geologic evidence. This value does not represent a true maximum peak acceleration but rather a value representing an average of several peaks during an earthquake event more appropriate for design analysis. The expected average return period of 0.4g is 500 years and probability of occurrence during that period of 11 percent.

4. STRESS REANALYSIS

4.1 Objective and Procedure of Analysis

In the original design of Vail Dam, the arches were assumed as fixed at the abutments and the arches were required to sustain the entire water load with no reduction in arch loading for cantilever action.

The modulus of elasticity of rock (E_R) was assumed infinitely large (i.e., $E_c/E_R \simeq 0$). The criteria used for arch ring design were as follows:

1. No tensile stress should exist in the arch rings, and the maximum compressive stresses should not exceed 700 pounds per square inch.
2. For full water pressure and with a sustained modulus of elasticity of concrete (E_c) equal to 3,500,000 psi there should be an adequate factor of safety against buckling.

The original basic assumption that the modulus of elasticity of the rock was infinitely large was known to be incorrect. The design data indicate that for the lower rings the design utilized a value of rock modulus equal to the concrete and the Cravitz analysis to show that with some abutment yield Criterion (1) was satisfied. Although known to be incorrect, this assumption was considered to be conservative. The basic criteria did not consider earthquake induced stresses in the arches, although a pseudo-static acceleration of 0.1g was considered in the design of the left gravity abutment.

In order to economically accomplish the objective of this report, a computer program was developed utilizing the Cravitz approach in such manner to allow for evaluating stresses regardless of the E_R value discussed in Chapter 2 or the earthquake loading postulated in Chapter 3. The reanalysis would be otherwise similar to the original design assumption in that the entire load would be carried by arch action

so that direct comparison on a stress basis could be made. The program was used to analyze various combinations of water surface elevation, E_C/E_R ratios, and earthquake loadings.

Analyses were made using this program for the following conditions:

1. Water surface at Elevation 1482.5 with $E_C/E_R = 0.01$ and M = 8.
2. Water surface at Elevation 1482.5 with E_C/E_R values of 5.83, 3.5 and 17.5 with appropriate values of M.
3. Water surface at Elevation 1470 with E_C/E_R values and M values as in (2).
4. Water surface at Elevation 1455 with E_C/E_R values and M values as in (2).
5. Condition 3 plus 0.2g earthquake loading.
6. Condition 4 plus 0.2g earthquake loading.
7. Condition 3 plus 0.4g earthquake loading.

Conditions 1, 2, 3 and 4 are static conditions. Of these, Conditions 2, 3 and 4 utilized the rock characteristics as evaluated in Chapter 2, and Condition 1 was used to check the accuracy of the program and the original design stresses.

Conditions 5, 6 and 7 are pseudo-static evaluations of stresses resulting from a combination of water and earthquake loadings.

4.2 Increase of Allowable Stress in Concrete Under Earthquake Loading Condition

The criteria for structural design of the arches of Vail Dam given on page 3 of the "Design Data" prepared by G.E. Goodall in 1947 did not include allowable stresses under earthquake loading conditions.

It was necessary to postulate the probable criteria for maximum allowable stresses on the arches had earthquake as well as water load been considered at that time.

It was accepted good practice in 1947 to allow a 1/3 increase in stresses when considering earthquakes. The best evidence of this practice is the 1946 Uniform Building Code, Section 2313(e) of which states in part: "Stresses in materials shall not exceed by more than 33-1/3 percent the allowable working stresses permitted in this Code." (The same Code, 1973 Edition, still allows this 1/3 increase.)

A review of the specifications and the project records shows that the concrete had a basic 28-day cylinder strength of at least 3000 psi. Assuming this strength, one would, using the provisions of the 1946 Code, establish the minimum allowable basic stress at 750 psi, and its corresponding allowable when considering earthquake at 1000 psi. The original design used a 700 psi value because of concern regarding aggregates.

Therefore, it is considered acceptable to increase the original static stress criterion of 700 psi up to 933 psi as the maximum allowable stress to be considered in the present investigation when earthquake load is considered as an addition to water load.

4.3 Effect of Poisson's Ratio, Elastic Deformation of Abutment Material

The effect of Poisson's ratio and elastic deformation of abutment material was studied in detail by Jacobsen, Cain, Vogt and Cravitz, etc. The value of Poisson's ratio depends on the material and is usually expressed as 1/M. As an arch dam is subjected to

stress in many directions, Poisson's ratio has a definite influence on the arch stress.

The rock on which the concrete arch thrusts is elastic and, within reasonable stress limits, obeys Hooke's law. In consequence, an arch dam is not truly fixed at the abutments.

The in-situ modulus of elasticity and Poisson's ratio presented in Section 2 and Appendix B are included in Conditions 2 through 7 of Section 4.1.

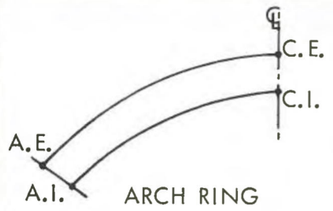
4.4 Discussion of Static Stress Reanalysis

The results of static stress analysis under the various loading conditions as stated in Section 4.1 are presented in Figures 1 and 2.

Figure 1 shows the stress comparison between the original design stresses and the stresses recalculated by computer. The following table indicates the various design parameters used to obtain the stresses as shown in Figure 1.

Item	E_c	E_R	E_c/E_R	M	W.L.
Original Stress	3,500,000	--	0	--	1482.5
Recalculated Stresses	3,500,000	350,000,000	0.01	8	1482.5

As is mentioned earlier the original stresses were calculated based on the assumption that the abutment was fixed, or that E_R approaches infinity while the recalculated stresses are based on the assumption the abutment is elastic (E_R is finite).



C.E. - Crown Extrados
C.I. - Crown Intrados
A.E. - Abutment Extrados
A.I. - Abutment Intrados

EXPLANATION

o Original Design Stress

Δ Recalculated Stress

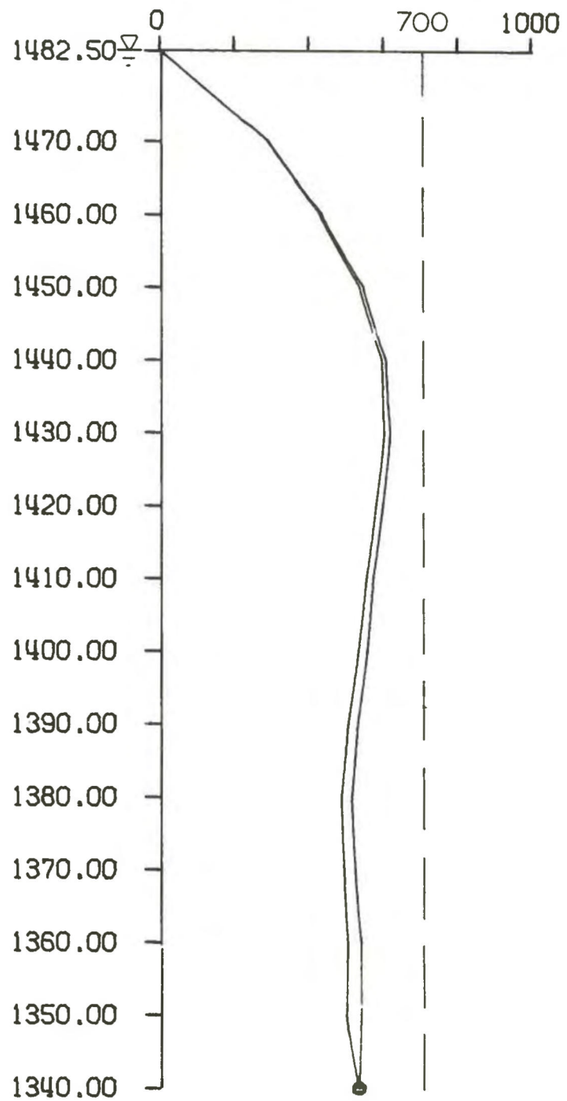
COMPARISON OF ORIGINAL AND RECALCULATED STRESSES - STATIC CASE

PREPARED BY: JAD & HRB	VAIL DAM STRESS REANALYSIS for Kaiser Aetna Rancho California, Riverside County, California	Figure No. 1
CHECKED BY: GSC		
APPROVED BY: GSC	DATE: July 28, 1975 SCALE: As Shown PROJECT NUMBER: 75-088-AEH	

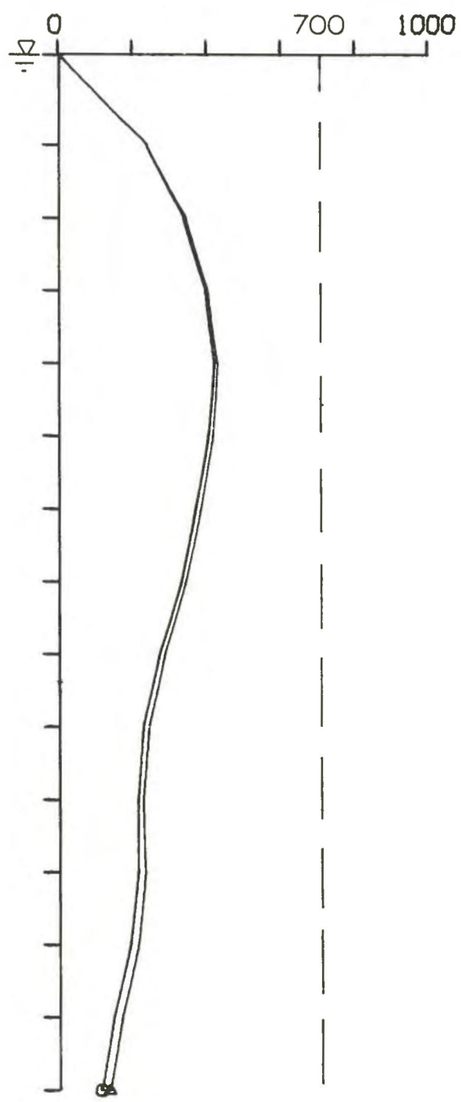
CONVERSE DAVIS DIXON ASSOCIATES *Geotechnical Consultants*

CROWN STRESS (PSI)

EXTRADOS

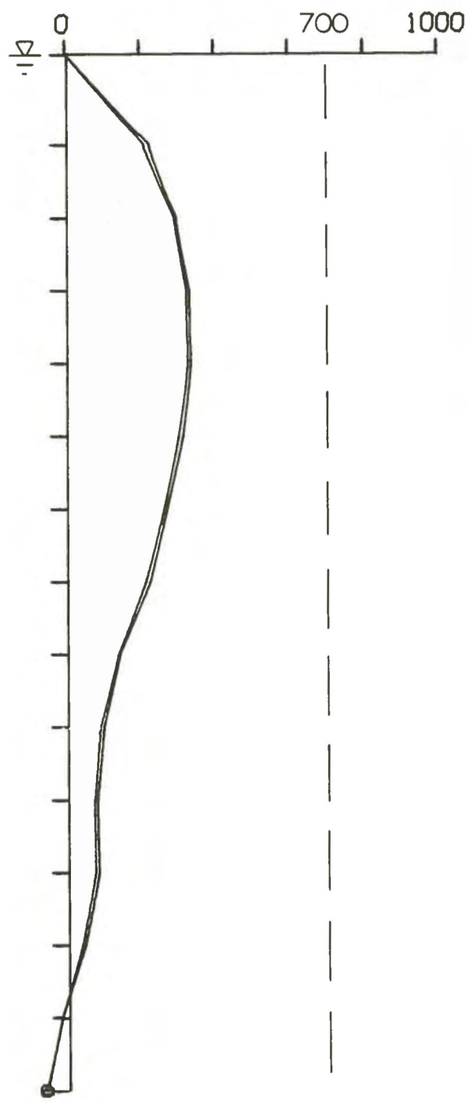


INTRADOS

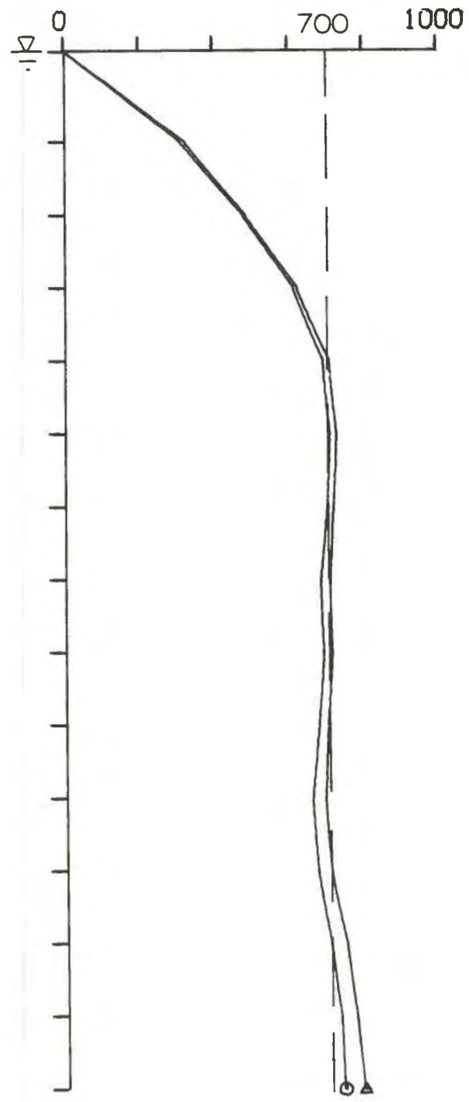


ABUTMENT STRESS (PSI)

EXTRADOS



INTRADOS



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FORM NO. D62-74

EXPLANATION

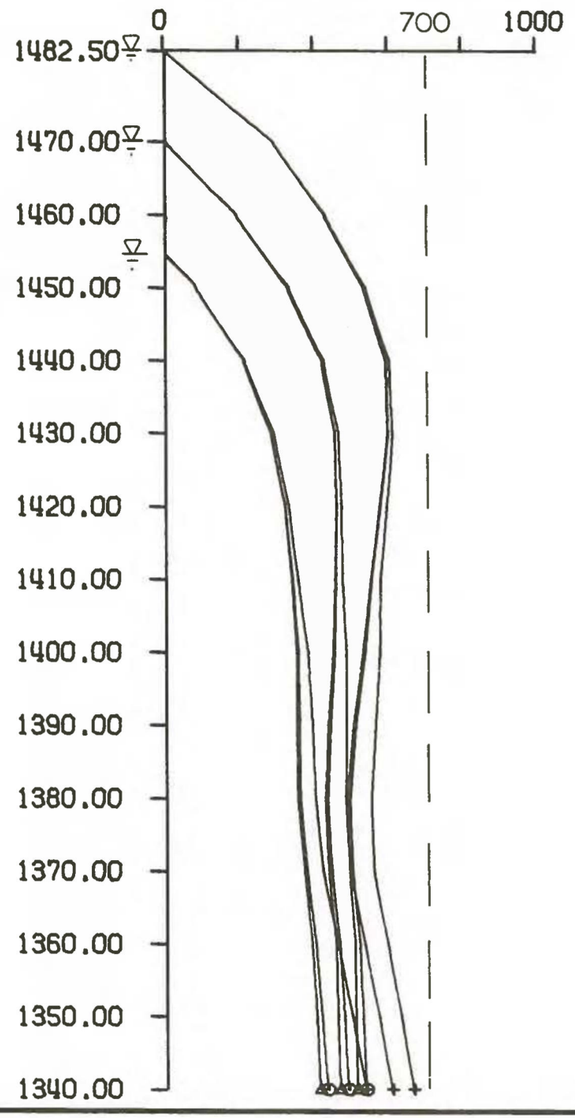
Symbol	Ec/Er	Young's Modulus	Poisson's Number (Ratio)
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△	3.5	1,000,000	5.0 (.20)
+	17.5	200,000	6.7 (.15)

No Earthquake Load

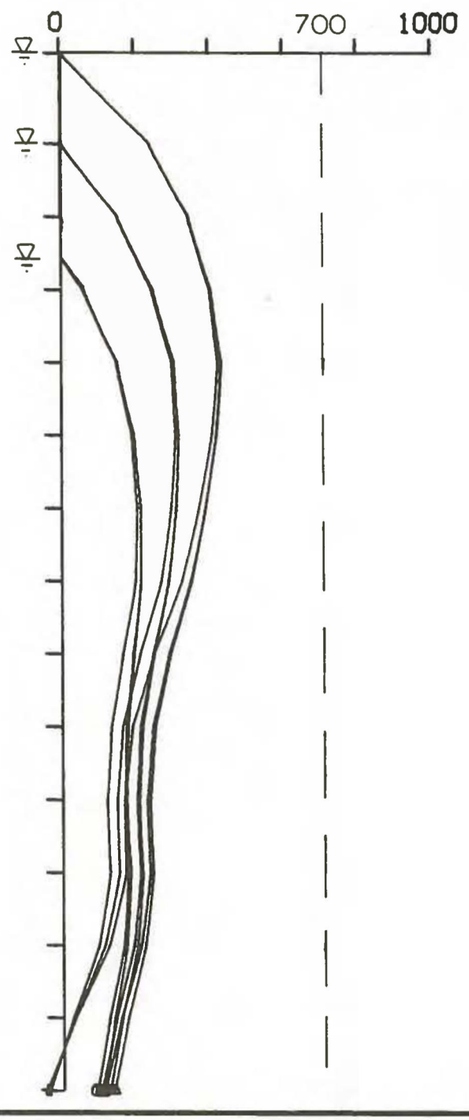
COMPARISON OF STRESS AT VARIOUS WATER LEVELS - STATIC CASE			
PREPARED BY: JAD	VAIL DAM STRESS REANALYSIS for Kaiser Aetna Rancho California, Riverside County, California		Figure No. 2
CHECKED BY: YSL			
APPROVED BY: YSC	DATE: July 29, 1975	SCALE: As Shown	PROJECT NUMBER: 75-088-AEH
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CROWN STRESS (PSI)

EXTRADOS

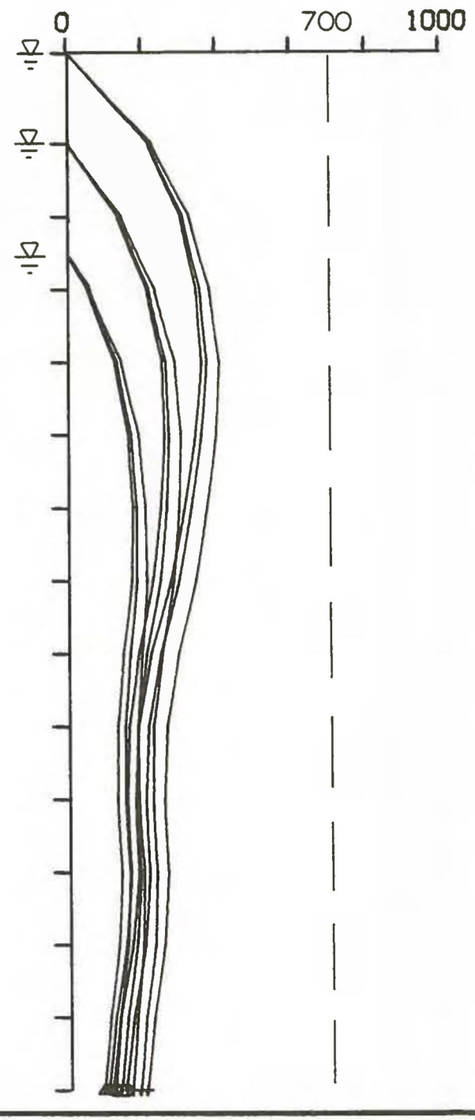


INTRADOS

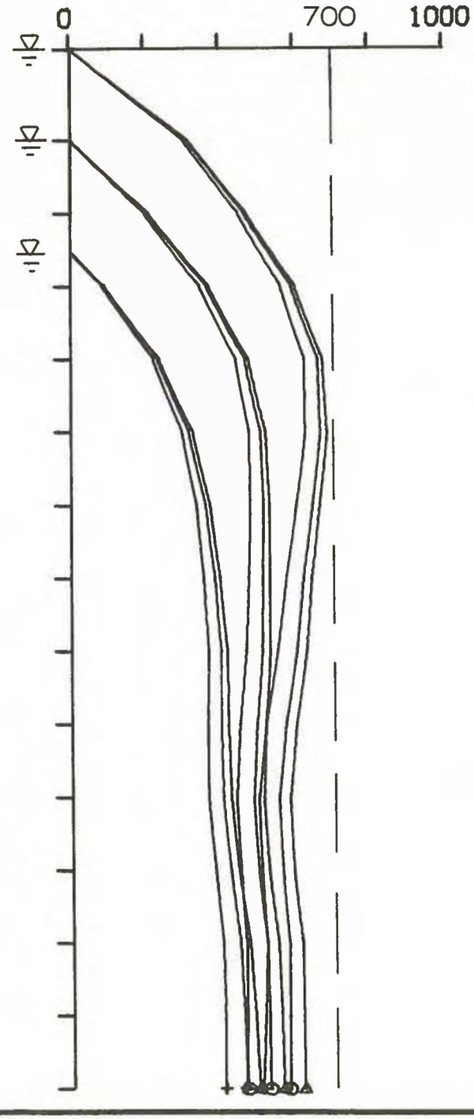


ABUTMENT STRESS (PSI)

EXTRADOS



INTRADOS



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FORM NO. D62-74

By setting the ratio of E_C/E_R at 0.01, which is close to assuming the abutment is rigid, the resulting stresses were computed. They were very close to the original calculated stresses, indicating that:

1. The original design stresses were correct for the assumptions made, and
2. The computer coded mathematical formulations could be used for the calculation of the other conditions.

Static stresses for water levels 1482.5, 1470 and 1455 feet are shown in Figure 2. For each water level loading condition, three sets of stresses are plotted corresponding to stress sets of material properties, i.e., mean, upper and lower limits. These stresses are plotted against the allowable stress (700 psi) as shown in dashed line.

It is concluded that, based on the results shown in this Figure 2, the static stresses that exist in the arch, are within the allowable compression limits as defined in the original design criterion. (See following section for discussion on tensile stresses.)

4.5 Discussion of Pseudo-Static Seismic Stress Analysis

The maximum horizontal ground acceleration likly to occur within the life of the structure was determined as 0.2g as stated in Section 3. This acceleration was considered in two stress analyses on a pseudo-static basis. The stresses with water surfaces at Elevation 1470 and water surface at Elevation 1455 in concurrence with earthquake load resulting from 0.2g were calculated and are presented in Figure 3.

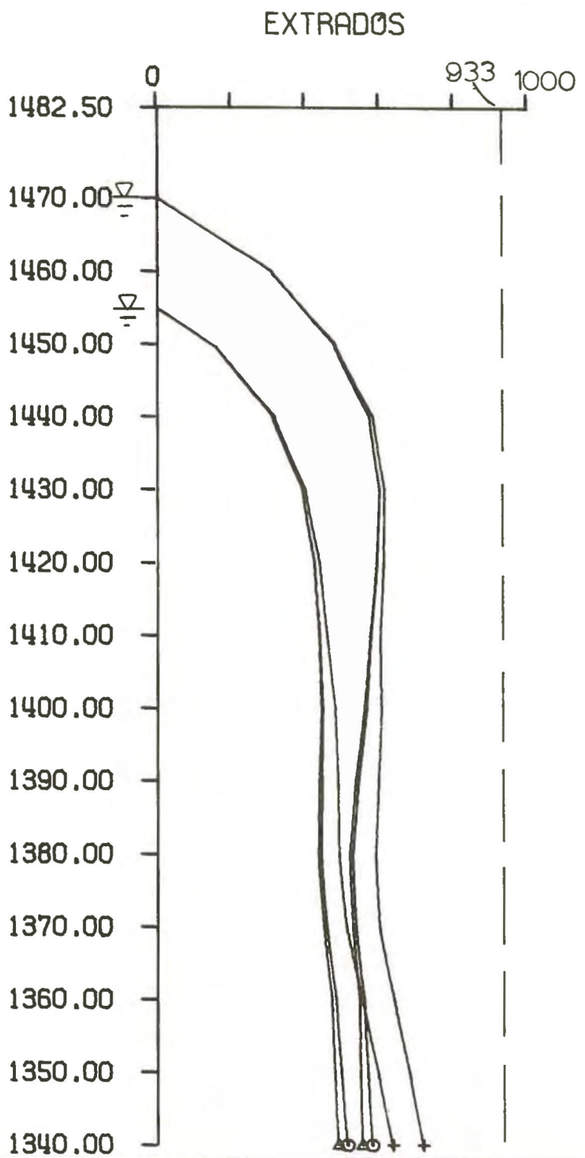
EXPLANATION

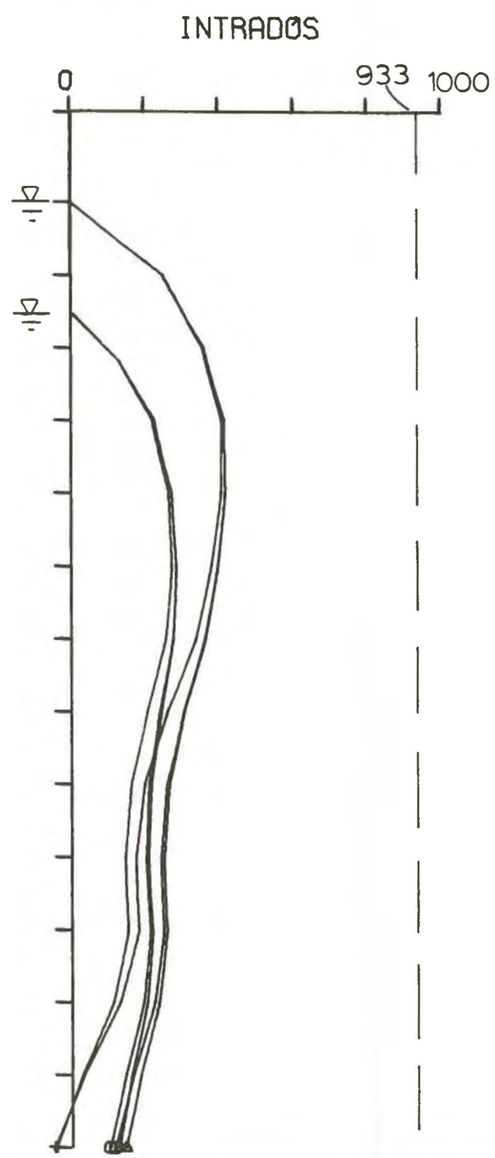
Symbol	Ec/Er	Young's Modulus	Poisson's Number (Ratio)
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△	3.5	1,000,000	5.0 (.20)
+	17.5	200,000	6.7 (.15)

Earthquake Load = 0.2

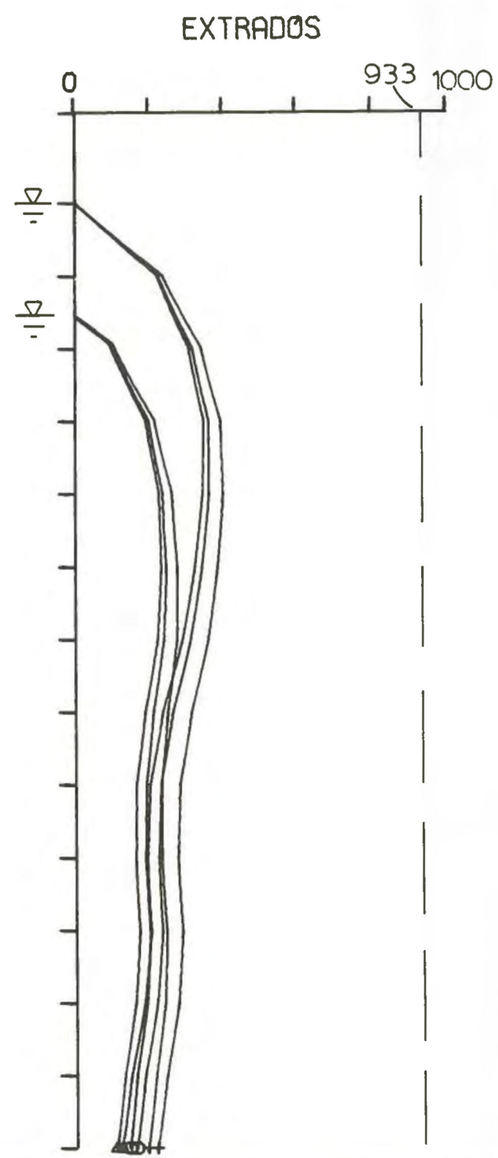
VARIATIONS OF STRESS AT DIFFERENT ROCK PROPERTIES- PSEUDO STATIC CASE			
PREPARED BY: JAD	VAIL DAM STRESS REANALYSIS for Kaiser Aetna Rancho California, Riverside County, California		Figure No. 3
CHECKED BY: [illegible]			
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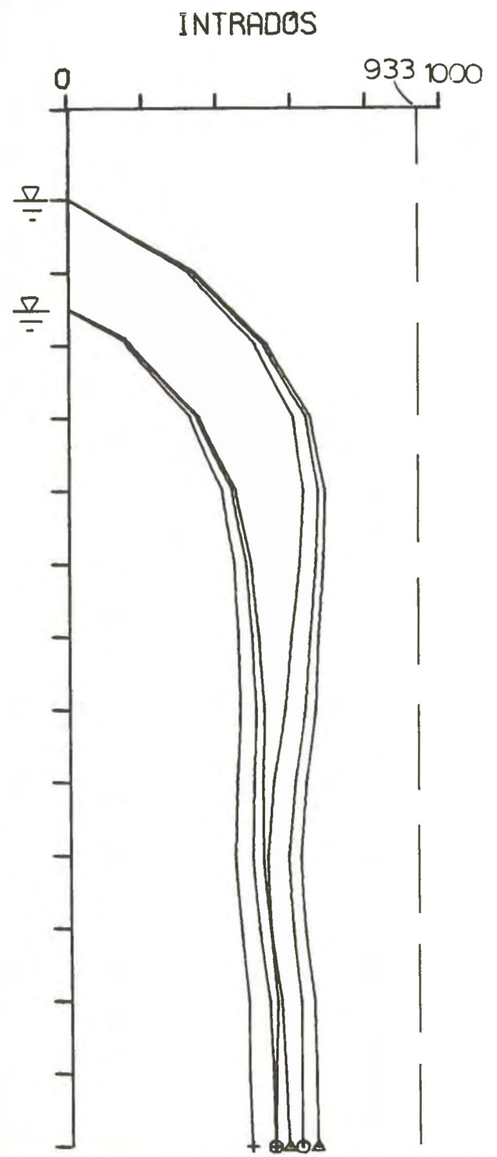
CROWN STRESS (PSI)





ABUTMENT STRESS (PSI)





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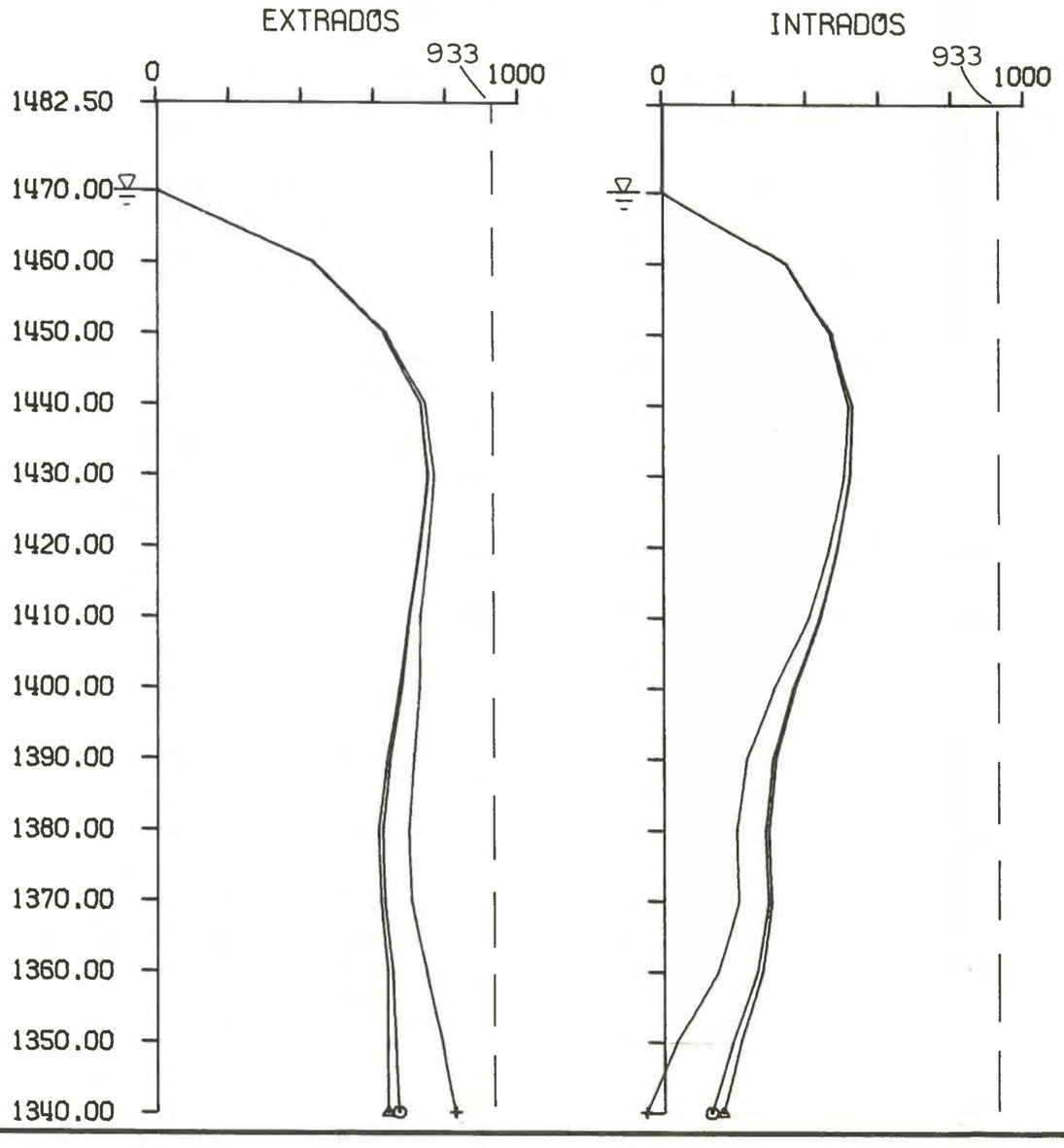
EXPLANATION

Symbol	Ec/Er	Young's Modulus	Poisson's Number (Ratio)
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△	3.5	1,000,000	5.0 (.20)
+	17.5	200,000	6.7 (.15)

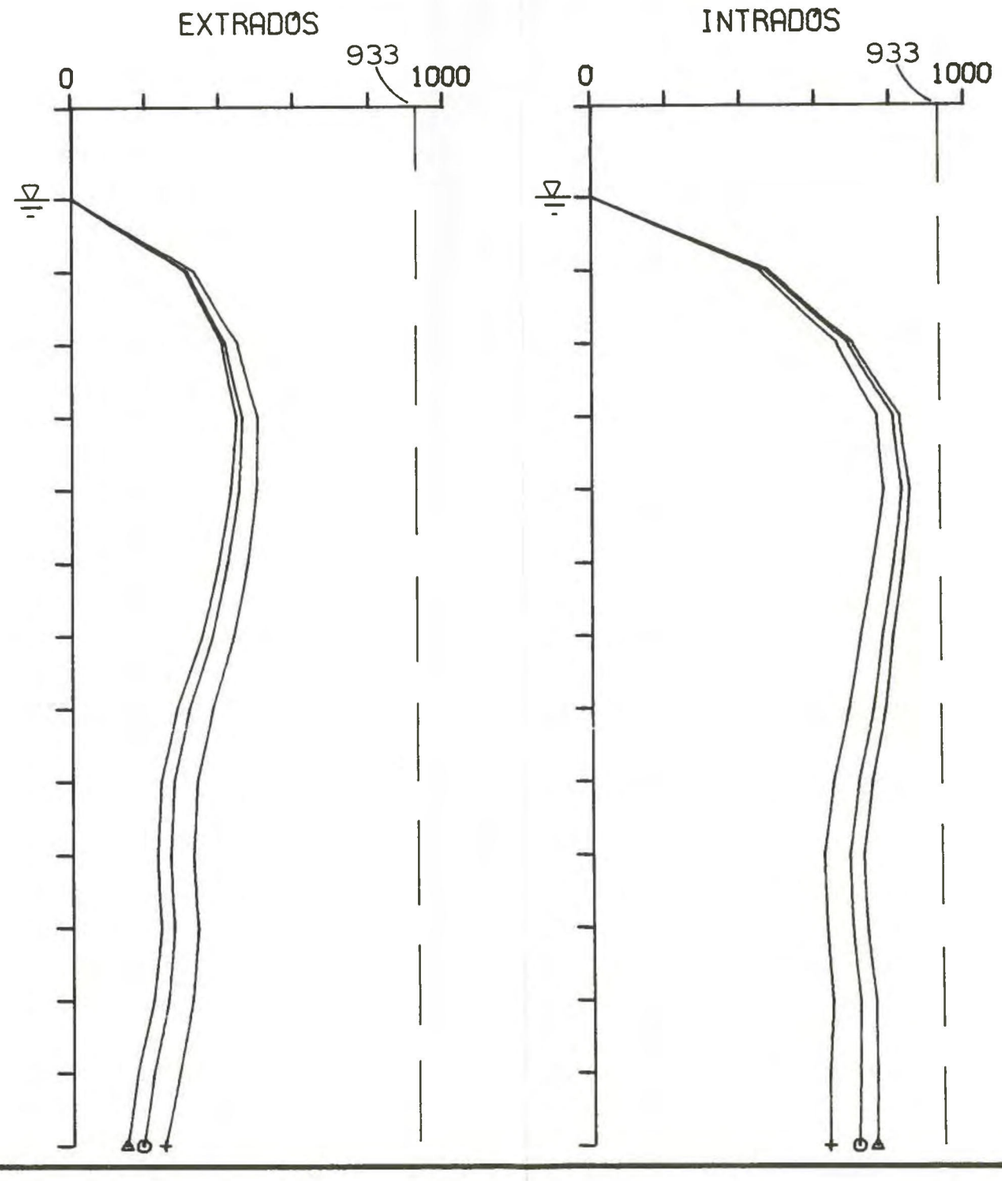
Earthquake Load = 0.4g

VARIATIONS OF STRESS AT DIFFERENT ROCK PROPERTIES - PSEUDO STATIC CASE		
PREPARED BY: JAD	VAIL DAM STRESS REANALYSIS for Kaiser Aetna Rancho California, Riverside County, California	Figure No. 4
CHECKED BY: ysl		
APPROVED BY: ysl	DATE: July 29, 1975 SCALE: As Shown PROJECT NUMBER: 75-088-AEH	
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CROWN STRESS (PSI)



ABUTMENT STRESS (PSI)



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As stated in Section 4.2, an allowable stress of 933 psi can be considered for combined water and earthquake load conditions. This allowable stress is shown in dashed line in Figure 3.

Figure 3 indicates that, the stresses which exist in the arches under the combined water and 0.2g earthquake loads are well within the proposed limit, and in fact, scarcely exceed the original design criteria.

At this point it could be argued that it would be safe to conclude Elevation 1470 was a "safe" operating level but in view of the discussions regarding uncertainty of earthquake prediction as given in Chapter 3, stresses under a postulated hypothesis of earthquake load of 0.4g were calculated with the water level at 1470 feet. The results are shown in Figure 4. It indicates clearly that, even under the extreme hypothesized earthquake loading condition, the resulting stresses are still within the 1/3 increase considered allowable.

Figures 3 and 4 (and also Figure 2) indicate that at the base of the dam some minor tension stresses occur at the crown intervals for the lowest probable limit of E_R. The original design criteria stated that no tensile stress should exist in the arch rings. The indicated tensile stresses are not considered to adversely affect the safety of Vail Dam, since:

1. The magnitude of maximum tensile stress is only 50 psi, far below the 120 to 300 psi tensile stress ranges permitted by other designers today.

2. The earthquake load is transitory and any tension at this low elevation would be transmitted tangentially into the foundation rock, even if cracks would occur.
3. It is doubtful that an E_R vaule at the base of the dam as low as 200,000 psi actually exists over a large enough area to affect the stress distribution or the overall structural action of the dam.
4. The actual conditions at the base would be such that a large portion of the load would be carried by cantilever rather than arch action.
5. Even were the section cracked, the capacity of the cracked section would be sufficient to carry all the arch load in the (readjusted) compression triangles without exceeding the compression stress design criteria.

4.6 Discussion of Empty Reservoir Condition

For static loading conditions, the empty reservoir condition analysis would produce no affect on the stability of Vail Dam.

For pseudo-static seismic loading condition, it is argued that:

1. The purpose of Vail Dam being for recreation and irrigation, any chance that the reservoir be empty is remote, and that this condition would coincide with even a moderate earthquake is highly remote.

2. It is normal engineering practice to disregard any loading condition which combines more than one remote possibility. An example of such reasoning is shown by the practice of not combining the stresses due to maximum flood level with those due to earthquake load.

It is our opinion that since the chance of having an empty reservoir subject to maximum earthquake loading is almost impossible, it need not be considered in design.

5. SUMMARY AND CONCLUSION

During field exploration, three core borings were drilled. Logging included a description of the rock, drill rate and RQD. Fresh samples of the foundation materials of the dam were obtained. A geologic map of the dam site area was also prepared.

Using rock core obtained from the field exploration, 12 unconfined compression tests were performed. Material properties, modulus of elasticity and Poisson's ratio, were obtained from the laboratory test results.

Since such an engineering analysis must be based on the in-situ modulus of elasticity, laboratory test results were modified based on correlation with the RQD determined from the core borings. A modulus reduction factor of 13 percent was determined and a modulus of elasticity of 600,000 psi and a Poisson's ratio of 0.17 was used for reanalysis. The analysis was also checked for possible upper and lower limits of material properties.

A detailed seismicity study was performed within a 100-mile radius centered at the dam site. Based on past recorded and pre-instrumented earthquake data and local geologic evidence, a design, psuedo-static, horizontal acceleration of 0.2g was selected. This earthquake load was combined with various water loads and used for pseudo-static, seismic stress analysis of the dam. The analyses were also performed for an upper level acceleration value of 0.4g.

It is concluded, based on the field and laboratory studies and stress analyses performed in this investigation, Vail Dam will be safe at a combined loading condition of water level at Elevation 1470 feet and maximum ground acceleration of 0.2g, as well as at a maximum surcharge storage to Elevation 1482.5. It is our opinion, therefore, on the basis of this analysis that the dam may be safely operated for all water surface elevations below the existing spillway crest of Elevation 1470.

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APPENDIX A

FIELD INVESTIGATION

APPENDIX A

FIELD INVESTIGATION

A.1 Drilling Program

The prime objective for the core holes was to obtain representative fresh samples of the foundation materials of the dam for modulus determination in the laboratory. In addition, the core samples were examined to determine whether the rock materials were similar throughout the foundation area of the dam.

Three core borings were drilled at the locations shown on Drawing A-1 (Geologic Map). All borings were drilled vertically with a Mobil B-51 rotary wash drill rig.

A ten-foot, NX core barrel was utilized to drill and sample the rock at all three locations. Close to 100 percent core recovery was obtained from each hole. The core was logged in the field then packaged for laboratory testing. Logging included a description of the rock, recording drilling rate and circulation loss of drilling fluids, and RQD determination. The RQD (Rock Quality Designation) was based on the number of fractures (joints) and the amount of softening or alteration in the rock mass as observed in the core from a drill hole. These data were compiled for each core hole and are shown on the logs attached to this Appendix.

A water pressure test was planned for the core hole (No. 2) on the right abutment. Due to jointing and fracturing in the rock, no water could be kept in the hole and therefore a test was not attempted.

A.2 Site Geology

As part of the field investigation a detailed geologic map was made in the immediate vicinity of the dam. Special consideration was given to a study of the foundation rock at the dam. Bedrock, surficial deposits and associated structural elements were mapped at a scale of 1"-60' and the results are presented on Drawing A-1. Available geologic literature pertaining to the site and area was reviewed including previous work done in 1970 for James M. Montgomery, Consulting Engineers, Inc. (Project No. 70-378-AH).

The general geologic setting of the region is for the most part complex with a relatively recent geologic history of uplift and degradation. The Oak and Vail Mountain Ranges in which the dam is situated are uplifted blocks within the Elsinore Fault Zone. Repeated episodes of deposition, uplift and erosion intervened by short periods of volcanism have created, within the last two million years, the present landscape. Presently the basin areas are being alluviated with the highlands being rapidly eroded away. The rugged basement rocks form a steep walled canyon downstream of the dam site.

The dam is founded entirely on basement rock of the Bedford Canyon Formation. These are considered the oldest (Triassic) rocks in the region and have undergone metamorphism since their deposition. Quaternary age continental deposits cap the basement rock at the higher elevation in the area. These water deposited sediments are relatively thin and for the most part poorly consolidated. The following sections describe the various rock units observed in the mapped area of the dam as shown on Drawing No. A-1.

SURFICIAL DEPOSITS

Fill

Fill, usually consisting of gray to brown silty sand with scattered fragments of schist, was placed in the mapped area as a result of road and dam construction. The thickest accumulation, in excess of 15 feet, forms the east periphery of the spillway and merges into an old roadcut to the south. Saturation of the toe of the fill by high water levels in Vail Lake resulted in numerous slumps and oversteepening of the fill slope. Tension cracks are evident along the top of slope. Minor amounts of fill form sections of the access road and apparently a small volume of excess fill from dam construction was pushed over the abutment slopes.

Alluvium

Relatively thin deposits of alluvium, consisting of silt, sand and gravel, cover the stream channel downstream of Vail Dam. The California Division of Mines Special Report 43, 1955, indicates 20 feet of alluvium was removed for construction of the dam. DH-1 encountered 40 feet of fill and alluvium.

A small deposit of sand, apparently derived from erosion of the adjacent fill slopes, extends along the east slope of the spillway and has also been mapped as alluvium.

Terrace Deposits

Remnants of nonmarine terrace deposits mantle the small, relatively level stream cut benches along the flanks of Temecula Canyon. These deposits consist of a mixture of silty sand with numerous rounded gravel and cobbles. Within the mapped area, they are estimated to be less than 10 feet thick.

Slopewash

Slopewash consists of thick accumulations of soil usually deposited in broad swales. The deposits are firm, porous and are composed of silty sand and sandy silt with scattered fragments of schist.

Bedrock

Bedford Canyon Formation (Trbc)

The Bedford Canyon Formation of Triassic(?) Age is the oldest formation in the region and is extensively exposed in the vicinity of Vail Dam. Within the mapped area, the Bedford Canyon Formation consists of gray with various hues of green and blue, micaceous schist and with lesser amounts of gneissic rocks. The formation has undergone metamorphism forming slates and argillites; mica schists have also formed in the vicinity of the dam.

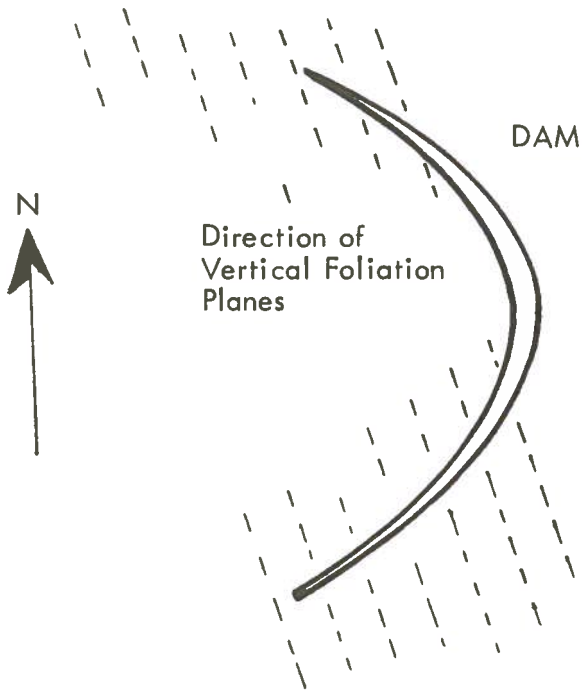
A close visual examination was made of the basement rock exposures on the right and left abutment areas as well as up and downstream of the dam. This examination combined with core drilling disclosed that there was no appreciable difference in rock type, composition or structure within the foundation materials of the dam. A general description of the Bedford Canyon Schist is as follows. Reference should be made to Table A-1 for definition of rock hardness, stratification, fracturing and weathering.

Rock Description and Foliation

The schist is well foliated which is a parallel orientation of flat or prismatic minerals and is the most characteristic feature of the rock. Their distribution and arrangement have caused a distinct thin banding of light to dark gray discontinuous layers. Mineral grain sizes vary with most ranging between

1/8 to 1/4 mm in diameter. The banding may vary from 1 mm to over 5 cm in thickness. When considering an entire outcrop the bands or foliation may appear uniform enough to be treated as a plane, however in an individual specimen (i.e., a piece of NX core) the foliation is very irregular with many contorted (wavy) and terminated planes.

The foliation has caused an anisotropic structural characteristic to the rock. The rock will break readily and move less smoothly along the foliation planes where platy minerals are uniformly aligned. In the vicinity of the dam foliation planes measures are very consistantly oriented throughout the entire foundation. The planes strike approximately North 15° West as shown in plan below and for all practical purposes are vertical.



Weathering and Hardness

There is some evidence of chemical alteration and weathering of the rock. The conditions vary from slightly to moderately weathered with no obvious changes at depth as noted in the core holes.

The rock as observed at the surface in outcrops ranges from moderately hard to hard. Cores tested for hardness in the field show the rock to be consistently "hard" as defined in Table A-1. Due to the high percent of core recovery in the drill holes and measured drill rates (average 15 feet per hour) the rock is considered relatively uniform with regard to hardness.

Jointing and Fracturing

Where accessible, joint set attitudes were measured and then plotted on joint rosette diagrams (Drawing No. A-1). This study was made in order to determine the degree of jointing and if these structural features had a preferred orientation. An explanation for the useage of rosette diagram is shown in Figure A-1 of this report. These data show that most joint sets dip at high angles, above 60 degrees to the north and south with corresponding strikes of north-east to east-west.

Fracturing and jointing varies with depths, ranging from "very fractured" (1 to 6 inch spacing) to "slightly fractured" (12 to 36 inch spacing). Rock observed at the surface is usually very fractured where it is exposed to the elements. As noted in the core boring (RQD) the rock usually becomes less fractured or jointed with depth. The prominent joints in most cases are open planar surfaces with a coating of iron oxide. Some

difficulty in drilling was experienced by the loss of drilling fluids through the open joints.

A refraction seismic survey in the spillway area conducted by Converse, Davis and Associates in 1970 indicates the rock has a relatively low P-wave velocity. This low velocity (10,000 to 12,000 feet/second) is an indication of either weathered rock and/or jointed and fractured rock. From general observation, it is believed that it may be a combination of both.

Temecula Arkose (Qta)

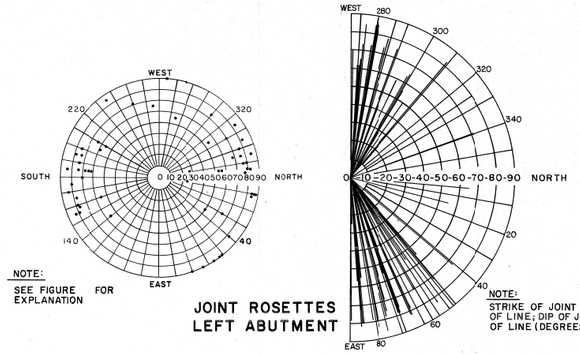
The Temecula Arkose unconformably overlies the Bedford Canyon Formation and is widely distributed north and east of Vail Dam. South of the dam, exposures of the arkose are limited to small, irregular outcrops consisting of arkosic sandstone, light-brown siltstone and white tuffaceous sandstone. The rocks range from soft to moderately hard, slightly to moderately fractured, and massive to moderately well-bedded.

A.3 Ground Water

The basement rocks are considered essentially non-water bearing especially near the ground surface. Due to the nearby reservoir some ground water may exist in open joints and fractures with some transmission between interconnecting planes. A ground water table was not determined during drilling, since water was used as a drilling fluid. High water loses (circulation) were recorded during drilling which suggest the water table, if one exists in the basement rock, is probably at greater depths than the borings.

GEOLOGIC MAP

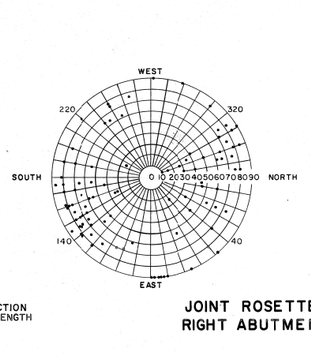
PREPARED BY: J.A.C.	VAIL DAM STRESS REANALYSIS FOR KAISER AETNA RANCHO CALIFORNIA, RIVERSIDE, COUNTY	DRAWING NO. A-1
CHECKED BY: C.M.F.		
APPROVED BY:	DATE: JULY 30, 1975 SCALE: 1" = 60'	PROJECT NUMBER: 75-088-AEH
CONVERSE, DAVIS AND ASSOCIATES	*Consulting Engineers and Geologists*	



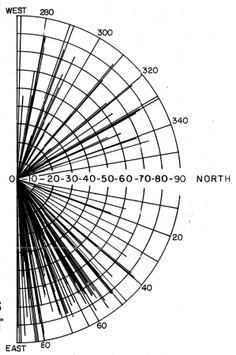
NOTE:
SEE FIGURE FOR EXPLANATION

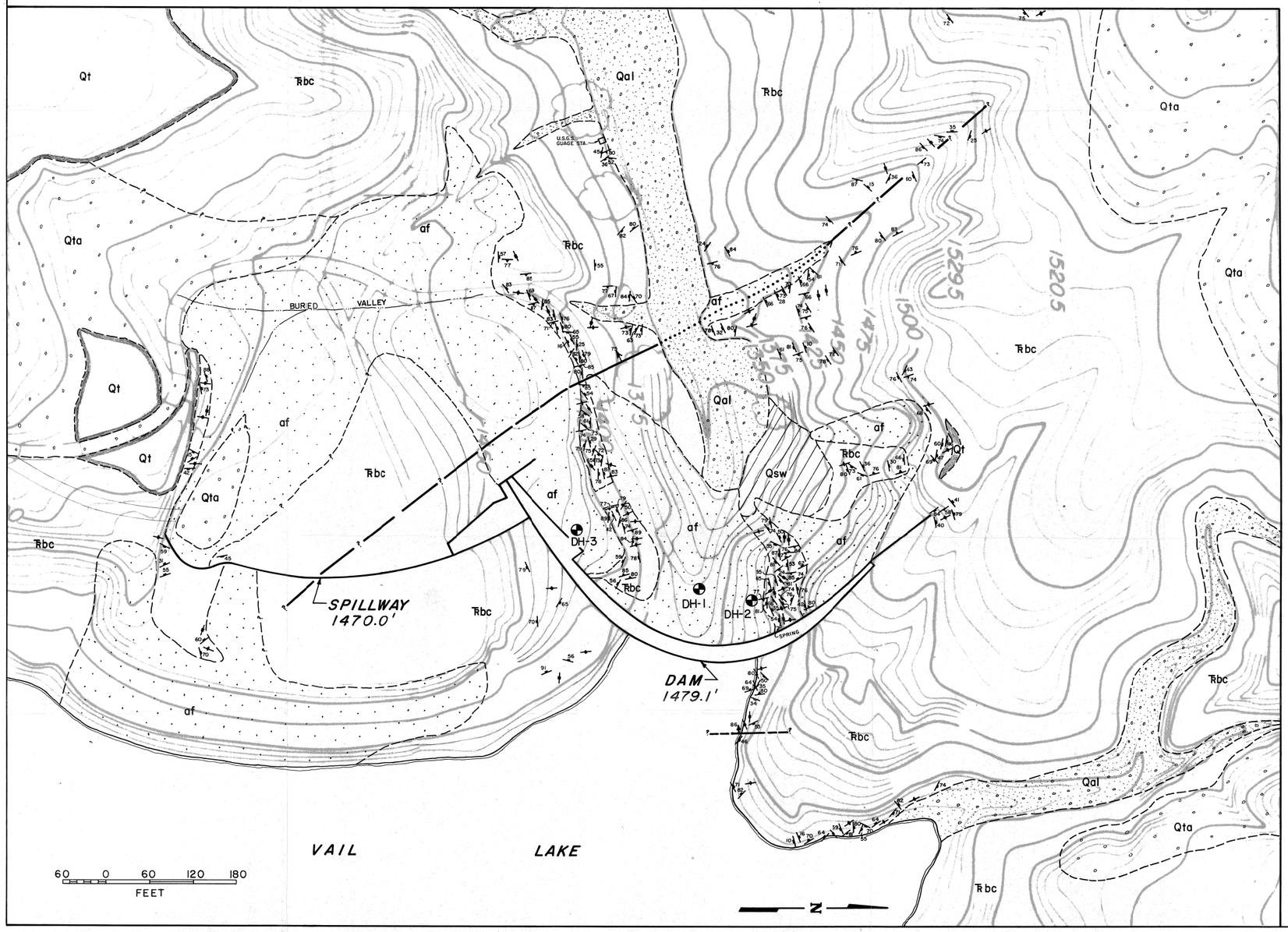
JOINT ROSETTES
LEFT ABUTMENT

NOTE:
STRIKE OF JOINT INDICATED BY DIRECTION OF LINE; DIP OF JOINT INDICATED BY LENGTH OF LINE (DEGREES AS SHOWN)



JOINT ROSETTES
RIGHT ABUTMENT





EXPLANATION

SURFICIAL DEPOSITS

PLEISTOCENE TO RECENT

- af — ARTIFICIAL FILL
- Qal — STREAM ALLUVIUM
- Qsw — SLOPEWASH (IN EXCESS OF 5 FT. THICK)
- Qt — TERRACE DEPOSITS, (RED BROWN SILTY SAND WITH ROUNDED GRAVEL & COBBLES)
- Qta — TEMECULA ARKOSE, (LIGHT GRAY & BROWN SILT, SANDSTONE, SILTSTONE & TUFFACEOUS SANDSTONE)

UNCONFORMITY

TRIASSIC

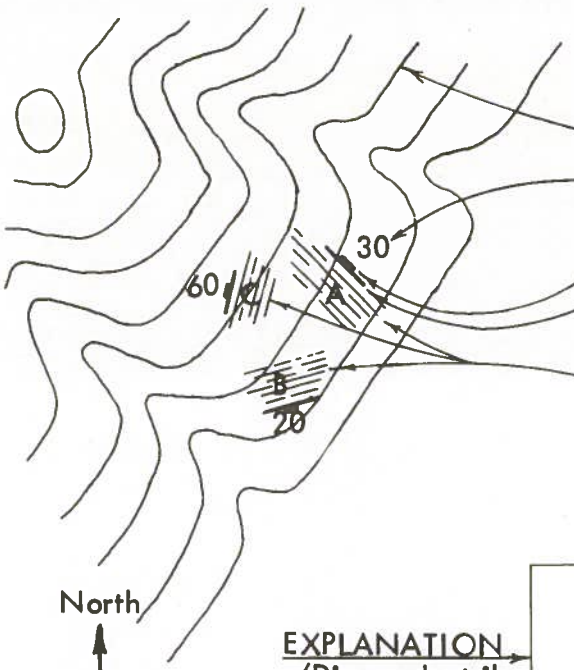
- Trbc — BEDFORD CANYON FORMATION, DARK GRAY, GREEN GRAY & BLACK MICACEOUS SCHIST WITH MINOR AMOUNTS OF GNEISS

SYMBOLS

- GEOLOGIC CONTACT, DASHED WHERE APPROXIMATELY LOCATED, QUESTIONED WHERE UNCERTAIN
- 75 — STRIKE AND DIP OF FOLIATION IN METAMORPHIC ROCKS
- STRIKE OF VERTICAL FOLIATION
- 74 — STRIKE AND DIP OF JOINT
- STRIKE AND DIP OF VERTICAL JOINT
- 75 — FAULT, DASHED WHERE APPROXIMATELY LOCATED, DOTTED WHERE CONCEALED, QUESTIONED WHERE UNCERTAIN
- DH-1 — DIAMOND CORE HOLE

NOTE:
TOPOGRAPHY PREPARED BY READ & LASSAR, 1965

FIELD OBSERVATIONS



Existing ground contours

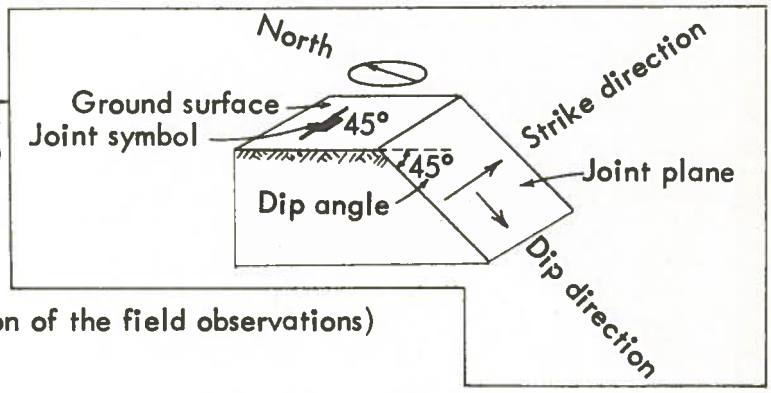
Measured dip angle of joint planes (30°)

Bar indicates direction of dip (N45°E)

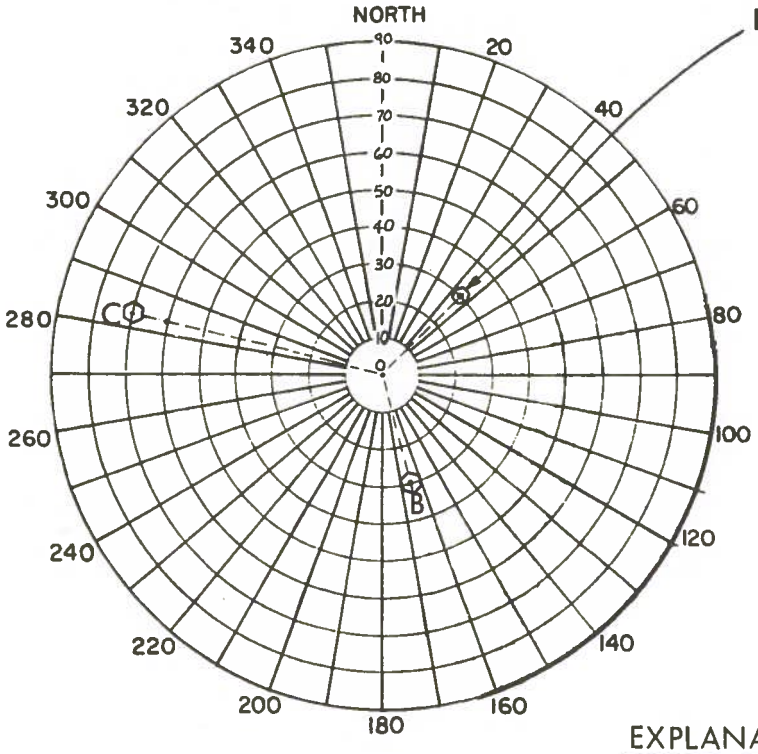
Measured strike (trend) angle of joint plane (N45°W)

Joint sets as observed in field

EXPLANATION
(Dip and strike of joint plane)



JOINT ROSETTE, (Presentation of the field observations)



Example A: Plot of joints (A)- dip angle (30°NE) shown on circles, dip direction (N45°E) plotted on radials. Strike of joints not shown.

EXPLANATION OF JOINT ROSETTES

VAIL DAM STRESS REANALYSIS
for Kaiser Aetna
Rancho California, Riverside County, California

FIGURE
A - 1

CONVERSE, DAVIS AND ASSOCIATES — *Consulting Engineers and Geologists* — PROJ. NO. 75-088-AEH

TABLE A-1

DEFINITION OF ROCK DESCRIPTION

HARDNESS	SOFT	- Can be dug by hand and crushed by fingers
	MODERATELY HARD	- Friable, can be gouged deeply with knife and will crumble readily under light hammer blows
	HARD	- Knife scratch leaves dust trace, will withstand a few hammer blows before breaking
	VERY	- Scratched with knife with difficulty, difficult to break with hammer blows
STRATIFICATION	THINLY LAMINATED	- less than 1/10"
	LAMINATED	- 1/10" to 1/2"
	VERY THINLY BEDDED	- 1/2" to 2"
	THINLY BEDDED	- 2" to 2 feet
	THICKLY BEDDED (Massive)	- more than 2 feet
FRACTURING	INTENSELY FRACTURED	- less than 1" spacing
	VERY FRACTURED	- 1" to 6" spacing
	MODERATELY FRACTURED	- 6" to 12" spacing
	SLIGHTLY FRACTURED	- 12" to 36" spacing
	MASSIVE -	- <36" spacing
WEATHERING	VERY WEATHERED	- Abundant fractures coated with oxides, carbonates, sulphates, mud, etc., through discoloration, rock disintegration, mineral decomposition
	MODERATELY WEATHERED	- Some fracture coating, moderate or localized discoloration, little to no affect on cementation, slight mineral decomposition
	SLIGHTLY WEATHERED	- A few stained fractures, slight discoloration, little to no affect on cementation, no mineral decomposition
	FRESH	- Unaffected by weathering agents, no appreciable change with depth

PROJECT NO. 75-088-AEH

CORE HOLE LOG

SHEET 1 NO. 1

HOLE NO. DH-1

CONVERSE, DAVIS AND ASSOCIATES

PROJECT Kaiser Aetna FEATURE Vail Dam LOCATION Toe Of Dam

INCLINATION Vertical BEARING - STARTED May 21, 1975 COMPLETED May 28, 1975

TOTAL DEPTH 51.2' GROUND ELEV. 1368.0'± HOLE SIZE NX

ELEV. WATER TABLE Dry WATER PRESSURE TESTS - TO - NO. CORE BOXES 2

LOGGED BY C.M.P. CONTRACTOR Pioneer Drilling Co. DRILL FOREMAN B. Danials

THIS LOG IS APPLICABLE ONLY AT THIS LOCATION AND TIME. CONDITIONS MAY DIFFER AT OTHER LOCATIONS OR TIME.

Elev.	RQD %	Depth	Core Rec. %	Graphic Log	Classification and Physical Condition	Drilling Information
1368'					FILL - SILT, SAND, GRAVEL, COBBLES in varying amounts & boulders to 3 ft. in diameter, loose	difficult drilling
		10'				← bottom flight auger casing
1348'		20'				↖ lost circulation 11 ft./hr. tricone continued drilling without circulation
		30'				grout 15 to 37 ft. attempt core, turned out to be large boulder ←
1328'		40'				← lost 100% circulation ↖ grout 37 to 40 ft., start coring, 60% circ. 15 ft./hr. drill rate
	54		95		BASEMENT ROCK - BIOTITE SCHIST, light gray (when dry), mod. weath., v. fract., open irreg. joints with iron staining, distinct foliation (thinly laminated), hard	
	43		100			6 to 8 ft./hr. drill rate
		50'				↖ 20% circulation
					Bottom of hole elevation 1316.8'	

PROJECT NO. 75-088-AEH

CORE HOLE LOG

SHEET 1 NO. 1

HOLE NO. DH-2

CONVERSE, DAVIS AND ASSOCIATES

PROJECT Kaiser Aetna FEATURE Vail Dam LOCATION Lower Right Abutment

INCLINATION Vertical BEARING - STARTED May 28, 1975 COMPLETED June 2, 1975

TOTAL DEPTH 69.0' GROUND ELEV. 1384.0'± HOLE SIZE NX

ELEV. WATER TABLE Dry WATER PRESSURE TESTS - TO - NO. CORE BOXES 6

LOGGED BY C.M.P. CONTRACTOR Pioneer Drilling Co. DRILL FOREMAN B. Danials

THIS LOG IS APPLICABLE ONLY AT THIS LOCATION AND TIME. CONDITIONS MAY DIFFER AT OTHER LOCATIONS OR TIME.

Elev.	RQD %	Depth	Core Rec. %	Graphic Log	Classification and Physical Condition	Drilling Information
1384'		10'			FILL - TALUS - SLOPEWASH - SANDY SILT (undifferentiated) with angular fragments of schist, loose	difficult drilling with tricone bit, lost 100% circulation, grout 0 to 3 ft., attempt to core lost circulation grout, attempt to core, turned out to be large boulder, lost 100% circulation
1364'		20'			BASEMENT ROCK - BIOTITE SCHIST, light gray (when dry), mod. weath., v. fract., open joints with iron staining, distinct foliation (vert., thinly laminated), hard, med. to fine grained	set 4" casing 100% circulation
	13		100			end rock bit, start coring, 20 ft./hr. drill rate, blocked at 27' 75% circulation
	14	30'	100			
	67		100		moderately fractured slightly weathered	lost 90% circulation 20 ft./hr. drill rate
1344'		40'			slightly fractured	grout 18 to 39 ft. 15 ft./hr. drill rate lost 10% circulation lost 80% circulation
	70		100			
		50'			slightly to moderately fractured (open, approx. 45° angle)	15 ft./hr. average drill rate
	52		100			
1324'		60'			very fractured slightly to moderately altered (weathered)	lost 100% circulation grout 30 to 59 ft. lost 40% circulation
	41		100		slightly to moderately fractured (open), slightly altered	
	60		95		intensely fractured	lost 100% circulation grout 55 to 69 ft.
		70'			Bottom of hole elevation 1315.0'	

FORM NO. CD-68

PROJECT NO. 75-088-AEH

CORE HOLE LOG

SHEET 1 NO. 1

HOLE NO. DH-3

CONVERSE, DAVIS AND ASSOCIATES

PROJECT Kaiser Aetna FEATURE Vail Dam LOCATION Left Abutment

INCLINATION Vertical BEARING - STARTED June 3, 1975 COMPLETED June 4, 1975

TOTAL DEPTH 53.8' GROUND ELEV. 1436.0'± HOLE SIZE NX

ELEV. WATER TABLE Dry WATER PRESSURE TESTS - TO - NO. CORE BOXES 5

LOGGED BY C.M.P. CONTRACTOR Pioneer Drilling Co. DRILL FOREMAN B. Danials

THIS LOG IS APPLICABLE ONLY AT THIS LOCATION AND TIME. CONDITIONS MAY DIFFER AT OTHER LOCATIONS OR TIME.

Elev.	RQD %	Depth	Core Rec. %	Graphic Log	Classification and Physical Condition	Drilling Information
1436'					FILL - SANDY SILT & gravel (pea to 6") 10 to 25%, cobbles, red-brown, firm	easy drilling with tricone bit, lost 25% circulation
		10'				
					BASEMENT ROCK - BIOTITE SCHIST, light gray (when dry), mod. weath., mod. to v. fract., open joints with iron staining and random orientation, foliation nearly vertical	← set 4" casing, start coring, lost 10% circulation
1416'	32	20'	78		occ. slightly gneissic	← lost 10% circulation
	25	30'	85		very fractured, open joints (15° to 20° dip) and iron stained	← lost 20% circulation drill rate 12 ft./hr.
					very weathered (locally crushed)	
1396'	82	40'	98		moderately to very fractured (10° to 15° dip), slightly weathered	← drill rate 15 ft/hr. lost 10% to 20% circulation
	85	50'	100		moderately fractured, tight with minor iron staining on surfaces	← drill rate 15 ft./hr. (smooth & constant) ← lost 40% circulation
					Bottom of hole elevation 1382.2'	

FORM NO. C-1-68

APPENDIX B

LABORATORY INVESTIGATION

APPENDIX B

LABORATORY INVESTIGATION

B.1 Rock Core Modulus and Poisson's Ratio Test Procedure and Results

Specimens tested were selected from the non-fractured portions of NX-size rock core recovered from the three borings drilled for this project (see Core Hole logs). Eight samples were tested for low stress (up to 1800 psi) level modulus and Poisson's Ratio. Four samples were tested for high stress (up to 10,000 psi) levels.

The specimens cut from the core samples were right circular cylinders with length to diameter ratio of approximately 2:1. The specimen end surfaces were trimed and sanded to insure that they were parallel and at right angles to the longitudinal axis.

Each specimen tested was instrumented with four electrical strain gages. The grid lengths of gages were 0.5 inch and 0.25 inch. Two gages were aligned longitudinally, approximately on the center of specimen to measure an average axial strain. The other two gages were aligned circumferentially in the opposite direction to measure an average radial strain. Eastman 910 adhesive was used to attach the gages. Average strain readings were obtained in the axial and circumferential directions using two temperature gages compensated for arm wheatstone bridges.

The test apparatus for low stress level modulus and Poisson's Ratio consisted of the following components:

1. Loading frame with screw-type constant-rate loading device.
2. Proving ring - load measuring device.
3. Two steel bearing blocks; one rigid, one spherically seated.

4. Two calibrated potentiometer strain readout instruments.

The test apparatus for high stress level modulus and ultimate specimen strength consisted of the following components:

1. Loading frame with hydraulic ram constant-rate loading device.
2. Hydraulic pressure load measuring device.
3. Two steel bearing blocks; one rigid, one spherically seated.
4. One calibrated potentiometer strain readout instrument (axial strain only).

The loads were applied continuously and without shock to about 1800 psi in the low stress level testing. Loads were applied continuously to failure in the high stress level testing. Loads and strains were recorded at frequent evenly spaced intervals during all tests.

The value of Poisson's Ratio, ν_R, was determined by the following formula:

$$\nu_R = \frac{E_R}{E_x}$$

where E_x relates incremental longitudinal stress ($\Delta\sigma_z$), to incremental radial strain ($\Delta\varepsilon_x$) and is defined as follows:

$$E_x = \frac{\Delta\sigma_z}{\Delta\varepsilon_x}$$

The values of Young's Modulus, E_R, Poisson's Ratio, ν_R and unconfined compression strength are summarized in Table B-1.

The Young's Modulus (E_R), was determined by the following relationship:

$$E_R = \frac{\Delta\sigma_z}{\Delta\varepsilon_z}$$

Where $\Delta\sigma_z$ is the incremental stress and $\Delta\varepsilon_z$ is the incremental strain, both measured along the longitudinal direction.

The values of Young's Modulus (E_R) reported represent average slopes of the straight line portion of the axial stress vs. axial strain curves presented in Drawings B-1 through B-5. Poisson's Ratio was evaluated as defined above using the average value of E_x from the axial stress vs. radial strain curves for the same axial stress range over which E_R is determined.

The average value of Young's modulus was determined as 4.6×10^6 psi with a standard deviation of 3.1×10^6 (indicating a significant variation in strength among the samples tested). The average Poisson's Ratio is determined as 0.17 with a standard deviation of 0.03.

TABLE B-1

LABORATORY TEST RESULTS

Drill Hole No.	Average Depth (Feet)	Low Stress Level: Minimum Tangent Modulus-E_R (psi)	Low Stress Level: Average Poisson's Ratio-V_R	High Stress Level: Minimum Tangent Modulus-E_R (psi)	Unconfined Compression Strength (psi)
1	41.7	7.6×10^6	0.12	---------	12,000
1	45.4	5.0×10^6	0.20	2.4×10^6	12,000
2	41.3	6.8×10^6	0.18	---------	------
2	63.9	8.4×10^6	0.18	6.4×10^6	22,000
2	65.6	5.9×10^6	0.18	4.0×10^6	29,000
3	14.8	3.2×10^5	0.20	---------	------
3	35.9	1.2×10^6	----	---------	------
3	37.5	2.0×10^6	0.18	1.9×10^6	5,000
	Average	4.6×10^6	0.17		

B.2 Selection of In-Situ Modulus of Deformation

Large-scale field tests have shown that the modulus of deformation of a rock mass is lower than the static modulus determined by laboratory tests. While a laboratory specimen may adequately represent the rock material, it does not include various rock defects such as joints and fractures which have a profound effect on the deformation characteristics of the rock mass. The selection of proper in-situ moduli to engineering design requires a geologic evaluation of the rock mass, which may be determined by field mapping, joint measurements, core drilling, drilling records, and geophysical testing. Variations in lithology, bedding, geologic structure, and the spacing and character of the geological discontinuities necessarily make this evaluation somewhat qualitative.

Deere, et al. developed a method of defining rock quality called Rock Quality Designation (RQD). The RQD is the percent of the coring interval represented in the core box by sound, unweathered cylinders at least 4 inches long; core fragments and weathered core are considered as additional core loss. The RQD offers a method of determining rock quality which is independent of laboratory tests. The reduction factor (after Coon and Merritt) to apply to laboratory tests for determining in-situ rock modulus is presented in Table B-2.

TABLE B-2

LABORATORY MODULUS REDUCTION FACTORS
(after Conn and Merritt)

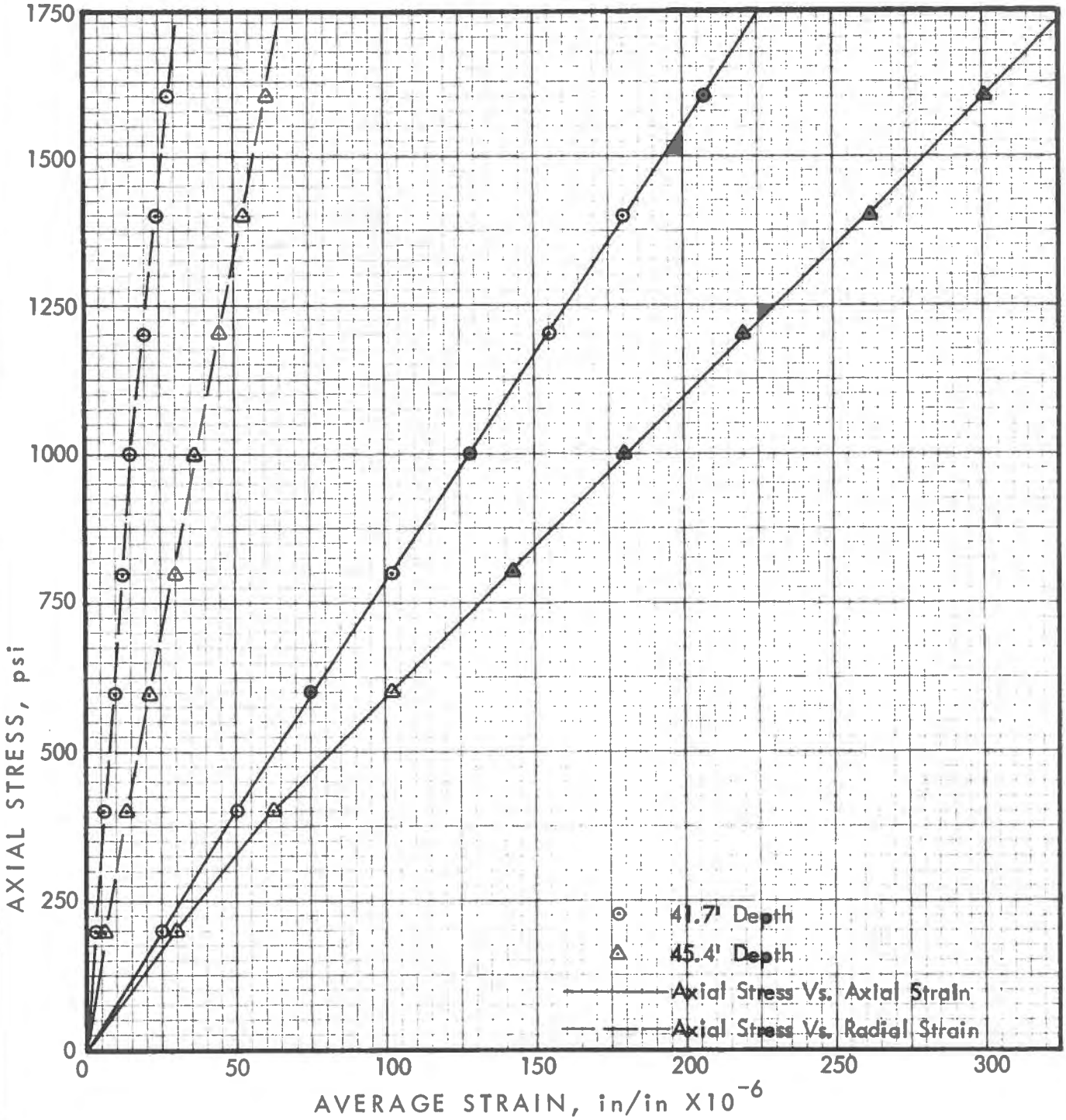
Classification	RQD (%)	Laboratory Test Results Reduction Factor
Very Poor	0-25	<0.20
Poor	25-50	<0.20
Fair	50-75	0.20-0.50
Good	75-90	0.50-0.80
Excellent	90-100	0.80-1.00

Deere and others suggested that the data below a rock quality of 60 percent the appropriate reduction factor to be used is between 0.1 and 0.2.

The RQD for this project is presented in Table B-3, and the average RQD is about 50 percent. Based on the geologic data presented in this report, the Rock Classification defined in Table B-2 above and data collected by Deere, Coon and others, indicate that a modulus reduction factor in excess of 0.10 but less than 0.20 should be used.

For the materials forming the foundation and abutments of Vail Dam, a factor of 0.13 was selected. It is considered that this value is reasonably conservative and adequately represents the foundation materials most affected by the arch action of the dam.

The in-situ modulus of elasticity used for analysis is therefore 13% of 4.6×10^6 psi (see Section B-1) or 600,000 psi. The upper and lower limits represented by one standard deviation of the laboratory test results are respectively, 1,000,000 and 200,000 psi. The analysis presented in Section 4 of the report performs for the selected as well as the upper and lower limits of the modulus values.



DH-1 Rock Core Samples
Unconfined Compression Tests
Stress Strain Data at Low Stress Levels

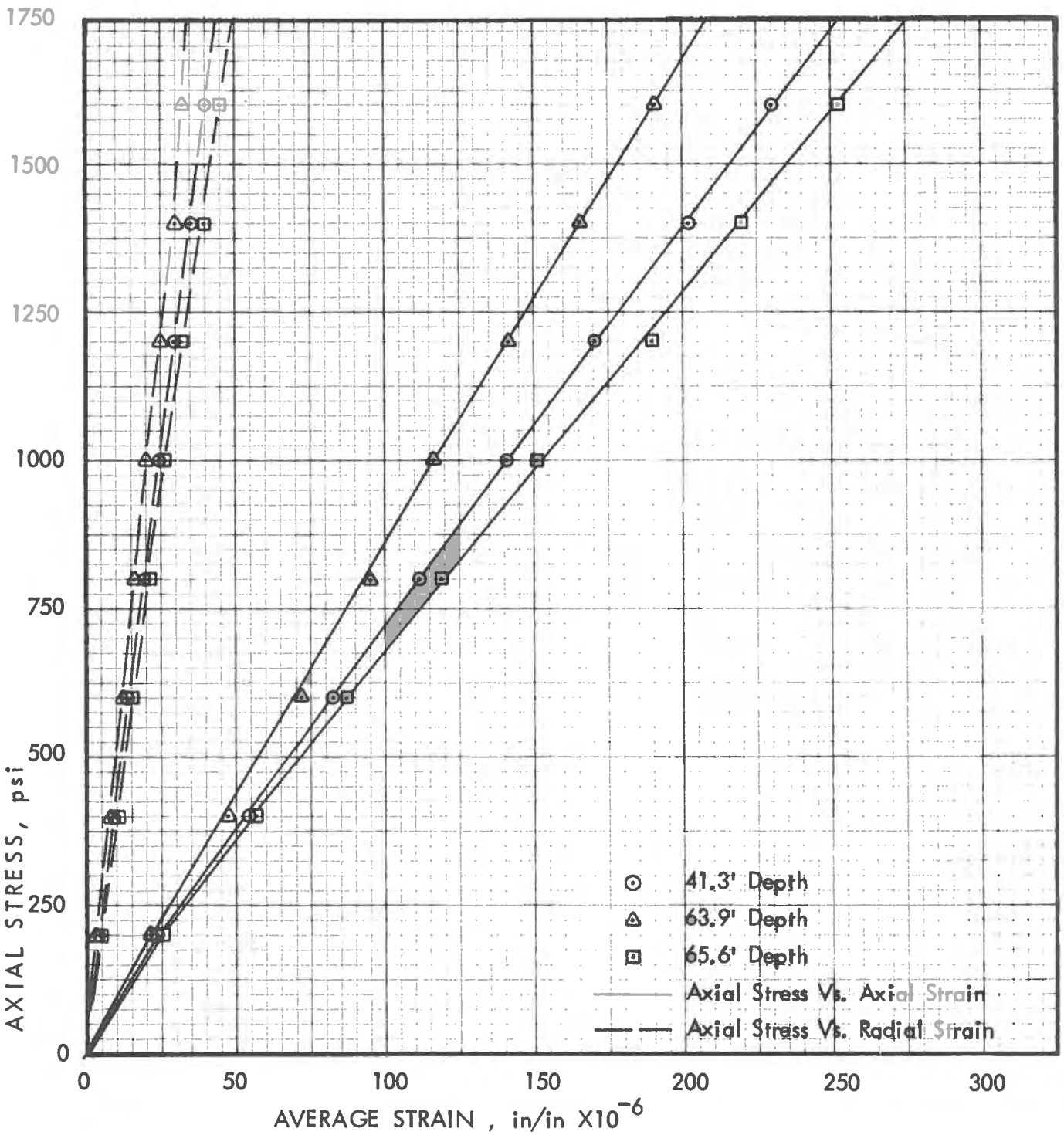
Note: sign of radial strains is opposite to that of axial strains

VAIL DAM STRESS REANALYSIS
for Kaiser Aetna
Rancho California, Riverside County, California

DRAWING NO. B-1

CONVERSE, DAVIS AND ASSOCIATES *Consulting Engineers and Geologists*

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DH-2 Rock Core Samples
Unconfined Compression Tests
Stress-Strain Data at Low Stress Levels

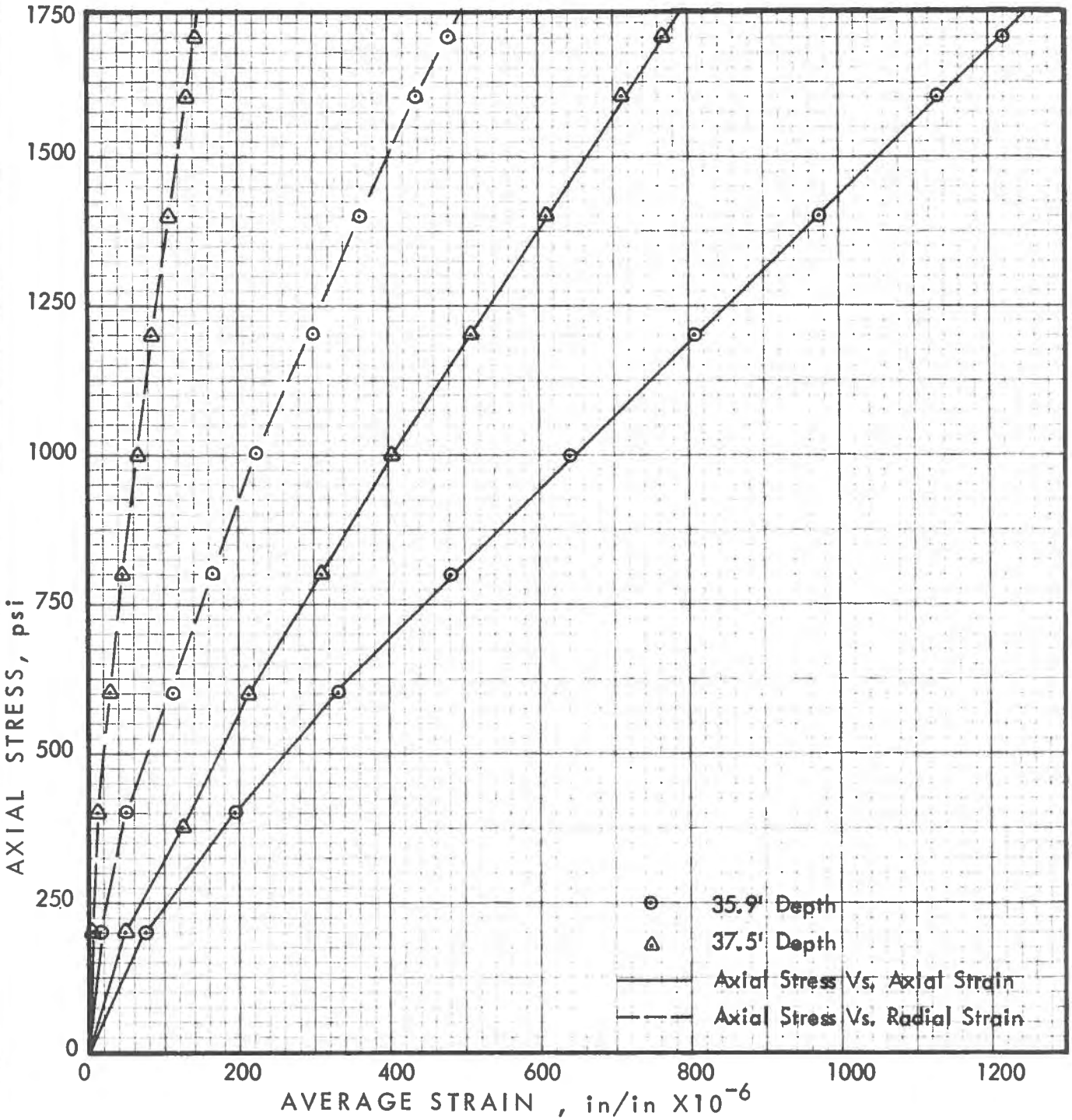
Note: sign of radial strains is opposite to that of axial strains

VAIL DAM STRESS REANALYSIS
for Kaiser Aetna
Rancho California, Riverside County, California

DRAWING NO. B-2

CONVERSE, DAVIS AND ASSOCIATES *Consulting Engineers and Geologists* PROJ. NO. 75-088-AEH

FORM NO. D25-7M-W APPROVED FOR PUBLICATION — BY



DH-3 Rock Core Samples
Unconfined Compression Tests
Stress-Strain Data at Low Stress Levels

Note: sign of radial strains is opposite to that of axial strains

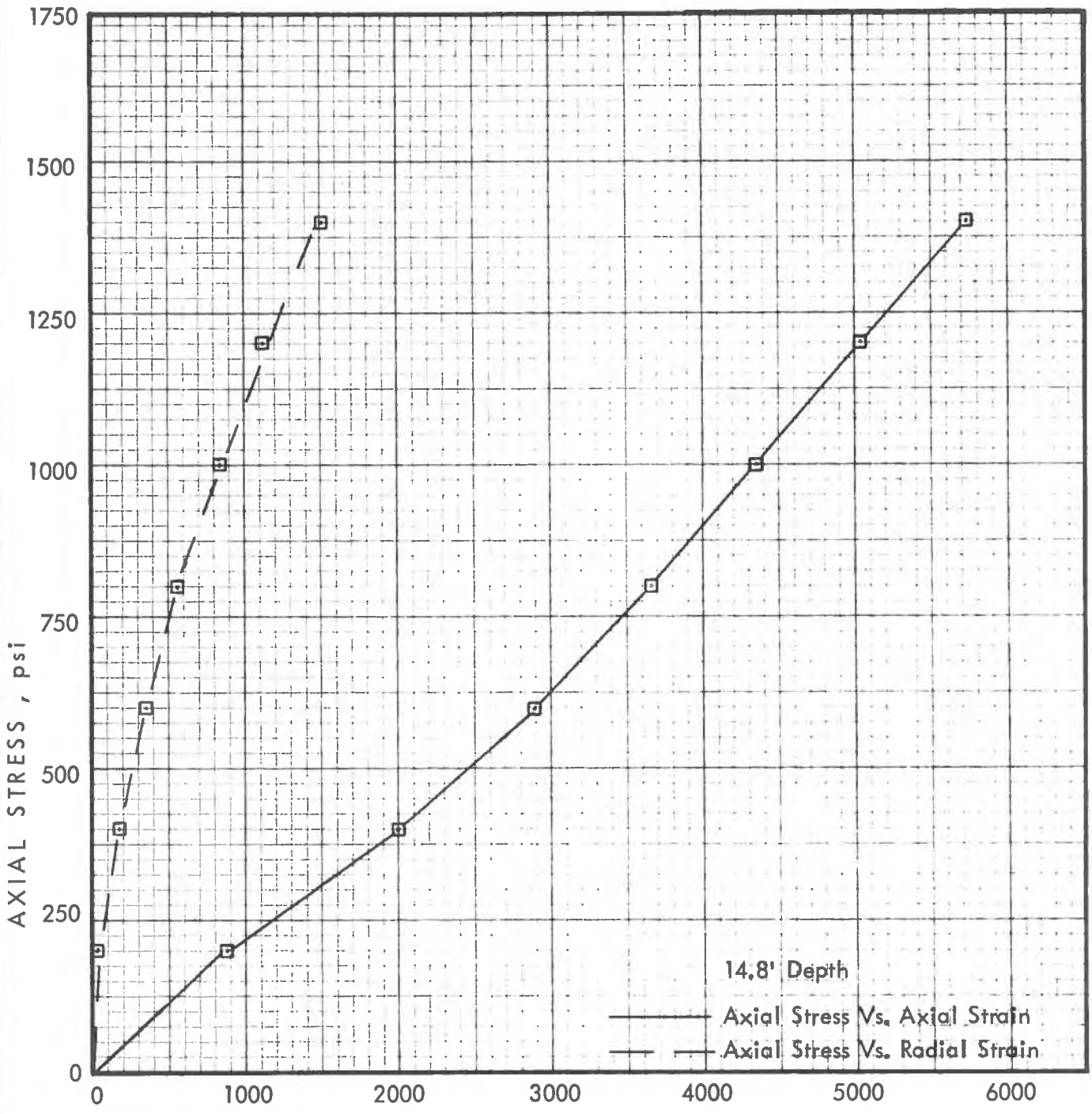
VAIL DAM STRESS REANALYSIS
for Kaiser Aetna
Rancho California, Riverside County, California

DRAWING NO. B-3

CONVERSE, DAVIS AND ASSOCIATES *Consulting Engineers and Geologists*

PROJ. NO. 75-088-AEH

FORM NO. D25-74W APPROVED FOR PUBLICATION 2/29/08 BY



DH-3 Rock Core Samples
Unconfined Compression Tests
Stress Strain Data at Low Stress Levels

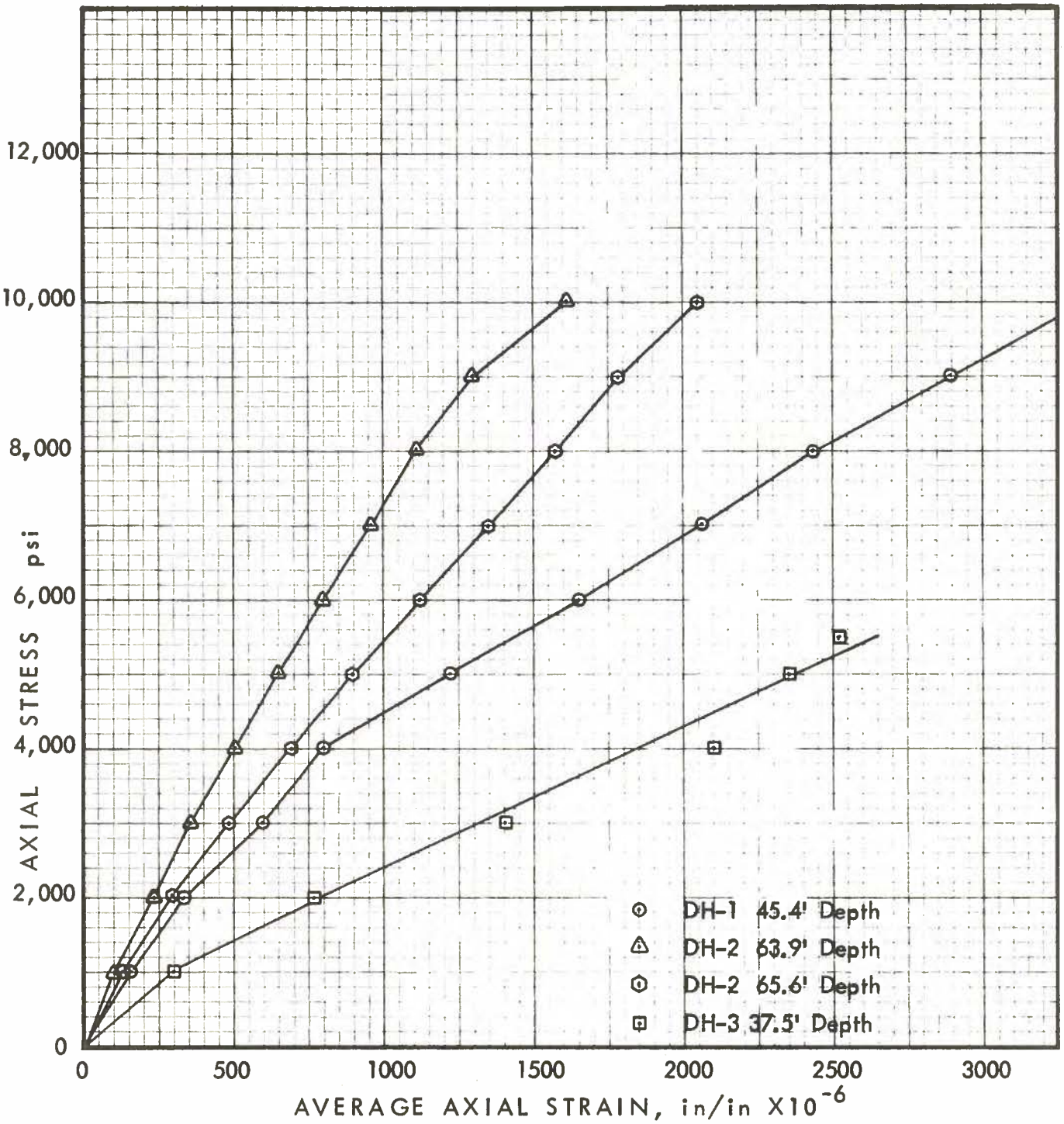
Note: sign of radial strains is opposite to that of axial strains

VAIL DAM STRESS REANALYSIS
for Kaiser Aetna
Rancho California, Riverside County, California

DRAWING NO. B-4

CONVERSE, DAVIS AND ASSOCIATES *Consulting Engineers and Geologists* PROJ. NO. 75-088-AEH

FORM NO. D24-74W APPROVED FOR PUBLICATION BY



Rock Core Samples
Unconfined Compression Tests
Axial-Strain Data at High Stress Levels

Note: strain measurments were terminated at 10,000 psi axial stress

VAIL DAM STRESS REANALYSIS
for Kaiser Aetna
Rancho California, Riverside County, California

DRAWING NO. B-5

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FORM NO. D25-24W APPROVED FOR PUBLICATION 12/10 BY

TABLE B - 3

ROCK QUALITY DESIGNATION (RQD)
OF VAIL DAMSITE

Core Run	Depth (Feet)	Length of Core Run	4-in.+ Pieces Length	Percent Recovery	Length Recovery	RQD Percent	RQD Rock Description
DH-1	Center						
Run 1	41.5-45.0	3.5	1.8	95	3.3	54	Fair
Run 2	45.0-51.2	6.2	2.7	100	6.2	43	Poor
DH-2	Right Abutment						
Run 1	24.0-27.0	3.0	0.4	100	3.0	13	Very Poor
Run 2	22.0-29.8	2.8	0.4	100	2.8	14	Very Poor
Run 3	29.8-39.5	9.7	6.5	100	9.7	67	Fair
Run 4	39.5-49.2	9.7	6.8	100	9.7	70	Fair
Run 5	49.2-58.4	9.2	4.8	100	9.2	52	Fair
Run 6	58.4-67.0	8.6	3.5	100	8.6	41	Poor
Run 7	67.0-69.0	2.0	1.2	95	2.0	60	Fair
DH-3	Left Abutment						
Run 1	14.0-24.0	10.0	2.5	78	7.8	32	Poor
Run 2	24.0-34.0	10.0	2.1	85	8.5	25	Poor
Run 3	34.0-44.0	10.0	8.0	98	9.8	82	Good
Run 4	44.0-53.8	9.8	8.5	100	9.8	85	Good
					Average	49	

APPENDIX C

FAULTING AND SEISMICITY

APPENDIX C

FAULTING AND SEISMICITY

C.1 Regional and Local Faulting

The geologic structure of the entire Southern California area is dominated mainly by the northwest trending faults associated with the right-lateral San Andreas system. Faults such as the Elsinore, Agua Caliente, San Jacinto, and the San Andreas are the major faults in this system (see Figure C-1) and are known to be seismically active. The San Andreas and San Jacinto faults have ruptured the ground surface in historic times. Table C-1 summarizes the active or potentially active faults, their length and distance to the Vail dam site, probable recurrence interval and maximum credible magnitude.

The San Jacinto Fault, a major branch of the San Andreas fault system, has repeatedly produced disastrous earthquakes in Southern California. Destructive or potentially destructive earthquakes centered near San Jacinto and Hemet were felt in 1899 (6.5? magnitude) and in 1918 (6.8 magnitude). In 1923 an earthquake with a magnitude of 6.25 occurred in Reche Canyon along a possible extension of the Casa Loma Fault. Several other earthquakes with magnitudes of 6.0 or greater have occurred along the San Jacinto Fault and its subsidiary faults in historic time. Ground breakage has occurred during at least some of these events.

The Elsinore and associated faults located near the site also are seismically active though no ground breakage has been observed in historic time. Magnitudes recorded from earthquakes generated along this fault system are considerably less than those of the San Jacinto Fault, however, the Elsinore Fault is capable of producing a 7.6 magnitude (maximum credible) earthquake.

Near the Elsinore Lake Basin, the Elsinore fault zone has at least three main branches and numerous subsidiary traces. Locally, the main branches have been called: Glen Ivy, Wildomar and Willard Faults. The Wildomar segment trends in a northwest-southeast direction and is located 6.5 miles southwest of the dam. According to published geologic maps of the area, the faults show Quaternary displacement, however, no historic seismicity has been recorded. This and any branch faults associated with the Elsinore fault zone should be considered active.

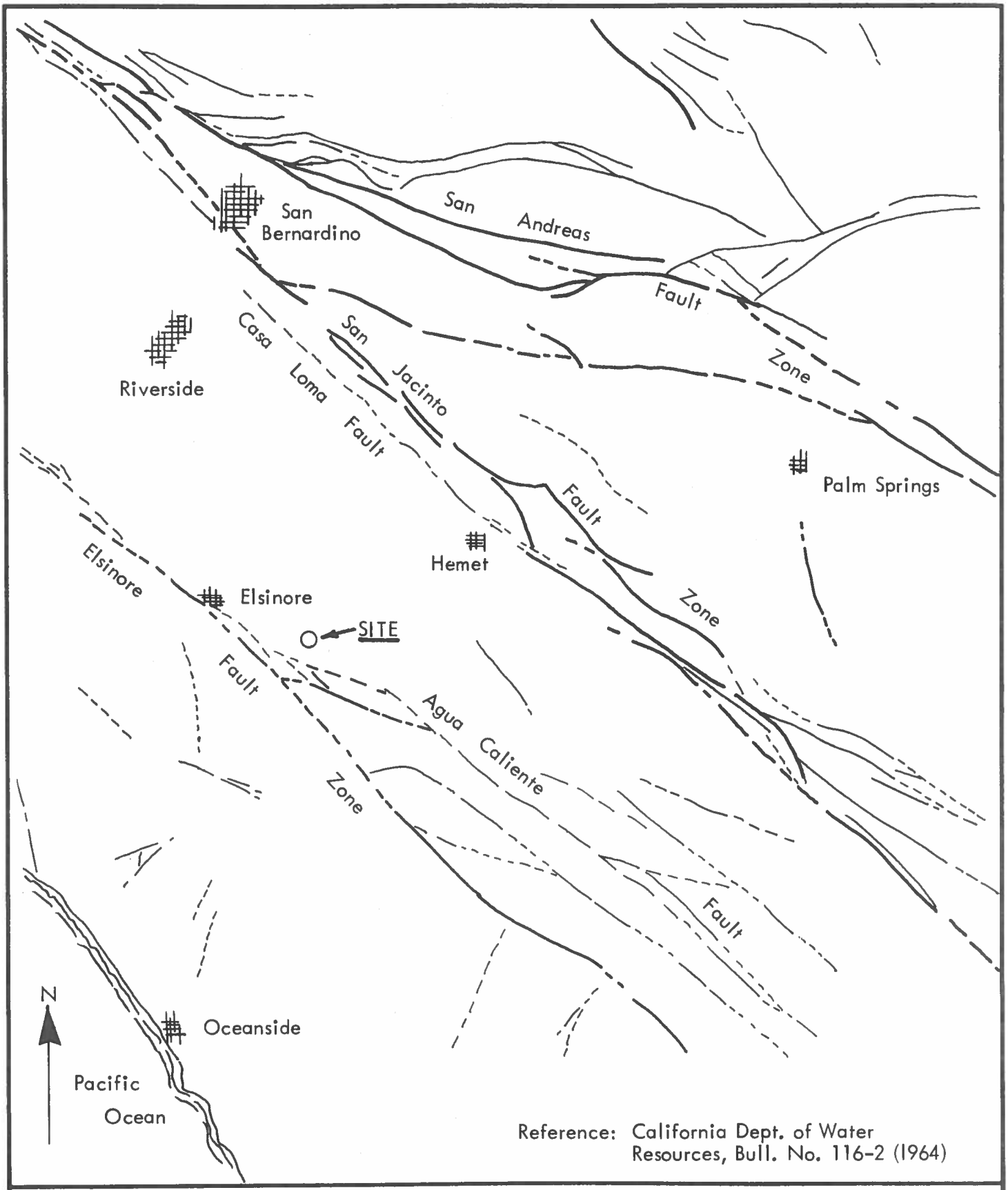
The Agua Caliente Fault located two miles north of the dam is a parallel segment of the Elsinore fault. Little is known about the fault other than it is related to the San Andreas Fault system and has notable historic earthquakes along its trace (i.e., September 13, 1973 - 4.8 magnitude at Agua Caliente Springs). No surface displacement is evidenced in geologic Recent time along this fault.

Geological evidence indicates that the greatest frequency of faulting and seismicity with associated uplift occurred in the region about middle Pleistocene time (1.5 million years before present). This faulting produced major displacement in the basement rocks and in the Temecula Arkose of which both are represented near the dam. By late Pleistocene time (11,000 to 1.5 million years before present) faulting had decreased to minor displacemnts along pre-existing faults with renewed movement along major transverse faults in the volcanic rock (fanglomerates) at the head of Paruiba Valley, two miles downstream of the dam (Mann, 1955).

Within Recent geologic time (200 to 11,000 years before present) geologic evidence indicates that major faulting (ground displacement) has subsided to what perhaps we see today in recorded history. The area is far from being quiet with regard to seismicity, however ground displacement in the region, with exception of the San Jacinto Fault, has been minimal.

As discussed previously the site and region have been mapped by John F. Mann, Jr., in 1949 (SR-43). Mann shows several faults (seven within a one mile radius of the dam) trending through the immediate area of the dam and reservoir. However, no faults trend through the dam structure with the exception of one in the spillway area. The faults are all relatively small (<6.5 miles in length) and are shown to displace Quaternary age deposits (11,000 to 2 million years old). Because the fault displace Quaternary deposits, the California Division of Mines and Geology (Jennings, 1973) classify these faults as "potentially active" (see Figure C-2). For the purpose of this investigation all local faults within a two-mile radius of the dam, displacing Quaternary deposits, are considered "potentially active." Based on known geologic evidence the latest (youngest) units (terrace deposits) cut by the faults are estimated to be at least 10,000 years old and most likely considerably older.

The longest of the local faults strikes approximately north 15 degrees east and its closest approach to the dam is some 300 to 400 feet upstream of the dam. This particular fault has an approximate six mile long trace and appears to trend along the foliation planes of the Bedford Canyon formation. The fault dips steeply to the east, however, the amount and direction of displacement are not known.

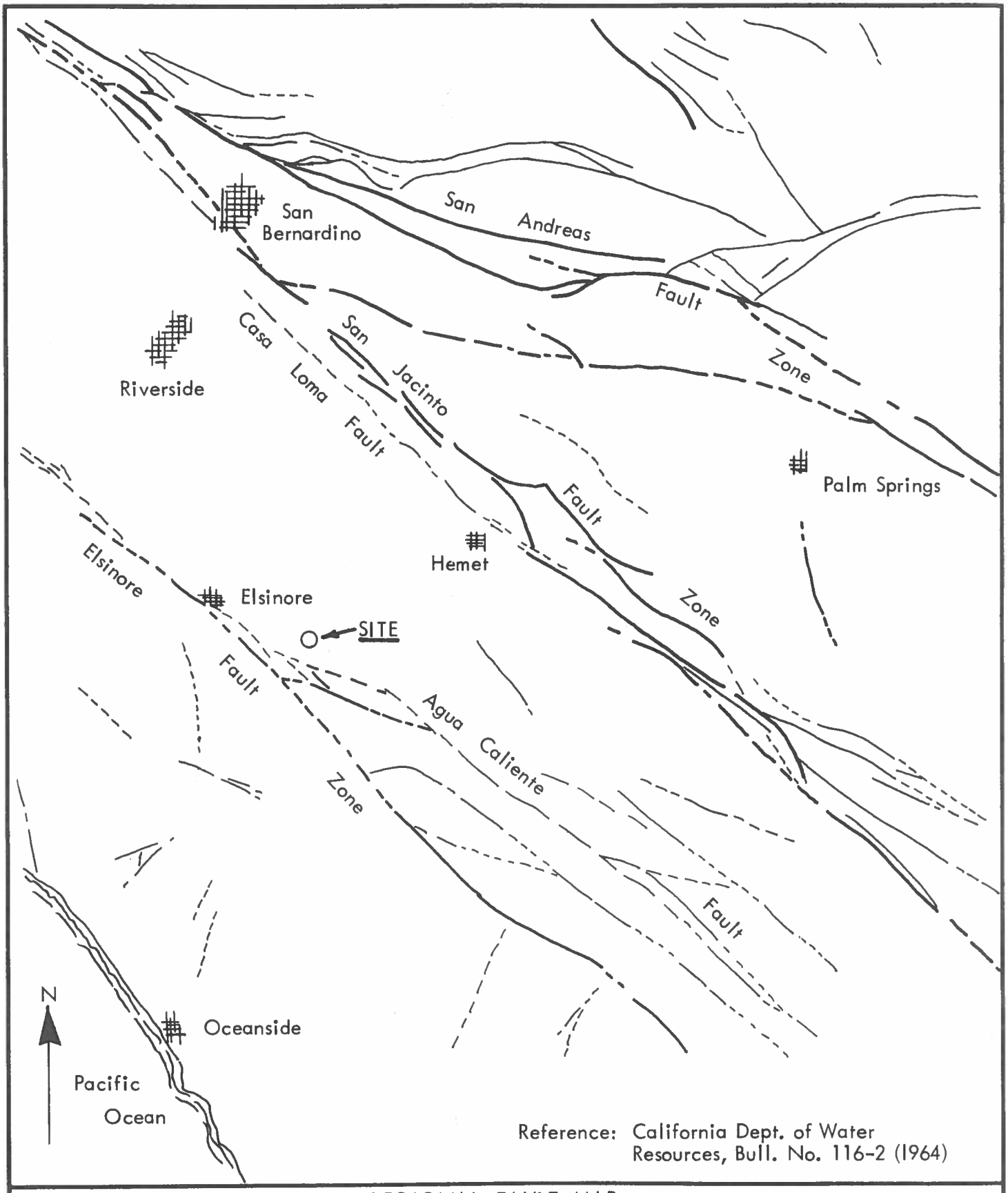


Reference: California Dept. of Water Resources, Bull. No. 116-2 (1964)

REGIONAL FAULT MAP

PREPARED BY: CMP	VAIL DAM STRESS REANALYSIS for Kaiser Aetna Rancho California, Riverside County, California	DRAWING NUMBER C-1
CHECKED BY:		
APPROVED BY:	DATE: / SCALE: 1 in. = 10 mi. / PROJECT NUMBER: 75-088-AEH	

CONVERSE, DAVIS AND ASSOCIATES — *Consulting Engineers and Geologists*

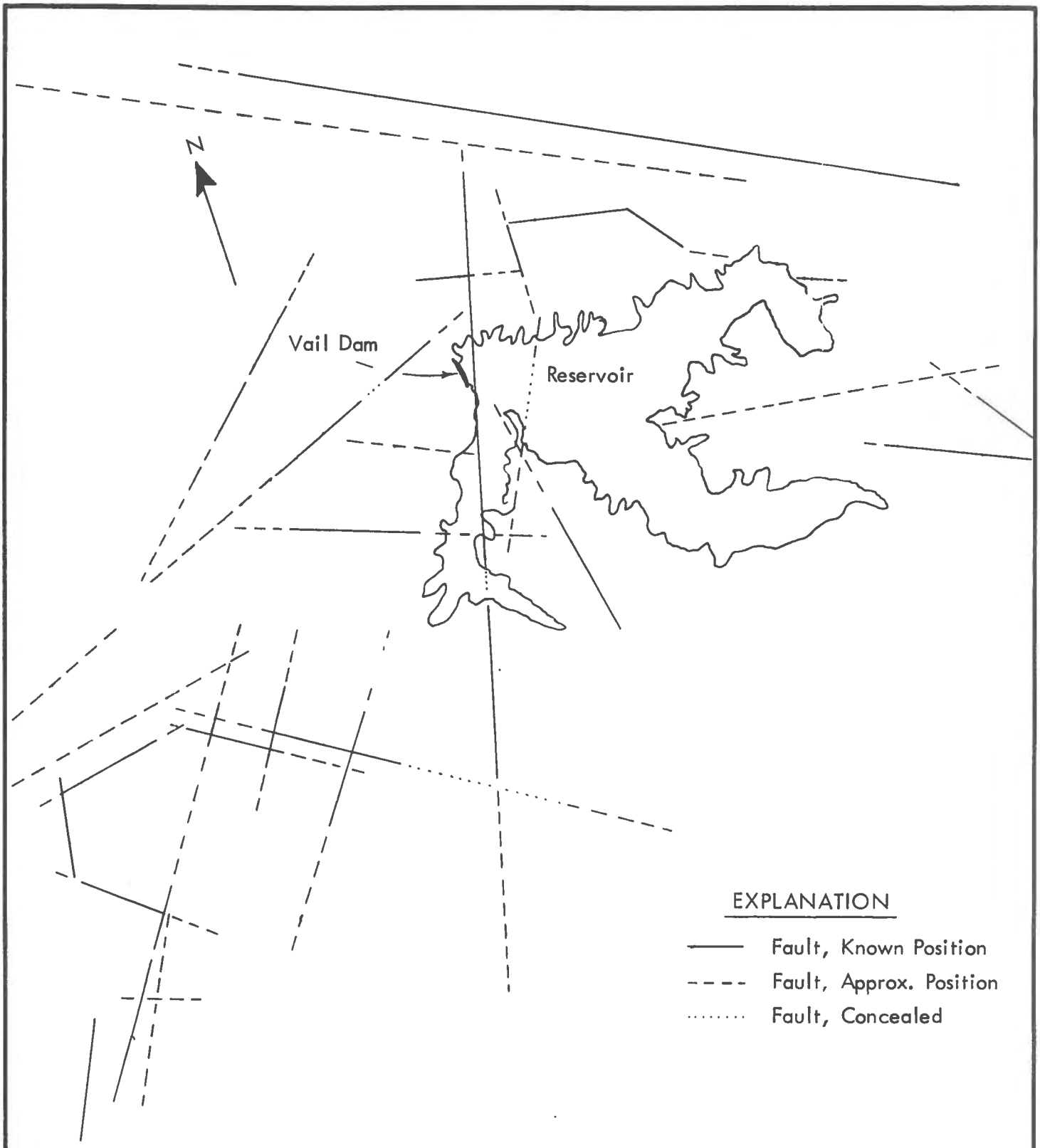


Reference: California Dept. of Water Resources, Bull. No. 116-2 (1964)

REGIONAL FAULT MAP

PREPARED BY: CMP	VAIL DAM STRESS REANALYSIS for Kaiser Aetna Rancho California, Riverside County, California	DRAWING NUMBER C-1
CHECKED BY:		
APPROVED BY:	DATE: / SCALE: 1 in. = 10 mi. / PROJECT NUMBER: 75-088-AEH	

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Reference: Mann, J. F., Calif. Div. of Mines, SR-43, Plate 1, 1949

LOCAL POTENTIALLY ACTIVE FAULTS

PREPARED BY: CMP	VAIL DAM STRESS REANALYSIS for Kaiser Aetna Rancho California, Riverside Co., California	DRAWING NUMBER C-2
CHECKED BY:		
APPROVED BY:	DATE: / SCALE: 1 in. = 1 mi. / PROJECT NUMBER: 75-088-AEH	

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TABLE C-1

FAULT ACTIVITY IN VICINITY OF VAIL DAM

Fault Name	Distance to Site (Miles)	Fault Length (Miles)	Probable Recurrence Interval (Years)	Active or Potentially Active (A or P)	Maximum Credible Earthquake Magnitude	Maximum Probable Magnitude (Geologic or Seismologic Evidence)
Elsinore (Whittier)	6.5 (SW of Dam)	130	2000	A	7.6	6.6 to 7.6 (100 mile length)
San Jacinto	15.7 miles NE of Site	200	400	A	7.5	6.4 to 7.4 (80 mile length)
San Andreas (Southern Section)	37.5	85	90	A	7.5	8+
Local Unnamed Faults (Typical - Longest of 7 within 1 mile of site)	<.1	6	2000+	P	6.1	2.8 to 5.8
Agua Caliente	2.0	64	2000+	P	7.0	4.4 to 6.8

During a previous investigation (Project No. 70-378-AH) a fault was observed in the left abutment road cut which trends north 33 degrees west and dips 75 degrees southwest. This fault coincides with the alignment of a narrow, linear gully extending about 800 feet northwest of Temecula Canyon, but no evidence of a gouge zone in the canyon was observed. To the south, the fault projects through the spillway, but is concealed by slough on the spillway surface and fill along the east edge. About 50 feet west, another fault was observed striking north 15 degrees west and dipping 40 degrees southwest. No evidence of recent displacement along these faults were noted.

All the local faults mapped in the area are believed to be related to the Elsinore Fault. These faults are considered spur or transverse faults and all can be considered secondary to the main fault zone (Wildomar Fault) some 6.5 miles south of the site.

C.2 Statistical Seismicity

Several methods of analyzing the regional and local seismicity were used for Vail Dam site and are described in the following sections. Drawing C-8 summarizes the basic epicentral data used for the statistical analysis and Table C-4 lists all earthquake events shown on Drawing C-8 for Magnitude 4 or greater.

Recurrence of Magnitude

The seismicity of the site region was determined according to Allen, et al. (1965) and Housner (1970). The method of Marachi and Dixon (1972) considering a circular area of 100-mile radius from the site resulted in the data points of Figure C-3. The recent instrumental seismicity (1934-1973) is about the average for Southern

California while the pre-instrumental seismicity (1800-1934) is somewhat lower.

Recurrence of Bedrock Acceleration

The occurrence and recurrence of various levels of bedrock acceleration were calculated from instrumental earthquake data (1934-1973) and the pre-instrumental earthquake data (1800-1934). Results were obtained using two methods of analysis.

The site region analysis was based on methods outlined by Marachi and Dixon (1972) and calculations were performed using all earthquakes included within a circular area of 100-mile radius about the site. These methods assume the random occurrence of earthquakes in space, the independence of events and modified attenuated acceleration areas fitting data published by Schnabel and Seed (1972 and 1973). The results of this analysis should be regarded as an average for the site region.

The local site analysis assumed the independence of seismic events and calculations were performed using all earthquakes recorded within a distance of 100 miles from the site. Bedrock accelerations at the site were calculated for each event using the magnitude, epicenter-site distance and attenuation curves from Schnabel and Seed (1972 and 1973). The results of this analysis are strongly dependent upon the specific site location and should be regarded as unique to the site.

The results of both site region and local site analyses performed on the two earthquake data records are summarized by Figure C-4 where the number of occurrences each 100 years exceeding a particular level

of bedrock acceleration are plotted against the maximum peak bedrock acceleration. In general, the instrumental earthquake data indicate higher seismicity than the pre-instrumental data.

It is our opinion that the solid lines of Figure C-4 reasonably bound the expected number of occurrences exceeding a particular maximum peak bedrock acceleration at the site during a 100-year period. These lines were converted to recurrence intervals or average return periods as shown by Figure C-5. The lower bound represents the most conservative estimate and would indicate that a maximum peak bedrock acceleration exceeding 0.20 g should be expected on the average once every 60 years, and a 0.4 g every 500 years.

Probability of Occurrence of Bedrock Acceleration

The probability of occurrence for exceeding various levels of maximum peak bedrock acceleration at the site was calculated from the lower bound recurrence intervals of Figure C-4 and further statistical analysis. The recurrence intervals or average return periods and probabilities of exceeding various levels of bedrock acceleration are summarized by Table C-2.

TABLE C-2

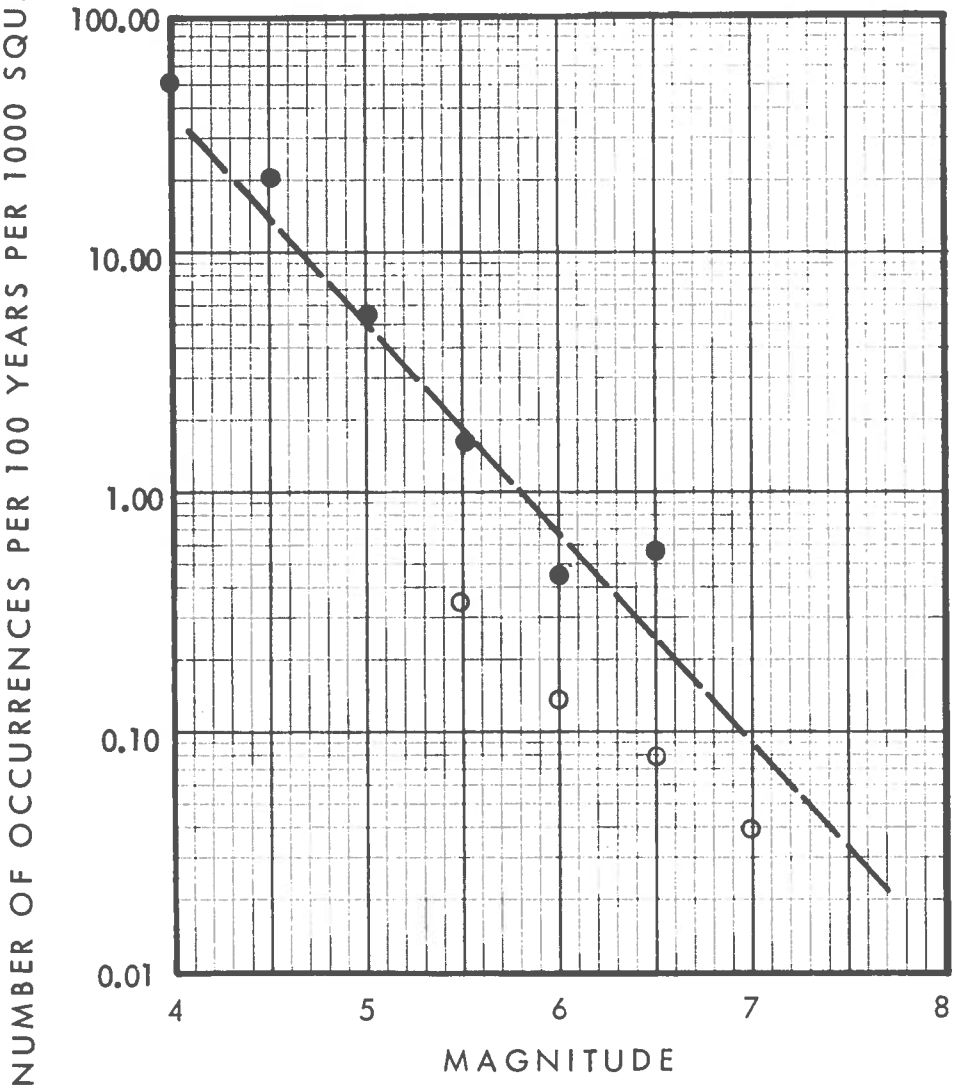
PROBABILITIES OF EXCEEDING VARIOUS LEVELS OF BEDROCK ACCELERATION

Maximum Peak Bedrock Acceleration Level (g)	Expected Average Return Period Years	Approximate Probability of Occurrence (%)	
		60 Years	100 Years
0.1	20	96	99
0.2	60	62	80
0.3	150	30	45
0.4	500	11	18
0.5	1400	4	7

Recurrence of Firm Ground Acceleration

The recurrence intervals for firm ground acceleration levels were calculated by the same general procedures followed in determining the recurrence of bedrock accelerations. The events analyzed included instrumental earthquake data (1934-1973) and pre-instrumental data (1800-1934). Results were obtained using the site region and local site methods of statistical analysis discussed previously except using firm ground attenuation areas and curves from Housner (1965 and 1970).

The results of both site region and local site analyses performed on the three earthquake data records are summarized on Figure C-6 where the number of occurrences exceeding a particular level of firm ground acceleration are plotted against the maximum peak firm ground acceleration. The local site method using both the instrumental and pre-instrumental indicate the highest seismicity.



● Instrumental Data for Site Region

○ Pre-instrumental Data for Site Region

Average for Southern California (After Allen et al., 1965)

(Magnitude Counting Interval = 0.5)

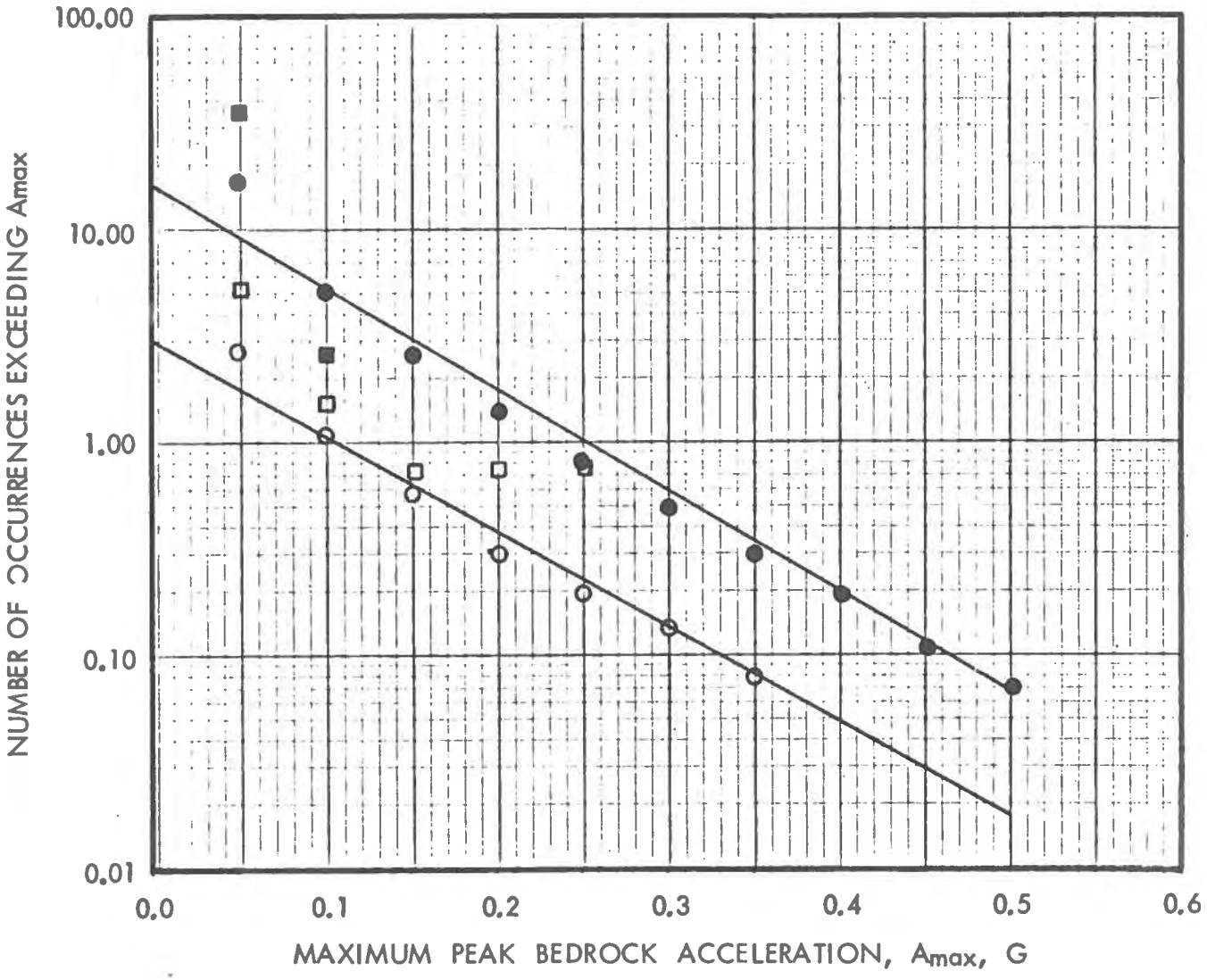
SEISMICITY OF THE SITE

VAIL DAM STRESS REANALYSIS
for Kaiser Aetna
Rancho California, Riverside County, California

FIGURE
C-3

CONVERSE, DAVIS AND ASSOCIATES *Consulting Engineers and Geologists*

PROJ. NO. 75-088-AEH



- ● Instumental data (1934-1973)
- ○ Pre-instrumental data (1800-1934)

} SITE REGION METHOD

- ■ Instrumental data (1934-1973)
- □ Pre-instrumental data (1800-1934)

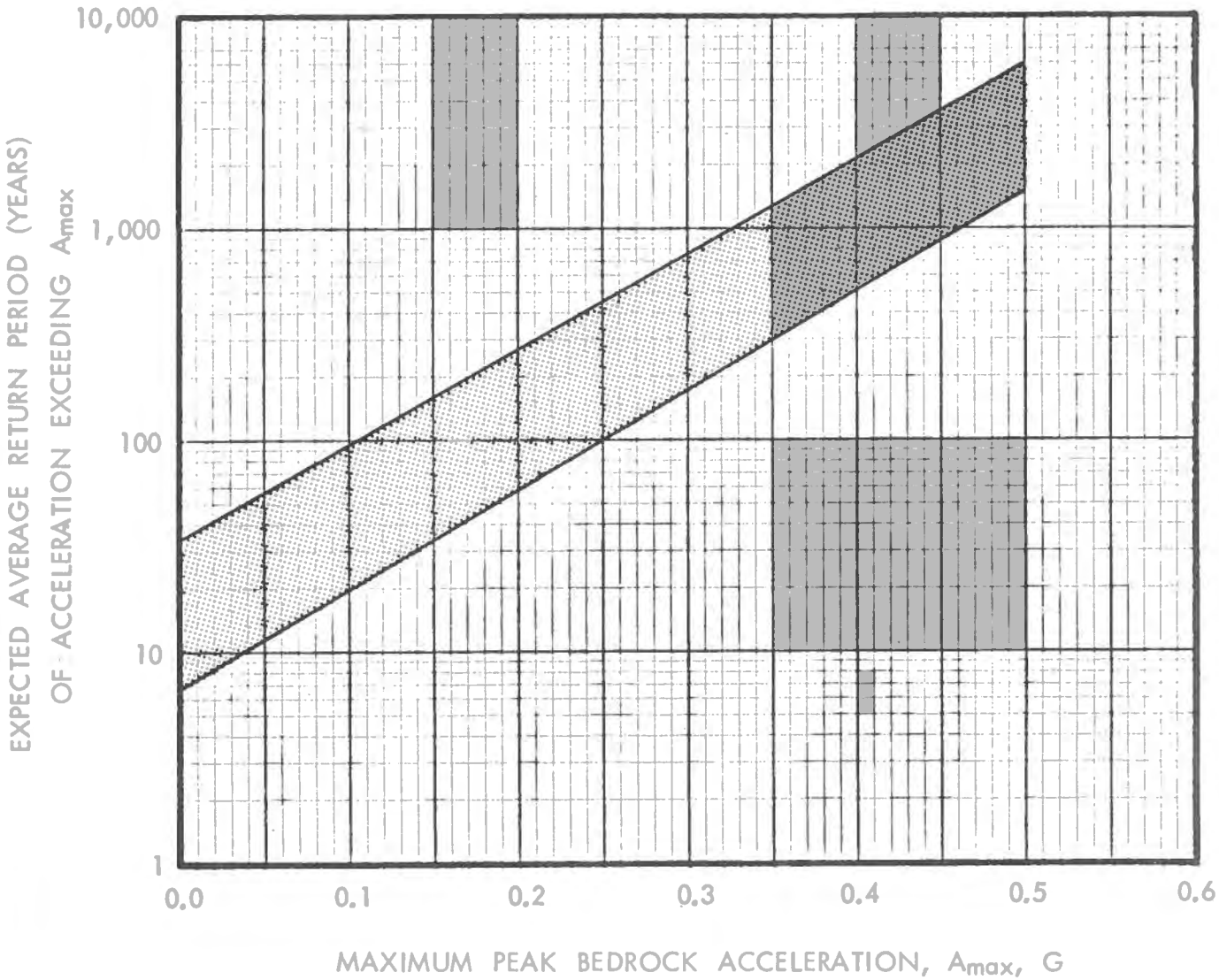
} LOCAL SITE METHOD

OCCURENCES OF BEDROCK ACCELERATION - 100 YEAR PERIOD

VAIL DAM STRESS REANALYSIS
for Kaiser Aetna
Rancho California, Riverside County, California

FIGURE C-4

CONVERSE, DAVIS AND ASSOCIATES *Consulting Engineers and Geologists* PROJ. NO. 75-088-AEH



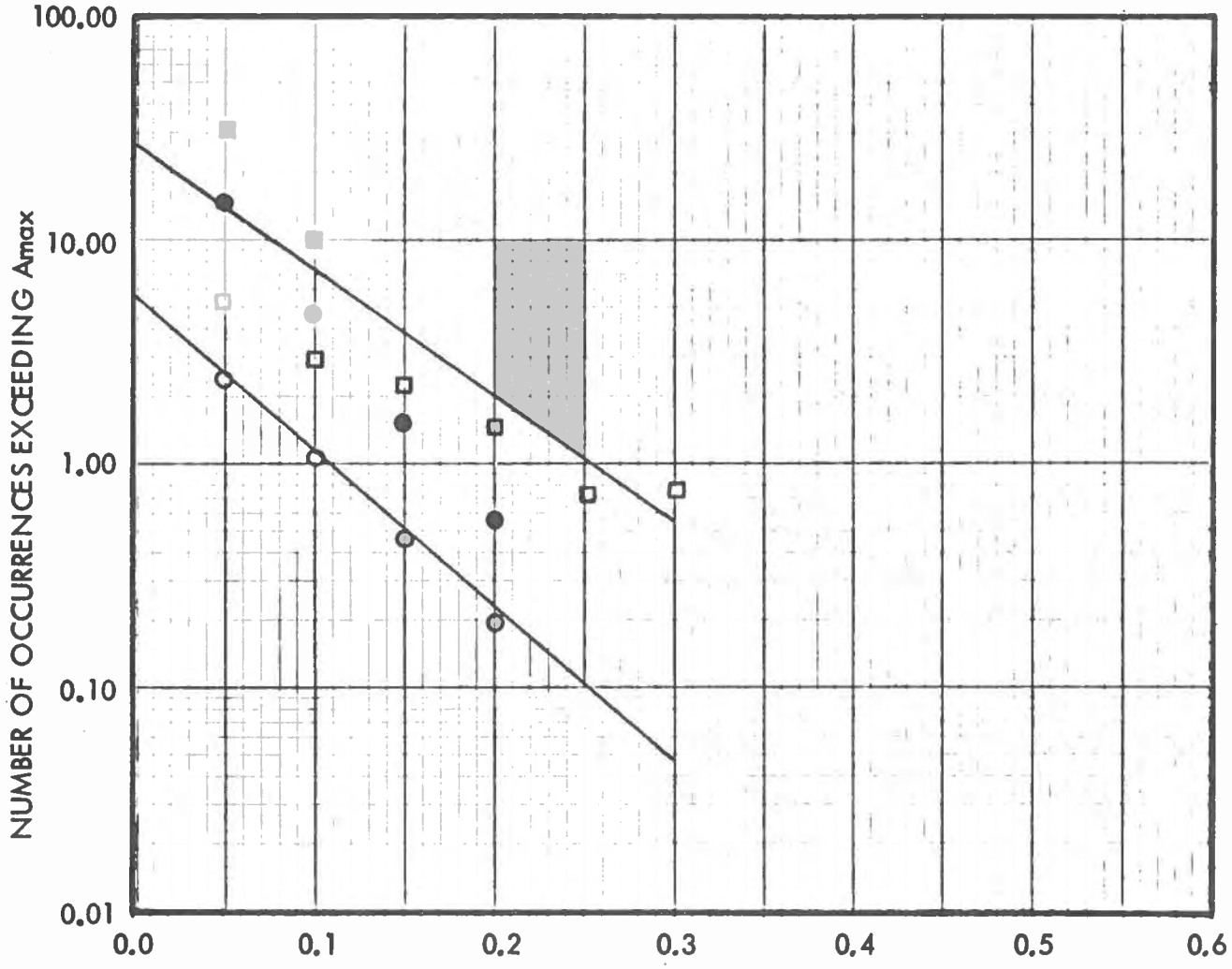
RECURRENCE OF BEDROCK ACCELERATION

VAIL DAM STRESS REANALYSIS
for Kaiser Aetna
Rancho California, Riverside County, California

FIGURE C-5

CONVERSE, DAVIS AND ASSOCIATES *Consulting Engineers and Geologists*

PROJ. NO. 75-088-AEH



- ● Instrumental data (1934-1973)
- ○ Pre-instrumental data (1800-1934)

} SITE REGION METHOD

- ■ Instrumental data (1934-1973)
- □ Pre-instrumental data (1800-1934)

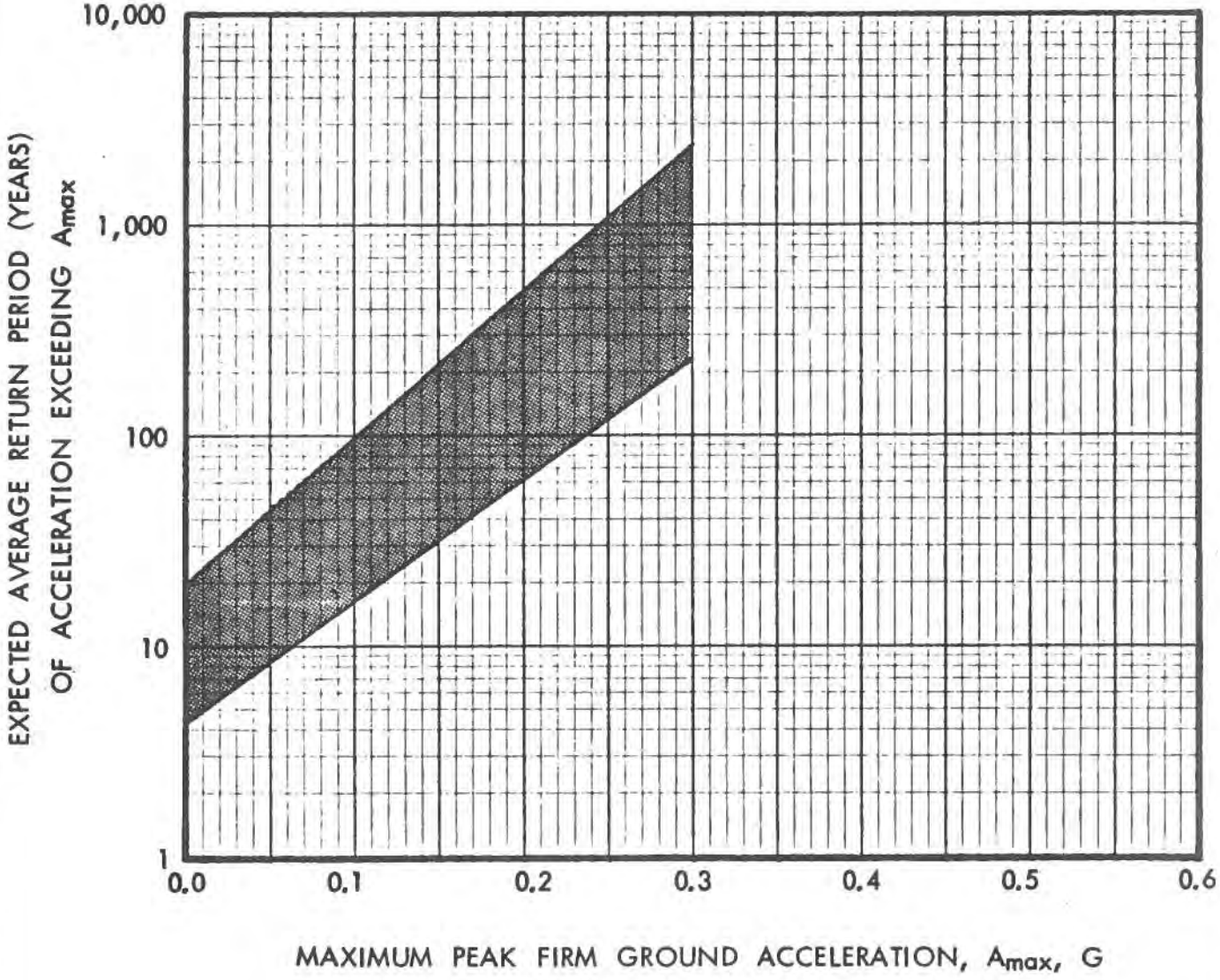
} LOCAL SITE METHOD

OCCURENCES OF FIRM GROUND ACCELERATION - 100 YEAR PERIOD

VAIL DAM STRESS REANALYSIS
for Kaiser Aetna
Rancho California, Riverside County, California

FIGURE C-6

CONVERSE, DAVIS AND ASSOCIATES *Consulting Engineers and Geologists* PROJ. NO. 75-088-AEH



RECURRENCE OF FIRM GROUND ACCELERATION

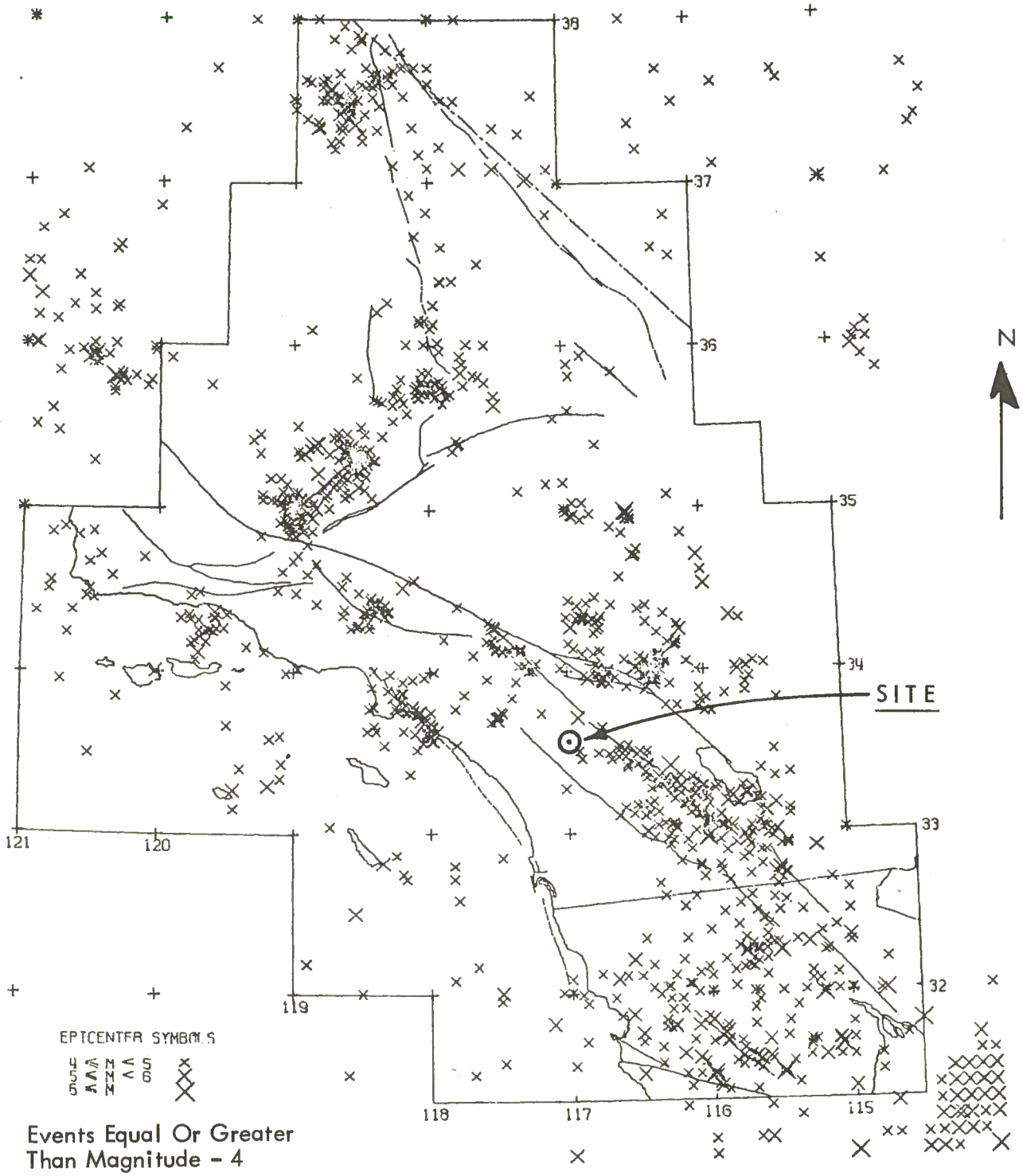
VAIL DAM STRESS REANALYSIS
for Kaiser Aetna
Rancho California, Riverside County, California

FIGURE
C-7

CONVERSE, DAVIS AND ASSOCIATES *Consulting Engineers and Geologists*

PROJ. NO.

FORM NO. D42A-74 APPROVED FOR PUBLICATION BY



Reference: Seismological Laboratory, California Institue Of Technology, Cont. 2385

EPICENTERS - 1932 THROUGH 1972

PREPARED BY: CMP	VAIL DAM STRESS REANALYSIS for Kaiser Aetna Rancho California, Riverside County, California	DRAWING NUMBER C-8
CHECKED BY:		
APPROVED BY:	DATE:	SCALE: 1 in. = 68 mi.
		PROJECT NUMBER: 75-088-AEH

CONVERSE, DAVIS AND ASSOCIATES — *Consulting Engineers and Geologists*

ORM 4-73

TABLE C-4

LIST OF EARTHQUAKES

LIST OF POST-1800 EARTHQUAKES WITH A MAGNITUDE
OF 4 OR GREATER WITHIN100. MILES OF THE SITE
75-088-III VAIL DAM STRESS ANALYSIS LATITUDE= 33 30.00 LONGITUDE=117 0.0

DATE			LATITUDE		LONGITUDE		MAGNITUDE	DISTANCE,	ACCELERATION	ACCELERATION
YEAR	MO	DAY	DEG	MIN	DEG	MIN		MILES	BEDROCK	FIRM GROUND
1800	11	22	33	0.0	117	30.00	5.6	44.9	0.0	0.0
1803	5	25	32	30.00	117	0.0	5.7	69.1	0.0	0.0
1812	12	8	33	30.00	117	40.00	6.4	38.4	0.050	0.150
1855	7	10	34	0.0	118	30.00	6.2	93.1	0.0	0.0
1856	9	20	33	0.0	116	30.00	5.6	45.0	0.0	0.0
1878	0	1	34	0.0	118	30.00	5.7	93.1	0.0	0.0
1889	8	27	34	0.0	118	0.0	5.0	67.2	0.0	0.0
1890	2	9	34	0.0	117	30.00	5.0	45.0	0.0	0.0
1894	10	23	33	0.0	117	0.0	5.6	34.5	0.050	0.050
1899	7	22	34	30.00	117	30.00	6.2	74.9	0.0	0.0
1899	12	25	33	30.00	116	30.00	6.7	28.8	0.100	0.200
1903	12	25	34	0.0	118	0.0	5.0	67.2	0.0	0.0
1907	9	19	34	0.0	117	0.0	5.6	34.6	0.050	0.050
1910	5	15	33	30.00	117	30.00	5.6	28.8	0.050	0.050
1915	6	22	32	48.00	115	30.00	6.2	99.1	0.0	0.0
1917	5	27	33	0.0	115	30.00	5.7	93.1	0.0	0.0
1918	4	21	33	45.00	117	0.0	6.8	17.3	0.250	0.300
1918	4	22	34	0.0	117	30.00	5.0	45.0	0.0	0.0
1918	11	19	34	0.0	118	30.00	5.0	93.1	0.0	0.0
1919	12	31	33	0.0	117	0.0	5.0	34.5	0.0	0.0
1920	6	21	34	0.0	118	30.00	6.2	93.1	0.0	0.0
1920	7	16	34	0.0	118	30.00	5.0	93.1	0.0	0.0
1923	7	22	34	0.0	117	15.00	6.2	37.5	0.050	0.100
1927	8	4	34	0.0	118	30.00	5.0	93.1	0.0	0.0
1929	7	8	34	0.0	118	0.0	4.7	67.2	0.0	0.0
1930	1	15	34	12.00	116	54.00	5.2	48.7	0.0	0.0
1930	2	25	33	0.0	115	30.00	6.2	93.1	0.0	0.0
1930	3	1	33	0.0	115	30.00	6.2	93.1	0.0	0.0
1930	8	30	33	0.0	118	0.0	5.6	67.2	0.0	0.0
1933	3	10	33	36.00	118	0.0	6.2	58.0	0.0	0.0
1933	10	2	33	48.00	118	6.00	5.4	66.7	0.0	0.0

LIST OF POST-1933 EARTHQUAKES WITH A MAGNITUDE
OF 4 OR GREATER WITHIN100. MILES OF THE SITE
75-086-III VAIL DAM STRESS ANALYSIS LATITUDE= 33 30.00 LONGITUDE=117 0.0

DATE			LATITUDE		LONGITUDE		MAGNITUDE	DISTANCE, MILES	ACCELERATION BEDROCK	ACCELERATION FIRM GROUND
YEAR	MO	DAY	DEG	MIN	DEG	MIN				
1934	1	9	34	6.00	117	41.00	4.5	57.2	0.0	0.0
1934	1	18	34	6.00	117	41.00	4.0	57.2	0.0	0.0
1934	1	20	33	37.00	118	7.00	4.5	64.8	0.0	0.0
1934	1	26	34	5.00	116	28.00	4.0	50.7	0.0	0.0
1934	2	20	33	28.00	116	38.00	4.0	21.2	0.0	0.0
1934	3	2	33	5.00	115	59.00	4.5	65.3	0.0	0.0
1934	4	17	33	34.00	117	59.00	4.0	56.8	0.0	0.0
1934	9	27	32	5.00	116	40.00	4.0	99.7	0.0	0.0
1934	10	17	33	38.00	118	24.00	4.0	81.2	0.0	0.0
1934	11	16	33	45.00	118	0.0	4.0	60.1	0.0	0.0
1934	11	25	32	5.00	116	40.00	5.0	99.7	0.0	0.0
1935	1	13	32	20.00	116	28.00	4.0	86.3	0.0	0.0
1935	6	7	33	16.00	117	1.00	4.0	16.1	0.0	0.0
1935	6	19	33	43.00	117	31.00	4.0	23.3	0.0	0.0
1935	7	13	34	10.00	117	52.00	4.5	68.0	0.0	0.0
1935	7	23	32	55.00	115	28.00	4.0	97.1	0.0	0.0
1935	9	3	34	2.00	117	19.00	4.5	41.2	0.0	0.0
1935	10	14	33	10.00	116	25.00	4.0	40.7	0.0	0.0
1935	10	24	34	6.00	116	53.00	5.0	42.0	0.0	0.0
1935	10	24	34	6.00	116	53.00	4.5	42.0	0.0	0.0
1935	10	24	34	6.00	116	53.00	4.5	42.0	0.0	0.0
1935	10	24	34	6.00	116	53.00	4.0	42.0	0.0	0.0
1935	10	29	32	10.00	117	40.00	4.5	99.8	0.0	0.0
1935	11	4	33	30.00	116	55.00	4.5	4.8	0.100	0.100
1935	12	2	33	9.00	116	35.00	4.0	34.1	0.0	0.0
1935	12	20	33	10.00	115	30.00	5.0	89.4	0.0	0.0
1935	12	25	33	36.00	118	1.00	4.5	59.0	0.0	0.0
1936	1	2	33	20.00	115	30.00	4.0	87.2	0.0	0.0
1936	2	23	34	7.65	117	20.28	4.5	47.6	0.0	0.0
1936	2	26	34	8.41	117	20.37	4.0	48.4	0.0	0.0
1936	5	7	33	8.00	116	5.00	4.5	58.6	0.0	0.0
1936	7	29	33	27.25	116	53.90	4.0	6.7	0.050	0.050
1936	8	22	33	46.00	117	49.00	4.0	50.5	0.0	0.0
1936	9	18	32	55.00	115	25.00	4.0	99.8	0.0	0.0
1936	9	18	32	51.36	115	42.62	4.5	86.6	0.0	0.0
1936	9	18	32	55.00	115	25.00	4.0	99.8	0.0	0.0
1936	9	18	32	56.00	115	25.00	4.0	99.3	0.0	0.0
1936	9	18	32	56.00	115	25.00	4.0	99.3	0.0	0.0
1936	10	12	32	47.55	115	54.85	4.0	79.4	0.0	0.0
1936	10	12	32	45.83	115	54.48	4.0	80.5	0.0	0.0
1937	1	15	33	33.66	118	3.48	4.0	61.1	0.0	0.0
1937	3	4	33	47.00	116	17.00	4.0	45.7	0.0	0.0
1937	3	19	34	6.70	117	25.54	4.0	48.9	0.0	0.0
1937	3	25	33	24.51	116	15.69	6.0	43.0	0.050	0.050
1937	3	25	33	25.57	116	25.25	4.0	33.8	0.0	0.0
1937	3	25	33	22.09	116	26.67	4.0	33.3	0.0	0.0
1937	3	26	33	28.00	116	25.00	4.0	24.1	0.0	0.0
1937	3	27	33	28.00	116	35.00	4.0	24.1	0.0	0.0
1937	3	27	33	28.00	116	35.00	4.5	24.1	0.0	0.0
1937	3	29	33	25.22	116	29.41	4.0	29.9	0.0	0.0
1937	6	1	34	34.71	116	36.20	4.0	77.9	0.0	0.0
1937	7	7	33	34.00	117	59.00	4.0	56.8	0.0	0.0
1937	9	1	34	12.65	117	31.79	4.5	57.9	0.0	0.0
1937	9	1	34	10.18	117	32.87	4.5	56.8	0.0	0.0
1937	11	16	33	10.00	116	10.00	4.0	53.2	0.0	0.0

1937	12	15	33 5.00	115 59.00	4.0	65.3	0.0	0.0
1938	1	4	33 28.00	116 35.00	4.5	24.1	0.0	0.0
1938	2	8	34 3.00	116 26.00	4.0	50.1	0.0	0.0
1938	2	15	34 10.42	116 15.44	4.5	63.3	0.0	0.0
1938	3	31	34 45.00	116 28.00	4.0	51.7	0.0	0.0
1938	4	13	32 53.00	115 35.00	4.5	92.1	0.0	0.0
1938	4	26	32 43.06	118 10.34	4.5	86.5	0.0	0.0
1938	5	21	33 37.00	118 2.00	4.0	60.1	0.0	0.0
1938	5	31	33 41.93	117 30.64	5.5	32.5	0.050	0.050
1938	6	10	34 8.00	116 57.00	4.0	43.9	0.0	0.0
1938	6	16	33 27.38	116 53.74	4.0	6.7	0.050	0.050
1938	6	29	33 23.00	115 36.00	4.0	81.1	0.0	0.0
1938	7	4	32 47.14	116 3.31	4.0	73.5	0.0	0.0
1938	7	5	33 40.93	117 33.20	4.5	34.3	0.0	0.0
1938	7	10	33 10.00	116 25.00	4.0	40.7	0.0	0.0
1938	8	6	33 56.00	116 45.00	4.0	33.2	0.0	0.0
1938	8	6	33 43.00	117 30.41	4.0	32.8	0.0	0.0
1938	8	31	33 45.54	118 15.20	4.5	74.4	0.0	0.0
1938	10	12	32 5.00	116 40.00	4.0	59.7	0.0	0.0
1938	11	29	33 54.20	118 25.84	4.0	87.0	0.0	0.0
1938	12	7	34 0.0	118 25.00	4.0	88.7	0.0	0.0
1938	12	10	33 5.00	115 59.00	4.0	65.3	0.0	0.0
1938	12	27	34 7.64	117 31.24	4.0	52.7	0.0	0.0
1939	2	22	32 32.00	116 11.00	4.0	81.7	0.0	0.0
1939	3	22	34 45.00	116 10.00	4.0	98.8	0.0	0.0
1939	4	3	34 2.59	117 13.71	4.0	39.8	0.0	0.0
1939	4	19	32 35.00	117 48.00	4.5	78.3	0.0	0.0
1939	5	12	33 28.00	116 35.00	4.5	24.1	0.0	0.0
1939	6	25	32 45.00	118 12.00	4.5	86.4	0.0	0.0
1939	11	4	33 46.00	118 7.00	4.0	66.9	0.0	0.0
1939	11	7	33 51.00	117 21.00	4.5	21.5	0.0	0.0
1939	11	12	32 32.00	116 11.00	4.0	81.7	0.0	0.0
1939	12	5	33 10.00	116 25.00	4.0	40.7	0.0	0.0
1939	12	27	33 47.00	118 8.00	4.5	68.2	0.0	0.0
1939	12	31	33 23.00	115 36.00	4.0	81.1	0.0	0.0
1940	1	4	33 18.00	116 18.00	4.0	42.6	0.0	0.0
1940	1	13	33 47.00	118 8.00	4.0	68.2	0.0	0.0
1940	2	8	33 42.00	118 4.00	4.0	63.0	0.0	0.0
1940	2	11	33 59.00	118 18.00	4.0	82.0	0.0	0.0
1940	2	19	33 42.00	117 26.00	4.5	28.5	0.0	0.0
1940	2	28	33 8.00	116 5.00	4.5	58.6	0.0	0.0
1940	4	18	34 4.00	117 23.00	4.5	45.0	0.0	0.0
1940	5	18	34 3.00	116 17.00	5.5	56.2	0.0	0.0
1940	5	18	34 3.00	116 17.00	5.5	56.2	0.0	0.0
1940	5	18	34 3.00	116 17.00	4.5	56.2	0.0	0.0
1940	5	18	34 3.00	116 17.00	5.0	56.2	0.0	0.0
1940	5	18	34 3.00	116 17.00	4.5	56.2	0.0	0.0
1940	5	19	34 3.00	116 17.00	4.5	56.2	0.0	0.0
1940	5	19	34 3.00	116 17.00	4.0	56.2	0.0	0.0
1940	5	19	34 3.00	116 17.00	4.0	56.2	0.0	0.0
1940	5	22	34 3.00	116 17.00	4.0	56.2	0.0	0.0
1940	5	22	34 3.00	116 17.00	4.0	56.2	0.0	0.0
1940	5	27	34 3.00	116 17.00	4.0	56.2	0.0	0.0
1940	6	1	34 3.00	116 17.00	4.5	56.2	0.0	0.0
1940	6	1	34 3.00	116 17.00	4.0	56.2	0.0	0.0
1940	6	1	34 3.00	116 17.00	4.5	56.2	0.0	0.0
1940	6	2	34 3.00	116 17.00	4.5	56.2	0.0	0.0
1940	6	4	33 7.00	116 25.00	5.0	42.8	0.0	0.0
1940	6	4	33 7.00	116 25.00	4.0	42.8	0.0	0.0
1940	6	5	33 50.00	117 24.00	4.0	32.6	0.0	0.0
1940	6	6	34 3.00	116 17.00	4.5	56.2	0.0	0.0

1940	6	6	33 16.00	116 24.00	4.0	38.1	0.0	0.0	
1940	6	6	34 3.00	116 17.00	4.0	56.2	0.0	0.0	
1940	6	6	34 3.00	116 17.00	4.5	56.2	0.0	0.0	
1940	6	8	34 3.00	116 17.00	4.0	56.2	0.0	0.0	
1940	6	11	34 3.00	116 17.00	4.5	56.2	0.0	0.0	
1940	6	14	34 3.00	116 17.00	4.0	56.2	0.0	0.0	
1940	6	24	34 3.00	116 17.00	4.0	56.2	0.0	0.0	
1940	7	13	33 5.00	115 59.00	4.0	65.3	0.0	0.0	
1940	7	14	33 5.00	115 59.00	4.0	65.3	0.0	0.0	
1940	7	20	33 42.00	118 4.00	4.0	63.0	0.0	0.0	
1940	7	21	33 5.00	115 59.00	4.5	65.3	0.0	0.0	
1940	8	1	34 3.00	116 17.00	4.0	56.2	0.0	0.0	
1940	8	4	34 3.00	116 17.00	4.0	56.2	0.0	0.0	
1940	10	6	33 8.00	116 5.00	4.0	58.6	0.0	0.0	
1940	10	11	33 47.00	118 25.00	5.0	83.9	0.0	0.0	
1940	10	12	33 47.00	118 25.00	4.0	83.9	0.0	0.0	
1940	10	14	33 47.00	118 25.00	4.0	83.9	0.0	0.0	
1940	10	16	33 8.00	116 5.00	4.0	58.6	0.0	0.0	
1940	10	21	33 7.00	116 25.00	4.5	42.8	0.0	0.0	
1940	11	1	33 47.00	118 25.00	4.0	83.9	0.0	0.0	
1940	11	1	33 38.00	118 12.00	4.0	69.8	0.0	0.0	
1940	11	2	33 47.00	118 25.00	4.0	83.9	0.0	0.0	
1941	1	30	33 58.00	118 3.00	4.0	68.5	0.0	0.0	
1941	2	23	33 30.00	116 29.00	4.5	29.8	0.0	0.0	
1941	3	22	33 31.00	118 6.00	4.0	63.4	0.0	0.0	
1941	3	25	34 13.00	117 28.00	4.0	56.4	0.0	0.0	
1941	4	11	33 57.00	117 35.00	4.0	45.8	0.0	0.0	
1941	6	25	32 30.00	115 54.00	4.0	93.8	0.0	0.0	
1941	10	22	33 49.00	118 13.00	5.0	73.4	0.0	0.0	
1941	10	22	33 47.00	118 12.00	4.0	71.9	0.0	0.0	
1941	11	1	32 42.00	115 51.00	4.0	66.3	0.0	0.0	
1941	11	14	33 47.00	118 15.00	5.5	74.6	0.0	0.0	
1941	12	24	32 36.00	116 6.00	4.5	81.0	0.0	0.0	
1942	1	24	32 48.00	117 50.00	4.0	68.2	0.0	0.0	
1942	1	25	34 24.00	116 55.00	4.0	62.4	0.0	0.0	
1942	2	1	34 24.00	116 55.00	4.0	62.4	0.0	0.0	
1942	2	1	34 24.00	116 55.00	4.5	62.4	0.0	0.0	
1942	2	1	34 24.00	116 55.00	4.5	62.4	0.0	0.0	
1942	2	27	34 20.00	117 0.0	4.0	57.6	0.0	0.0	
1942	3	1	34 5.00	116 28.00	4.0	50.7	0.0	0.0	
1942	3	3	34 0.0	115 45.00	5.0	79.9	0.0	0.0	
1942	3	4	34 0.0	115 45.00	4.0	79.9	0.0	0.0	
1942	4	5	33 12.00	116 14.00	4.0	48.8	0.0	0.0	
1942	4	16	33 22.00	118 9.00	4.0	66.9	0.0	0.0	
1942	4	26	33 57.00	116 44.00	4.0	34.6	0.0	0.0	
1942	5	22	34 27.00	116 47.00	4.0	66.8	0.0	0.0	
1942	5	23	32 59.00	115 59.00	5.0	68.6	0.0	0.0	
1942	6	9	33 20.00	116 14.00	4.0	45.7	0.0	0.0	
1942	6	14	33 14.00	115 50.00	4.0	69.7	0.0	0.0	
1942	6	14	33 14.00	115 50.00	4.0	69.7	0.0	0.0	
1942	6	24	33 14.00	115 50.00	4.0	69.7	0.0	0.0	
1942	8	7	34 18.00	116 25.00	4.5	64.7	0.0	0.0	
1942	8	7	34 18.00	116 25.00	4.0	64.7	0.0	0.0	
1942	8	7	34 18.00	116 25.00	4.0	64.7	0.0	0.0	
1942	8	22	34 7.00	116 45.00	4.0	45.0	0.0	0.0	
1942	9	20	34 21.00	116 17.00	4.0	71.8	0.0	0.0	
1942	9	21	33 32.00	116 38.00	4.0	21.3	0.0	0.0	
1942	10	21	32 58.00	116 0.0	4.5	68.4	0.0	0.0	
1942	10	21	32 58.00	116 0.0	5.0	68.4	0.0	0.0	
1942	10	21	32 58.00	116 0.0	5.0	68.4	0.0	0.0	
1942	10	21	32 58.00	116 0.0	4.5	68.4	0.0	0.0	
1942	10	21	32 58.00	116 0.0	4.5	68.4	0.0	0.0	

1942	10	21	32 58.00	116 0.0	4.5	68.4	0.0	0.0	
1942	10	21	32 58.00	116 0.0	4.5	68.4	0.0	0.0	
1942	10	21	32 58.00	116 0.0	4.0	68.4	0.0	0.0	
1942	10	22	33 14.00	115 43.00	5.5	76.2	0.0	0.0	
1942	10	22	32 58.00	116 0.0	4.0	68.4	0.0	0.0	
1942	10	22	32 58.00	116 0.0	4.0	68.4	0.0	0.0	
1942	10	22	32 58.00	116 0.0	5.0	68.4	0.0	0.0	
1942	10	25	32 57.00	116 9.00	4.0	62.0	0.0	0.0	
1942	10	26	33 14.00	115 43.00	4.5	76.2	0.0	0.0	
1942	10	26	33 14.00	115 43.00	4.0	76.2	0.0	0.0	
1942	10	26	32 58.00	116 0.0	4.0	68.4	0.0	0.0	
1942	10	26	33 14.00	115 43.00	4.5	76.2	0.0	0.0	
1942	10	29	32 58.00	116 0.0	4.5	68.4	0.0	0.0	
1942	10	29	32 58.00	116 0.0	4.5	68.4	0.0	0.0	
1942	10	29	32 58.00	116 0.0	4.0	68.4	0.0	0.0	
1942	10	30	32 58.00	116 0.0	4.5	68.4	0.0	0.0	
1942	10	31	32 58.00	116 23.00	4.0	61.2	0.0	0.0	
1942	11	2	32 58.00	116 0.0	4.5	68.4	0.0	0.0	
1942	11	3	32 58.00	116 0.0	4.5	68.4	0.0	0.0	
1942	11	3	32 58.00	116 0.0	4.0	68.4	0.0	0.0	
1942	11	7	32 58.00	116 0.0	4.0	68.4	0.0	0.0	
1942	11	9	34 37.00	116 0.0	4.5	56.3	0.0	0.0	
1942	11	12	32 58.00	116 0.0	4.0	68.4	0.0	0.0	
1942	11	12	33 12.00	115 36.00	4.0	83.3	0.0	0.0	
1942	11	22	32 58.00	116 0.0	4.0	68.4	0.0	0.0	
1943	1	2	33 25.00	116 25.00	4.5	34.1	0.0	0.0	
1943	1	8	32 58.00	116 0.0	4.0	68.4	0.0	0.0	
1943	2	23	32 51.00	117 29.00	4.0	52.9	0.0	0.0	
1943	2	24	32 58.00	116 0.0	4.0	68.4	0.0	0.0	
1943	3	7	32 58.00	116 0.0	4.0	68.4	0.0	0.0	
1943	3	26	32 58.00	116 0.0	4.0	68.4	0.0	0.0	
1943	4	7	32 58.00	116 0.0	4.0	68.4	0.0	0.0	
1943	4	27	32 58.00	116 0.0	4.0	68.4	0.0	0.0	
1943	4	30	32 58.00	116 0.0	4.0	68.4	0.0	0.0	
1943	6	12	33 20.00	116 6.00	4.0	53.1	0.0	0.0	
1943	6	18	33 7.00	116 7.00	4.5	57.4	0.0	0.0	
1943	8	17	32 58.00	116 0.0	4.0	68.4	0.0	0.0	
1943	8	29	34 16.00	116 58.00	5.5	53.0	0.0	0.0	
1943	8	29	34 16.00	116 58.00	4.0	53.0	0.0	0.0	
1943	8	29	34 16.00	116 58.00	4.0	53.0	0.0	0.0	
1943	10	14	34 20.00	116 53.00	4.5	58.0	0.0	0.0	
1943	10	15	34 21.00	116 52.00	4.5	59.3	0.0	0.0	
1943	10	24	33 56.00	117 22.00	4.0	36.6	0.0	0.0	
1943	10	31	33 47.00	116 12.00	4.5	50.1	0.0	0.0	
1943	11	2	32 58.00	116 0.0	4.5	68.4	0.0	0.0	
1943	11	2	32 58.00	116 0.0	4.0	68.4	0.0	0.0	
1943	11	2	32 58.00	116 0.0	4.5	68.4	0.0	0.0	
1943	11	2	32 58.00	116 0.0	4.0	68.4	0.0	0.0	
1943	11	2	32 58.00	116 0.0	4.0	68.4	0.0	0.0	
1943	11	16	32 58.00	116 0.0	4.0	68.4	0.0	0.0	
1943	11	17	33 55.00	116 42.00	4.5	33.5	0.0	0.0	
1943	12	22	34 20.00	115 48.00	5.5	90.0	0.0	0.0	
1944	2	4	32 58.00	116 0.0	3.8	68.4	0.0	0.0	
1944	5	5	34 0.0	116 23.00	4.0	49.6	0.0	0.0	
1944	5	21	33 45.00	118 31.00	3.8	89.1	0.0	0.0	
1944	6	10	34 0.85	116 46.26	4.5	37.9	0.0	0.0	
1944	6	10	33 58.37	116 46.12	4.0	35.2	0.0	0.0	
1944	6	12	33 58.57	116 43.24	5.1	36.6	0.0	0.0	
1944	6	12	33 59.67	116 42.70	5.3	38.0	0.050	0.050	
1944	6	12	33 54.88	116 47.91	3.8	30.9	0.0	0.0	
1944	6	12	33 58.89	116 42.13	4.2	37.4	0.0	0.0	
1944	6	14	33 59.16	116 42.25	3.9	37.6	0.0	0.0	

1944	6	15	33 50.41	116 56.02	3.8	23.8	0.0	0.0	
1944	6	19	33 52.00	118 13.00	4.5	74.5	0.0	0.0	
1944	6	19	33 52.00	118 13.00	4.4	74.5	0.0	0.0	
1944	7	26	33 47.00	118 15.00	3.8	74.6	0.0	0.0	
1944	8	4	32 58.00	116 0.0	3.9	68.4	0.0	0.0	
1944	8	20	32 58.00	116 0.0	4.0	68.4	0.0	0.0	
1944	8	25	34 0.0	116 42.00	4.2	38.7	0.0	0.0	
1944	9	4	33 19.00	116 4.00	4.1	55.3	0.0	0.0	
1944	10	26	33 17.00	116 11.00	4.2	49.4	0.0	0.0	
1944	10	28	33 56.00	116 45.00	4.4	33.2	0.0	0.0	
1944	11	4	32 58.00	116 0.0	3.8	68.4	0.0	0.0	
1945	3	11	33 52.00	116 12.00	3.8	52.6	0.0	0.0	
1945	3	20	34 15.00	116 10.00	5.0	70.7	0.0	0.0	
1945	3	29	34 17.00	116 11.00	4.2	71.7	0.0	0.0	
1945	4	18	34 26.00	116 59.00	4.3	64.5	0.0	0.0	
1945	8	15	33 13.00	116 8.00	5.7	53.6	0.0	0.0	
1945	8	27	33 2.00	115 53.00	4.0	72.0	0.0	0.0	
1945	9	7	33 58.00	116 48.00	4.3	34.2	0.0	0.0	
1945	9	22	33 33.00	116 50.00	3.8	10.2	0.0	0.0	
1945	11	15	33 12.00	115 56.00	3.8	64.9	0.0	0.0	
1946	1	8	33 0.0	115 50.00	5.4	75.6	0.0	0.0	
1946	1	16	32 53.00	115 37.00	4.2	90.4	0.0	0.0	
1946	2	24	34 24.00	117 48.00	4.1	77.4	0.0	0.0	
1946	4	28	33 52.00	115 42.00	4.4	79.1	0.0	0.0	
1946	6	4	33 55.00	115 42.00	4.8	80.2	0.0	0.0	
1946	6	4	33 55.00	115 42.00	3.9	80.2	0.0	0.0	
1946	6	15	32 36.00	116 19.00	4.8	73.6	0.0	0.0	
1946	7	18	34 32.00	115 59.00	5.6	92.4	0.0	0.0	
1946	8	15	33 55.00	116 15.00	4.0	51.9	0.0	0.0	
1946	8	30	33 14.00	115 42.00	4.6	77.1	0.0	0.0	
1946	9	28	33 57.00	116 51.00	5.0	32.2	0.0	0.0	
1947	3	21	33 0.0	115 31.00	3.8	92.2	0.0	0.0	
1947	5	11	34 14.00	116 20.00	4.9	63.6	0.0	0.0	
1947	6	17	33 52.00	116 31.00	3.8	37.6	0.0	0.0	
1947	6	23	34 7.00	117 17.00	3.8	45.7	0.0	0.0	
1947	7	24	34 1.00	116 30.00	5.5	45.9	0.0	0.0	
1947	7	24	34 1.00	116 30.00	4.3	45.9	0.0	0.0	
1947	7	24	34 1.00	116 30.00	4.9	45.9	0.0	0.0	
1947	7	25	34 1.00	116 30.00	5.0	45.9	0.0	0.0	
1947	7	25	34 1.00	116 30.00	4.6	45.9	0.0	0.0	
1947	7	25	34 1.00	116 30.00	3.8	45.9	0.0	0.0	
1947	7	25	34 1.00	116 30.00	3.9	45.9	0.0	0.0	
1947	7	25	34 1.00	116 30.00	3.9	45.9	0.0	0.0	
1947	7	25	34 1.00	116 30.00	4.3	45.9	0.0	0.0	
1947	7	25	34 1.00	116 30.00	5.2	45.9	0.0	0.0	
1947	7	25	34 1.00	116 30.00	4.2	45.9	0.0	0.0	
1947	7	25	34 1.00	116 30.00	4.5	45.9	0.0	0.0	
1947	7	25	34 1.00	116 30.00	3.9	45.9	0.0	0.0	
1947	7	26	34 1.00	116 30.00	4.2	45.9	0.0	0.0	
1947	7	26	34 1.00	116 30.00	5.1	45.9	0.0	0.0	
1947	7	26	34 1.00	116 30.00	3.8	45.9	0.0	0.0	
1947	7	26	34 1.00	116 30.00	4.5	45.9	0.0	0.0	
1947	7	26	34 1.00	116 30.00	4.1	45.9	0.0	0.0	
1947	7	29	34 1.00	116 30.00	4.2	45.9	0.0	0.0	
1947	7	30	34 1.00	116 30.00	4.2	45.9	0.0	0.0	
1947	8	1	34 1.00	116 30.00	4.1	45.9	0.0	0.0	
1947	8	8	34 1.00	116 30.00	4.0	45.9	0.0	0.0	
1947	8	31	32 45.00	116 15.00	3.9	67.5	0.0	0.0	
1947	11	10	34 24.00	116 25.00	4.5	70.7	0.0	0.0	
1948	1	12	33 5.00	115 58.00	3.8	66.1	0.0	0.0	
1948	2	10	33 43.00	116 0.0	3.8	59.5	0.0	0.0	
1948	3	1	34 10.00	117 32.00	4.7	55.4	0.0	0.0	

1948	5	10	32 5.00	117 0.0	4.0	97.8	0.0	0.0	
1948	6	24	33 28.00	117 46.00	3.8	44.2	0.0	0.0	
1948	7	4	32 54.00	116 3.00	3.8	68.7	0.0	0.0	
1948	9	18	33 59.00	116 21.00	3.8	50.2	0.0	0.0	
1948	10	3	34 11.00	117 35.00	4.0	58.0	0.0	0.0	
1948	12	4	33 56.00	116 23.00	6.5	46.4	0.050	0.100	
1948	12	4	33 57.00	116 25.00	3.9	45.8	0.0	0.0	
1948	12	5	33 56.00	116 22.00	4.9	47.2	0.0	0.0	
1948	12	5	33 56.00	116 21.00	4.4	47.9	0.0	0.0	
1948	12	5	33 58.00	116 26.00	4.6	45.9	0.0	0.0	
1948	12	5	34 0.0	116 28.00	4.4	46.3	0.0	0.0	
1948	12	5	33 58.90	116 28.75	3.9	44.8	0.0	0.0	
1948	12	6	34 0.0	116 28.00	4.3	46.3	0.0	0.0	
1948	12	10	33 56.00	116 24.00	4.4	45.7	0.0	0.0	
1948	12	11	33 58.00	116 27.00	4.5	45.2	0.0	0.0	
1948	12	15	33 56.00	116 21.00	3.8	47.9	0.0	0.0	
1948	12	27	34 0.0	116 3.00	4.0	64.8	0.0	0.0	
1948	12	28	33 29.00	116 42.00	4.0	17.3	0.0	0.0	
1949	3	16	33 17.00	116 2.00	4.0	57.7	0.0	0.0	
1949	4	13	33 17.00	116 21.00	4.1	40.3	0.0	0.0	
1949	5	2	34 1.00	115 46.00	4.6	79.6	0.0	0.0	
1949	5	2	34 1.00	115 41.00	5.9	83.9	0.0	0.0	
1949	5	2	34 1.00	115 41.00	3.8	83.9	0.0	0.0	
1949	5	2	34 1.00	115 41.00	4.2	83.9	0.0	0.0	
1949	5	2	34 1.00	115 41.00	4.2	83.9	0.0	0.0	
1949	5	3	34 1.00	115 41.00	3.8	83.9	0.0	0.0	
1949	5	6	34 1.00	115 41.00	4.1	83.9	0.0	0.0	
1949	5	10	34 1.00	115 41.00	4.7	83.9	0.0	0.0	
1949	5	22	34 1.00	115 41.00	4.0	83.9	0.0	0.0	
1949	5	23	34 1.00	115 41.00	3.9	83.9	0.0	0.0	
1949	5	24	34 1.00	115 41.00	3.8	83.9	0.0	0.0	
1949	5	25	34 1.00	115 41.00	4.5	83.9	0.0	0.0	
1949	5	26	34 1.00	115 41.00	3.9	83.9	0.0	0.0	
1949	5	27	34 1.00	115 41.00	3.8	83.9	0.0	0.0	
1949	6	15	34 1.00	115 41.00	3.9	83.9	0.0	0.0	
1949	8	19	33 57.39	116 53.96	3.8	22.0	0.0	0.0	
1949	9	20	34 53.00	116 40.00	4.1	97.5	0.0	0.0	
1949	9	23	33 57.52	116 39.07	4.0	37.5	0.0	0.0	
1949	10	13	33 51.00	115 51.00	4.0	70.5	0.0	0.0	
1949	10	14	33 11.00	116 23.00	4.1	41.7	0.0	0.0	
1949	11	4	32 12.00	116 33.00	5.7	93.5	0.0	0.0	
1949	11	4	32 12.00	116 32.00	3.8	93.7	0.0	0.0	
1949	11	4	32 12.00	116 32.00	3.9	93.7	0.0	0.0	
1949	11	5	32 12.00	116 33.00	5.1	93.5	0.0	0.0	
1949	11	5	32 12.00	116 33.00	4.0	93.5	0.0	0.0	
1949	11	6	32 12.00	116 33.00	4.0	93.5	0.0	0.0	
1949	11	11	32 12.00	116 33.00	4.2	93.5	0.0	0.0	
1950	1	7	32 6.00	116 36.00	4.0	99.4	0.0	0.0	
1950	1	9	34 6.35	116 53.37	3.9	43.0	0.0	0.0	
1950	1	11	33 56.37	118 12.29	4.1	75.8	0.0	0.0	
1950	1	13	33 57.79	116 25.52	4.1	46.0	0.0	0.0	
1950	4	2	33 5.00	116 3.00	3.8	61.8	0.0	0.0	
1950	5	19	33 57.00	115 43.00	3.9	80.2	0.0	0.0	
1950	7	27	33 7.00	115 34.00	4.1	86.7	0.0	0.0	
1950	7	27	33 7.00	115 34.00	4.8	86.7	0.0	0.0	
1950	7	27	33 7.00	115 34.00	4.2	86.7	0.0	0.0	
1950	7	27	33 7.00	115 34.00	3.8	86.7	0.0	0.0	
1950	7	27	33 7.00	115 34.00	3.9	86.7	0.0	0.0	
1950	7	27	33 7.00	115 34.00	3.8	86.7	0.0	0.0	
1950	7	27	33 7.00	115 34.00	4.5	86.7	0.0	0.0	
1950	7	28	33 7.00	115 34.00	4.7	86.7	0.0	0.0	
1950	7	28	33 7.00	115 34.00	3.9	86.7	0.0	0.0	

1950	7	29	33	7.00	115 34.00	3.8	86.7	0.0	0.0
1950	7	28	33	7.00	115 34.00	3.8	86.7	0.0	0.0
1950	7	28	33	7.00	115 34.00	4.0	86.7	0.0	0.0
1950	7	28	33	7.00	115 34.00	4.7	86.7	0.0	0.0
1950	7	28	33	7.00	115 34.00	4.1	86.7	0.0	0.0
1950	7	28	33	7.00	115 34.00	5.4	86.7	0.0	0.0
1950	7	28	33	7.00	115 34.00	4.8	86.7	0.0	0.0
1950	7	28	33	7.00	115 34.00	4.2	86.7	0.0	0.0
1950	7	28	33	7.00	115 34.00	4.0	86.7	0.0	0.0
1950	7	28	33	7.00	115 34.00	4.2	86.7	0.0	0.0
1950	7	29	33	7.00	115 34.00	4.1	86.7	0.0	0.0
1950	7	28	33	7.00	115 34.00	3.9	86.7	0.0	0.0
1950	7	28	33	7.00	115 34.00	3.8	86.7	0.0	0.0
1950	7	28	33	7.00	115 34.00	3.9	86.7	0.0	0.0
1950	7	29	33	7.00	115 34.00	4.5	86.7	0.0	0.0
1950	7	29	33	7.00	115 34.00	3.9	86.7	0.0	0.0
1950	7	29	33	7.00	115 34.00	3.9	86.7	0.0	0.0
1950	7	29	33	7.00	115 34.00	3.8	86.7	0.0	0.0
1950	7	29	33	7.00	115 34.00	5.5	86.7	0.0	0.0
1950	7	29	33	7.00	115 34.00	3.8	86.7	0.0	0.0
1950	7	29	33	7.00	115 34.00	4.5	86.7	0.0	0.0
1950	7	29	33	7.00	115 34.00	3.9	86.7	0.0	0.0
1950	7	29	33	7.00	115 34.00	4.3	86.7	0.0	0.0
1950	7	29	33	7.00	115 34.00	4.7	86.7	0.0	0.0
1950	8	1	33	7.00	115 34.00	4.7	86.7	0.0	0.0
1950	8	12	34	19.00	116 48.00	4.3	97.6	0.0	0.0
1950	8	14	33	7.00	115 34.00	4.7	86.7	0.0	0.0
1950	8	28	34	18.40	116 50.13	4.2	96.6	0.0	0.0
1950	9	5	33	59.00	116 45.00	4.8	17.7	0.05C	0.100
1950	9	17	32	10.00	116 25.00	4.5	98.0	0.0	0.0
1950	10	14	32	10.00	116 34.00	3.8	95.4	0.0	0.0
1950	10	15	33	0.0	115 24.00	3.8	98.4	0.0	0.0
1950	10	16	33	0.0	115 24.00	3.9	98.4	0.0	0.0
1950	11	6	32	43.00	117 59.00	4.4	72.4	0.0	0.0
1950	11	12	34	1.00	115 0.0	3.6	87.6	0.0	0.0
1950	11	17	33	55.00	118 19.00	3.8	81.1	0.0	0.0
1950	12	22	33	25.00	116 34.00	4.0	25.6	0.0	0.0
1950	12	28	33	12.00	116 7.00	4.2	95.0	0.0	0.0
1951	1	24	32	59.00	115 44.00	5.6	81.3	0.0	0.0
1951	1	24	32	59.00	115 44.00	4.0	81.3	0.0	0.0
1951	1	24	32	59.00	115 44.00	3.8	81.3	0.0	0.0
1951	1	24	32	59.00	115 44.00	3.8	81.3	0.0	0.0
1951	2	13	32	58.00	115 32.00	4.2	92.2	0.0	0.0
1951	2	13	32	58.00	115 32.00	4.1	92.2	0.0	0.0
1951	2	15	33	29.00	116 30.00	4.8	23.8	0.0	0.0
1951	2	15	33	29.00	116 30.00	4.8	23.8	0.0	0.0
1951	3	10	34	1.00	116 52.55	3.9	36.5	0.0	0.0
1951	3	29	33	17.00	116 2.00	4.4	97.7	0.0	0.0
1951	4	21	33	29.00	116 20.00	3.9	38.4	0.0	0.0
1951	8	10	33	16.00	115 40.00	4.4	78.5	0.0	0.0
1951	8	15	33	12.00	116 0.0	4.0	61.2	0.0	0.0
1951	9	22	34	7.11	117 20.46	4.3	47.1	0.0	0.0
1951	9	30	33	15.00	116 22.00	3.8	39.5	0.0	0.0
1951	10	16	34	10.00	116 59.00	4.0	46.1	0.0	0.0
1951	11	14	32	57.00	116 15.00	4.1	97.6	0.0	0.0
1951	12	5	33	6.00	115 24.00	4.5	96.2	0.0	0.0
1951	12	5	33	6.00	115 24.00	3.8	96.2	0.0	0.0
1951	12	16	33	6.00	115 34.00	3.8	87.1	0.0	0.0
1951	12	26	32	49.00	118 21.00	5.9	91.0	0.0	0.0
1952	1	8	33	57.50	116 20.75	4.4	49.2	0.0	0.0
1952	2	8	33	6.00	116 38.00	4.0	34.8	0.0	0.0
1952	2	13	32	52.00	118 15.00	4.7	84.3	0.0	0.0

1952	2	17	33 59.75	117 16.19	4.5	37.6	0.0	0.0
1952	3	10	32 30.00	116 12.00	3.9	83.1	0.0	0.0
1952	3	28	33 17.00	115 55.00	4.2	64.2	0.0	0.0
1952	4	9	33 57.00	115 47.00	3.9	76.7	0.0	0.0
1952	8	23	34 31.16	118 11.89	5.0	98.6	0.0	0.0
1952	10	19	34 30.28	118 10.36	3.9	96.9	0.0	0.0
1952	11	16	34 0.64	117 11.26	3.8	37.0	0.0	0.0
1953	2	4	33 24.00	116 34.00	4.3	25.9	0.0	0.0
1953	2	20	33 17.00	116 22.00	3.9	39.4	0.0	0.0
1953	5	2	34 4.62	117 37.07	3.9	53.5	0.0	0.0
1953	6	14	32 57.00	115 43.00	5.5	83.2	0.0	0.0
1953	6	14	32 57.00	115 43.00	4.8	83.2	0.0	0.0
1953	6	14	32 57.00	115 43.00	3.8	83.2	0.0	0.0
1953	8	16	33 1.00	115 43.00	3.8	81.1	0.0	0.0
1953	9	11	34 3.00	115 38.00	4.2	87.5	0.0	0.0
1953	11	22	32 49.00	116 12.00	4.1	66.0	0.0	0.0
1953	11	23	33 6.00	116 27.00	4.3	42.0	0.0	0.0
1954	1	4	33 16.00	116 3.00	3.9	57.1	0.0	0.0
1954	1	4	33 16.00	116 6.00	4.2	54.3	0.0	0.0
1954	2	12	33 20.00	116 26.00	4.5	34.6	0.0	0.0
1954	3	19	33 17.00	116 11.00	6.2	49.4	0.050	0.050
1954	3	19	33 17.00	116 11.00	5.0	49.4	0.0	0.0
1954	3	19	33 17.00	116 11.00	4.6	49.4	0.0	0.0
1954	3	19	33 17.00	116 11.00	4.0	49.4	0.0	0.0
1954	3	19	33 17.00	116 11.00	4.2	49.4	0.0	0.0
1954	3	19	33 17.00	116 11.00	4.5	49.4	0.0	0.0
1954	3	19	33 17.00	116 11.00	3.9	49.4	0.0	0.0
1954	3	19	33 17.00	116 11.00	4.5	49.4	0.0	0.0
1954	3	19	33 17.00	116 11.00	5.5	49.4	0.0	0.0
1954	3	19	33 17.00	116 11.00	3.8	49.4	0.0	0.0
1954	3	19	33 17.00	116 11.00	4.0	49.4	0.0	0.0
1954	3	19	33 17.00	116 11.00	3.8	49.4	0.0	0.0
1954	3	19	33 17.00	116 11.00	3.9	49.4	0.0	0.0
1954	3	19	33 17.00	116 11.00	4.3	49.4	0.0	0.0
1954	3	19	33 17.00	116 11.00	4.1	49.4	0.0	0.0
1954	3	19	33 17.00	116 11.00	4.0	49.4	0.0	0.0
1954	3	19	33 17.00	116 11.00	3.9	49.4	0.0	0.0
1954	3	19	33 17.00	116 11.00	3.8	49.4	0.0	0.0
1954	3	20	33 17.00	116 11.00	4.9	49.4	0.0	0.0
1954	3	20	33 17.00	116 11.00	4.3	49.4	0.0	0.0
1954	3	23	33 17.00	116 11.00	5.1	49.4	0.0	0.0
1954	3	23	33 17.00	116 11.00	3.9	49.4	0.0	0.0
1954	3	24	33 17.00	116 11.00	3.8	49.4	0.0	0.0
1954	3	24	33 17.00	116 11.00	3.8	49.4	0.0	0.0
1954	4	4	33 17.00	116 11.00	4.1	49.4	0.0	0.0
1954	4	30	34 1.75	116 47.21	4.2	38.6	0.0	0.0
1954	10	26	33 44.00	117 28.00	4.1	31.3	0.0	0.0
1954	10	30	34 2.00	115 33.00	4.6	91.3	0.0	0.0
1955	1	28	33 49.00	115 28.00	4.3	91.0	0.0	0.0
1955	4	25	33 27.00	116 41.00	4.0	18.6	0.0	0.0
1955	5	10	33 10.00	115 46.00	4.3	74.7	0.0	0.0
1955	5	15	34 7.42	117 28.82	4.0	51.2	0.0	0.0
1955	6	14	32 58.00	115 32.00	3.8	92.2	0.0	0.0
1955	6	15	33 8.00	115 24.00	4.0	95.6	0.0	0.0
1955	7	2	34 24.31	116 40.05	4.2	65.4	0.0	0.0
1955	6	26	33 3.00	116 1.00	4.3	64.6	0.0	0.0
1955	10	25	33 0.0	115 32.00	4.3	91.3	0.0	0.0
1955	12	17	33 0.0	115 30.00	3.8	93.1	0.0	0.0
1955	12	17	33 0.0	115 30.00	4.3	93.1	0.0	0.0
1955	12	17	33 0.0	115 30.00	3.9	93.1	0.0	0.0
1955	12	17	33 0.0	115 30.00	5.4	93.1	0.0	0.0
1955	12	17	33 0.0	115 30.00	4.1	93.1	0.0	0.0

1955	12	17	33	0.0	115	30.00	4.6	93.1	0.0	0.0
1955	12	17	33	0.0	115	30.00	3.8	93.1	0.0	0.0
1955	12	17	33	0.0	115	30.00	3.8	93.1	0.0	0.0
1955	12	17	33	0.0	115	30.00	4.3	93.1	0.0	0.0
1956	1	3	33	43.50	117	29.91	4.7	32.6	0.0	0.0
1956	1	3	32	23.00	116	0.0	4.7	96.3	0.0	0.0
1956	3	16	34	18.36	116	45.55	4.8	57.4	0.0	0.0
1956	3	16	34	14.98	116	46.19	4.0	53.5	0.0	0.0
1956	3	16	34	15.83	116	45.31	4.0	54.7	0.0	0.0
1956	3	16	34	20.17	116	44.53	4.4	59.7	0.0	0.0
1956	3	16	34	9.57	116	51.05	3.8	46.4	0.0	0.0
1956	3	18	34	17.97	116	47.06	4.0	56.6	0.0	0.0
1956	4	1	33	46.00	116	1.00	3.8	59.6	0.0	0.0
1956	5	11	34	13.77	116	47.73	4.7	51.8	0.0	0.0
1956	7	19	32	16.00	117	21.00	3.8	87.6	0.0	0.0
1956	9	1	33	44.70	115	59.82	4.0	60.2	0.0	0.0
1956	9	2	33	46.25	116	3.03	4.2	57.8	0.0	0.0
1956	9	17	33	58.00	116	15.00	3.8	53.9	0.0	0.0
1956	9	23	33	32.37	116	33.68	4.3	25.4	0.0	0.0
1956	10	2	33	49.17	117	2.59	3.8	22.2	0.0	0.0
1957	1	17	34	12.82	116	44.61	3.8	51.5	0.0	0.0
1957	1	24	33	6.62	116	31.36	4.6	38.5	0.0	0.0
1957	2	1	33	59.78	116	20.38	4.6	50.7	0.0	0.0
1957	2	26	33	2.27	116	21.65	4.1	48.7	0.0	0.0
1957	3	30	33	7.95	116	24.77	3.9	42.3	0.0	0.0
1957	4	2	33	44.68	115	56.91	4.1	62.9	0.0	0.0
1957	4	16	33	4.34	116	27.63	3.9	42.9	0.0	0.0
1957	4	25	33	12.99	115	48.50	5.2	71.4	0.0	0.0
1957	4	25	33	6.00	115	54.00	4.2	69.1	0.0	0.0
1957	4	25	33	11.00	115	51.00	4.2	69.8	0.0	0.0
1957	4	25	33	11.00	115	51.00	5.1	69.8	0.0	0.0
1957	4	25	33	6.00	115	54.00	4.1	69.1	0.0	0.0
1957	4	25	33	6.00	115	54.00	4.2	69.1	0.0	0.0
1957	4	26	33	8.00	115	41.00	3.9	80.0	0.0	0.0
1957	4	26	33	7.00	115	40.00	3.8	81.3	0.0	0.0
1957	5	26	33	13.88	116	0.27	5.0	60.3	0.0	0.0
1957	5	26	33	5.90	116	4.00	3.9	60.5	0.0	0.0
1957	5	31	33	8.00	115	57.00	3.8	65.6	0.0	0.0
1957	7	2	33	0.14	116	26.16	4.1	47.2	0.0	0.0
1957	8	10	33	48.00	115	36.00	3.8	83.3	0.0	0.0
1957	12	4	34	4.01	116	25.92	4.3	51.1	0.0	0.0
1957	12	12	34	10.79	116	11.44	4.4	66.2	0.0	0.0
1958	3	10	33	17.00	116	12.00	3.8	48.5	0.0	0.0
1958	6	2	33	10.00	116	30.00	3.8	36.9	0.0	0.0
1958	8	18	33	10.00	115	56.00	3.8	65.6	0.0	0.0
1958	8	19	33	10.00	115	56.00	3.8	65.6	0.0	0.0
1958	10	16	33	2.00	115	38.00	3.9	85.1	0.0	0.0
1958	10	16	33	2.00	115	38.00	3.9	85.1	0.0	0.0
1958	11	6	32	59.41	116	16.07	4.1	55.0	0.0	0.0
1958	12	19	32	36.00	115	42.00	4.1	97.4	0.0	0.0
1959	4	17	33	52.80	116	26.20	4.2	41.7	0.0	0.0
1959	6	1	32	43.00	116	2.00	4.6	77.7	0.0	0.0
1959	6	12	33	29.30	116	46.62	4.0	12.9	0.0	0.0
1959	6	27	33	56.09	116	52.94	4.0	33.0	0.0	0.0
1959	7	20	33	22.00	116	33.00	3.8	27.5	0.0	0.0
1959	8	4	33	57.00	115	40.00	4.1	82.9	0.0	0.0
1959	8	18	33	5.85	116	26.62	4.3	42.4	0.0	0.0
1959	8	26	34	3.92	116	34.42	4.3	46.2	0.0	0.0
1960	2	24	34	0.0	117	34.00	3.8	47.6	0.0	0.0
1960	4	21	32	44.00	115	42.00	4.2	91.8	0.0	0.0
1960	6	28	34	6.95	117	28.45	4.1	50.6	0.0	0.0
1960	8	1	33	10.00	116	28.00	4.2	38.4	0.0	0.0

1960	8	20	33 41.00	118 22.00	3.8	79.8	0.0	0.0	
1960	8	21	34 11.00	117 25.00	3.8	53.0	0.0	0.0	
1960	9	1	33 46.00	116 8.00	3.8	54.1	0.0	0.0	
1960	12	30	33 16.00	115 56.00	3.8	63.5	0.0	0.0	
1960	12	30	33 16.00	115 56.00	4.0	63.5	0.0	0.0	
1961	1	10	34 17.00	117 4.00	3.8	54.3	0.0	0.0	
1961	4	28	33 14.42	116 2.16	4.2	58.4	0.0	0.0	
1961	5	28	33 48.84	116 1.70	4.4	60.0	0.0	0.0	
1961	8	22	33 2.56	116 15.60	4.4	53.1	0.0	0.0	
1961	8	23	33 1.69	116 12.23	3.9	56.3	0.0	0.0	
1961	8	23	33 3.01	116 14.28	4.7	53.8	0.0	0.0	
1961	9	16	32 53.67	116 7.13	4.4	65.8	0.0	0.0	
1961	9	20	33 2.00	116 14.00	4.0	54.7	0.0	0.0	
1961	10	4	33 51.25	117 45.12	4.1	49.7	0.0	0.0	
1961	10	20	33 39.59	117 58.62	3.8	57.4	0.0	0.0	
1961	10	20	33 39.24	117 59.65	4.3	58.3	0.0	0.0	
1961	10	20	33 39.57	117 58.84	4.0	57.6	0.0	0.0	
1961	10	20	33 39.91	117 58.77	4.0	57.6	0.0	0.0	
1961	10	20	33 40.29	118 0.75	4.1	59.5	0.0	0.0	
1961	11	20	33 40.83	117 59.57	4.0	58.5	0.0	0.0	
1962	4	27	33 44.26	117 11.20	4.1	19.6	0.0	0.0	
1962	6	28	33 3.00	116 13.00	3.8	54.8	0.0	0.0	
1962	8	15	33 18.00	116 10.00	3.8	50.0	0.0	0.0	
1962	10	5	33 19.96	116 14.16	4.1	45.5	0.0	0.0	
1962	10	22	33 3.95	116 10.36	3.8	56.3	0.0	0.0	
1962	10	29	34 19.52	116 51.90	4.8	57.6	0.0	0.0	
1962	11	2	33 14.87	116 16.72	3.8	45.1	0.0	0.0	
1962	11	30	34 20.22	116 54.57	4.3	58.1	0.0	0.0	
1962	12	1	34 19.47	116 53.09	4.3	57.4	0.0	0.0	
1962	12	1	34 19.00	116 53.00	3.8	56.8	0.0	0.0	
1962	12	2	34 19.52	116 52.52	4.4	57.5	0.0	0.0	
1963	1	13	33 1.28	116 13.39	4.2	55.6	0.0	0.0	
1963	1	13	33 1.00	116 13.00	3.9	56.1	0.0	0.0	
1963	4	26	32 36.00	115 42.00	4.0	97.4	0.0	0.0	
1963	5	23	32 54.90	115 41.82	4.3	85.3	0.0	0.0	
1963	5	23	33 0.20	115 40.73	3.8	83.5	0.0	0.0	
1963	5	23	32 58.93	115 33.94	4.6	90.1	0.0	0.0	
1963	5	23	33 1.63	115 40.87	4.8	82.7	0.0	0.0	
1963	7	18	34 12.13	116 10.03	3.9	68.3	0.0	0.0	
1963	7	30	34 9.23	116 12.59	4.7	64.2	0.0	0.0	
1963	8	22	34 9.43	116 11.64	4.4	65.0	0.0	0.0	
1963	8	24	32 20.02	116 10.21	4.1	93.7	0.0	0.0	
1963	9	14	33 32.56	118 20.41	4.2	77.3	0.0	0.0	
1963	9	23	33 42.61	116 55.50	5.0	15.1	0.050	0.100	
1963	9	25	33 26.16	118 12.85	3.8	70.1	0.0	0.0	
1963	9	25	33 25.27	118 14.15	3.8	71.4	0.0	0.0	
1963	9	27	33 1.75	115 43.74	3.8	80.1	0.0	0.0	
1963	10	27	33 17.02	115 44.10	4.0	74.4	0.0	0.0	
1963	10	27	33 12.01	115 37.98	4.1	81.4	0.0	0.0	
1963	10	27	33 21.34	115 23.31	4.1	93.4	0.0	0.0	
1963	10	27	32 53.11	115 51.91	4.4	78.0	0.0	0.0	
1963	10	27	33 7.84	115 36.69	4.2	84.0	0.0	0.0	
1963	10	27	33 16.75	115 38.25	3.9	80.0	0.0	0.0	
1963	10	28	33 10.50	115 45.83	4.0	74.7	0.0	0.0	
1963	10	28	33 14.20	115 45.50	3.8	73.8	0.0	0.0	
1963	11	2	33 14.17	115 36.38	3.9	82.3	0.0	0.0	
1964	1	6	34 24.34	116 26.64	3.8	70.3	0.0	0.0	
1964	1	6	34 22.85	116 28.47	4.5	68.0	0.0	0.0	
1964	5	22	33 28.29	116 34.85	3.8	24.2	0.0	0.0	
1964	8	4	33 29.48	116 51.08	3.9	8.6	0.050	0.0	
1964	8	17	33 5.73	115 53.89	3.9	69.4	0.0	0.0	
1964	8	30	34 16.10	118 26.68	4.0	98.7	0.0	0.0	

1964	10	5	33	2.18	115	54.20	4.1	70.8	0.0	0.0
1964	10	5	33	3.17	115	51.30	4.4	72.8	0.0	0.0
1964	10	5	33	5.23	115	55.07	3.8	68.6	0.0	0.0
1964	11	17	33	53.91	116	34.12	4.0	37.1	0.0	0.0
1964	11	21	33	0.10	116	5.12	4.2	82.9	0.0	0.0
1964	11	29	32	59.41	115	40.94	4.2	83.7	0.0	0.0
1965	1	1	34	7.37	117	31.36	3.9	52.6	0.0	0.0
1965	1	1	34	8.43	117	30.93	4.4	53.3	0.0	0.0
1965	2	25	32	55.84	115	43.82	3.8	83.1	0.0	0.0
1965	4	11	33	0.73	115	35.53	4.1	87.8	0.0	0.0
1965	4	15	34	7.92	117	25.58	4.5	50.1	0.0	0.0
1965	4	27	33	1.87	115	57.98	3.9	67.8	0.0	0.0
1965	6	16	33	3.34	115	37.19	4.4	85.2	0.0	0.0
1965	6	17	33	2.25	115	35.07	4.3	87.6	0.0	0.0
1965	6	17	33	0.48	115	39.58	4.1	84.4	0.0	0.0
1965	6	17	33	1.17	115	34.39	4.2	88.7	0.0	0.0
1965	7	27	33	17.26	116	1.11	4.3	58.4	0.0	0.0
1965	8	19	32	44.66	115	57.79	3.8	79.4	0.0	0.0
1965	8	26	33	16.73	116	5.10	4.2	54.9	0.0	0.0
1965	8	26	33	13.99	116	5.17	4.5	55.8	0.0	0.0
1965	8	26	33	12.12	116	0.76	3.8	60.5	0.0	0.0
1965	8	26	33	14.79	116	4.57	3.9	56.0	0.0	0.0
1965	9	25	34	42.75	116	30.16	5.2	88.5	0.0	0.0
1965	9	25	34	42.66	116	28.54	4.9	88.9	0.0	0.0
1965	10	17	33	58.55	116	46.48	4.9	35.3	0.0	0.0
1965	10	17	33	59.71	116	48.44	3.9	35.9	0.0	0.0
1965	11	30	32	47.76	116	3.28	4.0	73.1	0.0	0.0
1966	1	7	33	16.73	116	14.92	4.0	45.9	0.0	0.0
1965	3	19	33	17.19	116	19.00	4.0	41.9	0.0	0.0
1967	1	8	33	37.93	118	29.03	4.0	85.0	0.0	0.0
1967	1	8	33	39.79	118	24.80	4.0	82.2	0.0	0.0
1967	1	8	33	34.78	118	21.72	3.8	78.7	0.0	0.0
1967	1	8	33	34.74	118	24.23	3.8	81.1	0.0	0.0
1967	4	2	33	3.18	116	18.35	4.3	50.5	0.0	0.0
1967	4	15	32	57.30	115	54.65	4.0	73.2	0.0	0.0
1967	5	21	33	30.37	116	35.08	4.7	23.5	0.0	0.0
1967	6	15	33	59.79	117	58.49	4.1	65.8	0.0	0.0
1967	8	11	33	30.51	116	37.86	4.1	21.3	0.0	0.0
1968	2	12	33	0.81	116	19.25	3.8	51.6	0.0	0.0
1968	3	28	34	3.12	116	7.26	4.0	63.4	0.0	0.0
1968	4	9	33	11.40	116	7.72	6.4	54.6	0.050	0.050
1968	4	9	33	10.00	116	7.00	4.3	55.9	0.0	0.0
1968	4	9	33	10.00	116	7.00	4.4	55.9	0.0	0.0
1968	4	9	33	10.00	116	7.00	3.9	55.9	0.0	0.0
1968	4	9	33	6.81	116	2.25	5.2	61.5	0.0	0.0
1968	4	9	33	6.27	116	2.16	4.7	61.9	0.0	0.0
1968	4	9	33	3.34	115	59.58	4.3	65.2	0.0	0.0
1968	4	9	33	6.40	116	0.40	4.0	63.4	0.0	0.0
1968	4	9	33	5.19	116	3.15	3.8	61.6	0.0	0.0
1968	4	9	33	14.10	116	15.98	4.0	46.1	0.0	0.0
1968	4	9	33	6.21	116	3.65	4.0	60.6	0.0	0.0
1968	4	9	32	53.43	115	44.98	3.9	83.5	0.0	0.0
1968	4	9	33	18.90	116	18.31	4.7	42.0	0.0	0.0
1968	4	10	33	15.53	116	5.04	3.9	55.3	0.0	0.0
1968	4	14	33	14.21	116	11.43	4.3	50.1	0.0	0.0
1968	4	16	33	2.88	115	59.16	4.8	66.2	0.0	0.0
1968	4	18	34	19.18	116	55.51	4.0	56.8	0.0	0.0
1968	4	23	32	6.80	116	47.11	4.2	96.6	0.0	0.0
1968	4	23	32	47.64	115	36.88	4.1	93.6	0.0	0.0
1968	5	6	33	2.36	115	56.94	4.0	68.4	0.0	0.0
1968	5	11	33	2.43	116	0.30	4.2	65.5	0.0	0.0
1968	5	22	33	18.62	116	13.45	4.4	46.6	0.0	0.0

1968	8	6	34 5.08	116 29.77	3.8	49.8	0.0	0.0
1968	12	17	33 2.69	115 51.79	4.7	72.6	0.0	0.0
1969	1	23	33 53.21	116 2.42	4.8	61.4	0.0	0.0
1969	1	25	33 49.58	115 59.12	4.1	62.7	0.0	0.0
1969	2	28	34 33.91	118 6.81	4.3	97.6	0.0	0.0
1969	4	28	33 20.60	116 20.78	5.8	39.2	0.050	0.050
1969	5	5	34 18.23	117 34.21	4.4	64.5	0.0	0.0
1969	5	19	33 20.95	116 11.30	4.5	47.9	0.0	0.0
1969	6	8	33 12.76	115 57.14	3.9	63.5	0.0	0.0
1969	8	20	33 1.17	116 13.50	4.0	55.6	0.0	0.0
1969	10	14	32 55.38	116 16.33	4.5	57.9	0.0	0.0
1969	10	27	33 32.71	117 48.40	4.5	46.6	0.0	0.0
1970	1	21	32 40.82	116 21.26	4.1	67.8	0.0	0.0
1970	9	12	34 16.04	117 31.11	4.1	60.9	0.0	0.0
1970	9	12	34 16.19	117 32.40	5.4	61.6	0.0	0.0
1970	9	13	34 16.86	117 33.10	4.4	62.7	0.0	0.0
1970	12	14	34 18.96	115 43.76	4.0	92.4	0.0	0.0
1971	1	23	32 33.07	115 47.08	4.1	95.9	0.0	0.0
1971	2	9	34 21.67	118 18.38	4.7	96.0	0.0	0.0
1971	2	9	34 20.34	118 19.92	4.1	96.2	0.0	0.0
1971	2	9	34 23.24	118 21.85	4.0	99.7	0.0	0.0
1971	2	9	34 18.67	118 25.30	3.8	99.3	0.0	0.0
1971	2	9	34 14.13	118 27.00	3.8	97.8	0.0	0.0
1971	2	9	34 20.09	118 19.84	4.8	96.0	0.0	0.0
1971	2	9	34 22.53	118 20.55	3.8	98.2	0.0	0.0
1971	2	9	34 20.74	118 17.33	3.8	94.5	0.0	0.0
1971	2	9	34 24.98	118 20.36	3.9	99.8	0.0	0.0
1971	2	10	34 18.71	118 19.55	3.9	94.8	0.0	0.0
1971	2	10	34 22.20	118 18.12	4.0	96.1	0.0	0.0
1971	2	10	34 24.67	118 19.76	4.3	99.2	0.0	0.0
1971	2	23	33 30.08	116 25.76	4.2	32.9	0.0	0.0
1971	4	19	33 15.94	116 12.44	3.8	48.5	0.0	0.0
1971	4	25	34 22.09	118 18.86	4.0	96.6	0.0	0.0
1971	5	22	33 6.13	116 21.32	3.8	46.2	0.0	0.0
1971	5	25	33 7.29	116 20.96	4.1	45.7	0.0	0.0
1971	6	22	33 44.86	117 28.74	4.2	32.5	0.0	0.0
1971	8	25	32 57.65	116 17.42	4.0	55.4	0.0	0.0
1971	9	30	33 2.01	115 49.24	5.1	75.2	0.0	0.0
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1972	1	31	34 18.72	116 52.77	4.0	56.6	0.0	0.0
1972	4	14	34 4.90	116 23.15	3.9	53.6	0.0	0.0
1972	9	11	34 5.03	117 14.10	3.8	42.6	0.0	0.0
1972	12	19	33 58.67	116 3.64	3.8	63.4	0.0	0.0

LONG BEACH EARTHQUAKE AND AFTERSHOCKS

DATE			LATITUDE		LONGITUDE		MAGNITUDE	DISTANCE, MILES	ACCELERATION BEDROCK	ACCELERATION FIRM GROUND
YEAR	MO	DAY	DEG	MIN	DEG	MIN				
1933	3	11	33	34.50	118	0.0	4.0	57.9	0.0	0.0
1933	3	11	33	34.50	118	0.0	4.0	57.9	0.0	0.0
1933	3	11	33	34.50	118	0.0	4.0	57.9	0.0	0.0
1933	3	11	33	34.50	118	0.0	4.0	57.9	0.0	0.0
1933	3	11	33	34.50	118	0.0	4.0	57.9	0.0	0.0
1933	3	11	33	34.50	118	0.0	4.0	57.9	0.0	0.0
1933	3	11	33	34.50	118	0.0	4.0	57.9	0.0	0.0
1933	3	11	33	34.50	118	0.0	4.0	57.9	0.0	0.0
1933	3	11	33	34.50	118	0.0	4.0	57.9	0.0	0.0
1933	3	11	33	34.50	118	0.0	4.0	57.9	0.0	0.0

1933	3	11	33	34.50	118	0.0	4.0	57.9	0.0	0.0
1933	3	11	33	34.50	118	0.0	4.0	57.9	0.0	0.0
1933	3	11	33	34.50	118	0.0	4.0	57.9	0.0	0.0
1933	3	11	33	34.50	118	0.0	4.0	57.9	0.0	0.0
1933	3	11	33	34.50	118	0.0	4.0	57.9	0.0	0.0
1933	3	11	33	34.50	118	0.0	4.0	57.9	0.0	0.0
1933	3	11	33	34.50	118	0.0	4.0	57.9	0.0	0.0
1933	3	11	33	34.50	118	0.0	4.0	57.9	0.0	0.0
1933	3	11	33	34.50	118	0.0	4.0	57.9	0.0	0.0
1933	3	11	33	34.50	118	0.0	4.0	57.9	0.0	0.0
1933	3	11	33	34.50	118	0.0	4.0	57.9	0.0	0.0
1933	3	11	33	34.50	118	0.0	4.0	57.9	0.0	0.0
1933	3	11	33	34.50	118	0.0	4.0	57.9	0.0	0.0
1933	3	11	33	34.50	118	0.0	4.0	57.9	0.0	0.0
1933	3	11	33	34.50	118	0.0	4.0	57.9	0.0	0.0
1933	3	11	33	34.50	118	0.0	4.0	57.9	0.0	0.0
1933	3	11	33	34.50	118	0.0	4.0	57.9	0.0	0.0
1933	3	11	33	34.50	118	0.0	4.0	57.9	0.0	0.0
1933	3	11	33	34.50	118	0.0	4.0	57.9	0.0	0.0
1933	3	11	33	34.50	118	0.0	4.0	57.9	0.0	0.0
1933	3	11	33	34.50	118	0.0	4.0	57.9	0.0	0.0
1933	3	11	33	34.50	118	0.0	4.5	57.9	0.0	0.0
1933	3	11	33	34.50	118	0.0	4.5	57.9	0.0	0.0
1933	3	11	33	34.50	118	0.0	4.5	57.9	0.0	0.0
1933	3	11	33	34.50	118	0.0	4.5	57.9	0.0	0.0
1933	3	11	33	34.50	118	0.0	4.5	57.9	0.0	0.0
1933	3	11	33	34.50	118	0.0	4.5	57.9	0.0	0.0
1933	3	11	33	34.50	118	0.0	4.5	57.9	0.0	0.0
1933	3	11	33	34.50	118	0.0	4.5	57.9	0.0	0.0
1933	3	11	33	34.50	118	0.0	4.5	57.9	0.0	0.0
1933	3	11	33	34.50	118	0.0	5.0	57.9	0.0	0.0
1933	3	11	33	34.50	118	0.0	5.0	57.9	0.0	0.0
1933	3	11	33	34.50	118	0.0	5.0	57.9	0.0	0.0
1933	3	11	33	34.50	118	0.0	5.0	57.9	0.0	0.0
1933	3	11	33	34.50	118	0.0	5.5	57.9	0.0	0.0
1933	3	11	33	34.50	118	0.0	6.5	57.9	0.0	0.0

APPENDIX D

REPORT OF MR. JACK S. BARRISH

J. S. BARRISH
CONSULTING CIVIL AND STRUCTURAL ENGINEER

JACK S. BARRISH, CIVIL AND STRUCTURAL
W. S. ALDRICH, CIVIL AND STRUCTURAL

SUITE 307
2131 CAPITOL AVENUE
SACRAMENTO, CALIFORNIA 95816
PHONE 444-3320

July 28, 1975

Converse Davis Dixon Associates
126 West Del Mar Boulevard
Box 2268D
Pasadena, California 91105

Attention: S. J. Dixon, Executive Vice President

Subject: Vail Dam Stress Reanalysis

Gentlemen:

I have reviewed the July 30, 1975 draft report pertaining to Vail Dam Stress Reanalysis. This review included study of the appendices as well as the body of the report and its conclusions.

I have also read your letter of May 12, 1975 to Kaiser-Aetna and am of the opinion that the statement under Task IV, Stress Analyses beginning "The approach to be used..... (and ending)..... safe operating level based on this type of reanalysis" contains the essence of the prime objective of the report.

Having this opinion, I comment as follows:

1. You did develop an accurate mathematical model (computer program) based on the formulations of Cravitz and expanded by you to include the effects of varying rock characteristics and of earthquake loading. Its accuracy was checked when you ran the program, at my request, for water surface at 1482.5, E_C/E_R = 0.01 and m = 8 and plotted the results on the same plate as the original design data of Goodall with non-yielding abutments and the same water surface. The results (Figure 1) were virtually identical, the small differences being attributed by me to the fact that the computer program cannot handle E_C/E_R = 0.00, nor an "m" equal to infinity.

2. Your field sampling of foundation rock had to be accomplished by coring at locations away from the dam. Consequently, whatever samples you took were probably of lesser quality than the real foundation uncovered by open excavations and approved for use during the actual construction. In my opinion, your use of these cores as being representative must be considered to be on the conservative side.

3. Your laboratory determination of rock characteristics is not open to question, but your development of "in-situ" characteristics from these again appears to me to be on the conservative side; I would have probably used a 20 percent rather than 13 percent ratio so that instead of a probable in-situ modulus of 600,000 I would have had a slightly higher value.

4. Your development of the pseudo static seismic coefficient of 0.2 g is not, in my opinion, quite as conservative as your determination of rock characteristics, my review of the appendices indicating that an acceleration of 0.25 could possibly be inferred. However, since you actually conducted an analysis using 0.4 g (Figure 4) as well as one using 0.2 g (Figure 3) and showed that these stresses would also be well within reasonable limits, this comment has no effect upon your conclusions.

5. You have, in Figures 1 and 2, shown that original maximum allowable compression stress of 700 psi would not be exceeded for any height of water surface investigated. You have, in Figure 3, shown that for either elevation of water surface studied and with an earthquake acceleration of 0.2 g, the original maximum allowable compression stress would not be exceeded by any appreciable amount. You have, in Figure 4, shown that for the "safe operating level" of 1470 recommended even an earthquake acceleration of 0.4 g would not increase maximum compressive stresses above a reasonable value. I do not consider the minor tensions at crown intrados of the lowest ring in Figures 2, 3 and 4 for E_R = 200,000 to be significant.

My comments above were made in as critical a manner as they would have been had I been retained by your client. Therefore, I can answer the questions posed in your letter of July 22, 1975 directly as follows:

1. The stress analyses as presented are accurate.

2. I agree with the basic conclusion that water surface elevation of 1470 is a safe operating level for Vail Dam.

Thank you for the opportunity to be of service. Please feel free to call if there are any further questions.

Very truly yours,

J.S. Barrish

J.S. Barrish
CE 6730, SE 623

JSB:bh

Appendix C

Seismic Refraction Surveys

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Appendix C
Seismic Refraction Surveys

Geophysical measurements were obtained along six seismic refraction profiles (RS-1 to RS-6) during August 2017 at the locations shown on Figures 5, 6 and 7. These profiles were obtained to characterize the range of shallow rock depths and material characteristics in the vicinity of Vail Dam. Five of the profiles are 230 feet long and one (RS-3) is 575 feet long.

C.1 Survey Methodology

The seismic refraction technique is based on the measurement of the time required for a shockwave to travel from a sourcepoint (shotpoint) to one or more co-linear sensors (geophones). Measurements were obtained using a Geometrics seismograph with 24 geophones. The source consisted of multiple sledgehammer blows to a groundplate or rock. Geophones were normally spaced at 10-foot intervals. Shotpoints were nominally placed at the center of each line segment, at each end, and typically offset 100 feet beyond each end. The ends of each profile were marked for later survey. The primary constraint on data quality was wind noise and background activities.

The seismic travel times were plotted on time-distance graphs and interpreted using time-term methods (the generalized reciprocal method with the XY parameter set to zero), as shown in Figure C-1. The resulting models represent the rock and soils depths and compression wave (P-wave) velocities which would account for the measured travel times. The models are non-unique but appear to be the most reasonable solutions based on the known geology. Basic assumptions inherent in this geophysical method include the expectation that P-wave velocity increases downward, that layers are relatively continuous and thick enough to be individually resolved, and that significant P-wave velocity differences are present between the layers of interest. The generally accepted value for depth accuracy is 20%.

C.2 Survey Results

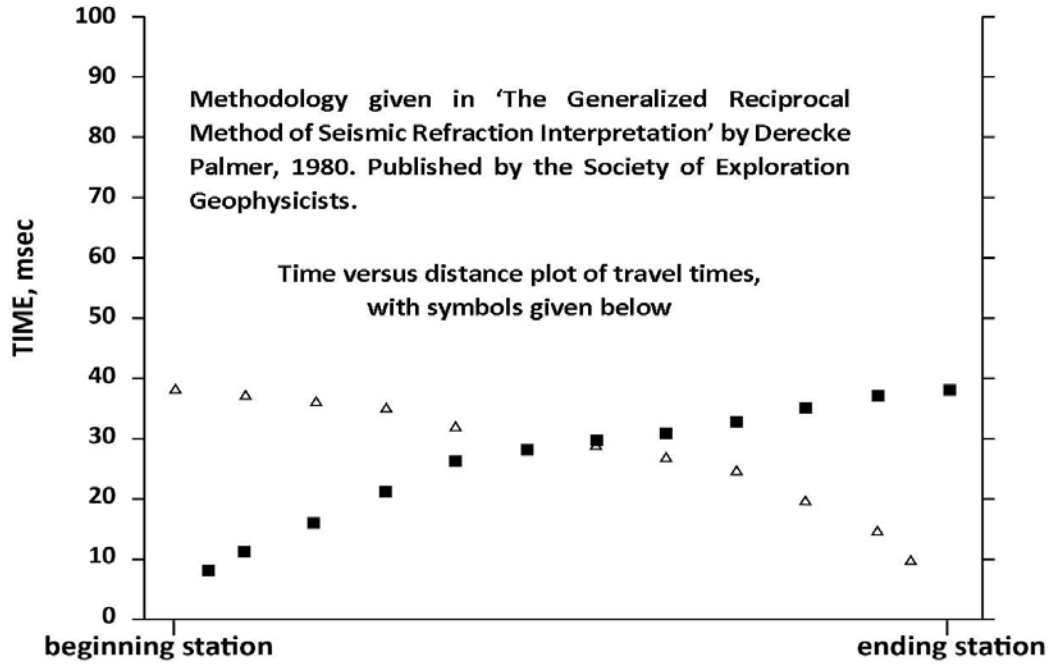
Figures C-2 through C-7 present the interpreted profiles. Figures C-8 through C-15 present the data plots and interpretative process. Three seismic layers are generally evident. The surface layer typically consists of less than 5 feet of loose surficial soils with an estimated average P-wave velocity of 1,500 fps (feet per second). This first layer is generally too thin and ill-defined to plot on the profiles, except for a few areas where the thickness approaches 10 feet. The second seismic layer consists of fill, alluvium or highly weathered/fractured bedrock, typically 10 feet to 50 feet thick, with a normal P-wave velocity range of 2,000 fps to 3,700 fps. The third seismic layer is bedrock, with a usual P-wave velocity range of 8,300 fps to 15,600 fps. The plotted profiles show averaged P-wave velocities from multiple measurements within each profile.

RS-1, RS-2 and RS-3, near the dam foundation, usually show P-wave velocities of 12,000 fps to 15,000 fps at typical depths of 20 to 50 feet. The downstream half of RS-3 did not provide usable data, probably because bedrock in this area exceeds the survey depth of penetration (about 50 feet). Lines RS-4 and RS-5, in the proposed borrow area, show bedrock P-wave

velocity decreasing southwards from 15,600 fps to 9,100 fps. The south end of RS-5 shows a lateral P-wave velocity decrease to just 4,100 fps. This change would probably best be characterized as a complex transition involving greater depths to higher quality rock. Line RS-6, in the spillway area, shows P-wave velocities of 8,300 fps at depths of 30 feet to 40 feet. An isolated point with a depth of 15 feet corresponds to a bedrock outcrop. Seismic quality on this profile is relatively poor and data points are shown only every 20 feet since interpolation methods had to be used for most of these data.

These data plots show strong evidence that the layers of interest are often relatively thin and discontinuous, with differing materials sometimes having similar seismic properties. The fill, alluvium and weathered bedrock P-wave velocities appear to overlap or occur in relatively thin sequences that result in the masking of them as separate layers. As a result, the profiles show highly simplified representations of conditions. In addition, the maximum seismic depth of penetration for this survey is about fifty feet.

KEY TO SYMBOLS AND NOTATION USED ON SEISMIC REFRACTION DATA SHEETS



Geophone Spacing = Distance between adjacent geophones (ft)

Arrival Time, msec △ ■ ● △ □

Travel times of arrivals from a shot to a geophone, with corresponding symbols (msec)

t_{ab} =	Reciprocal time, end-to-end travel time (msec)
XY =	Geophone analysis separation distance (ft)
t_a =	Travel times of refracted arrivals from end shot (msec)
t_b =	Travel times of refracted arrivals from reversed shot (msec)
½Δ t =	Velocity analysis function, plotted above travel times on time-distance plot (msec)
t_g =	Time depth, $(t_a+t_b - t_{ab})/2$ (msec)
t_c =	Delay times due to thin surface later (1/2 time intercept at shotpoints) with z_0 depth and v_0 velocity (msec)
z_i =	Calculated depth to the i^{th} layer, assumed normal to the
z_{i+1} =	surface, (t_g-t_c) x Velocity Function (ft)
v_i =	Velocity of the i^{th} layer from the Velocity Function
v_{i+1} =	or the inverse slope of the raw data (ft/sec)
v_{i+2} =	(i) values inferred from other data (see text)

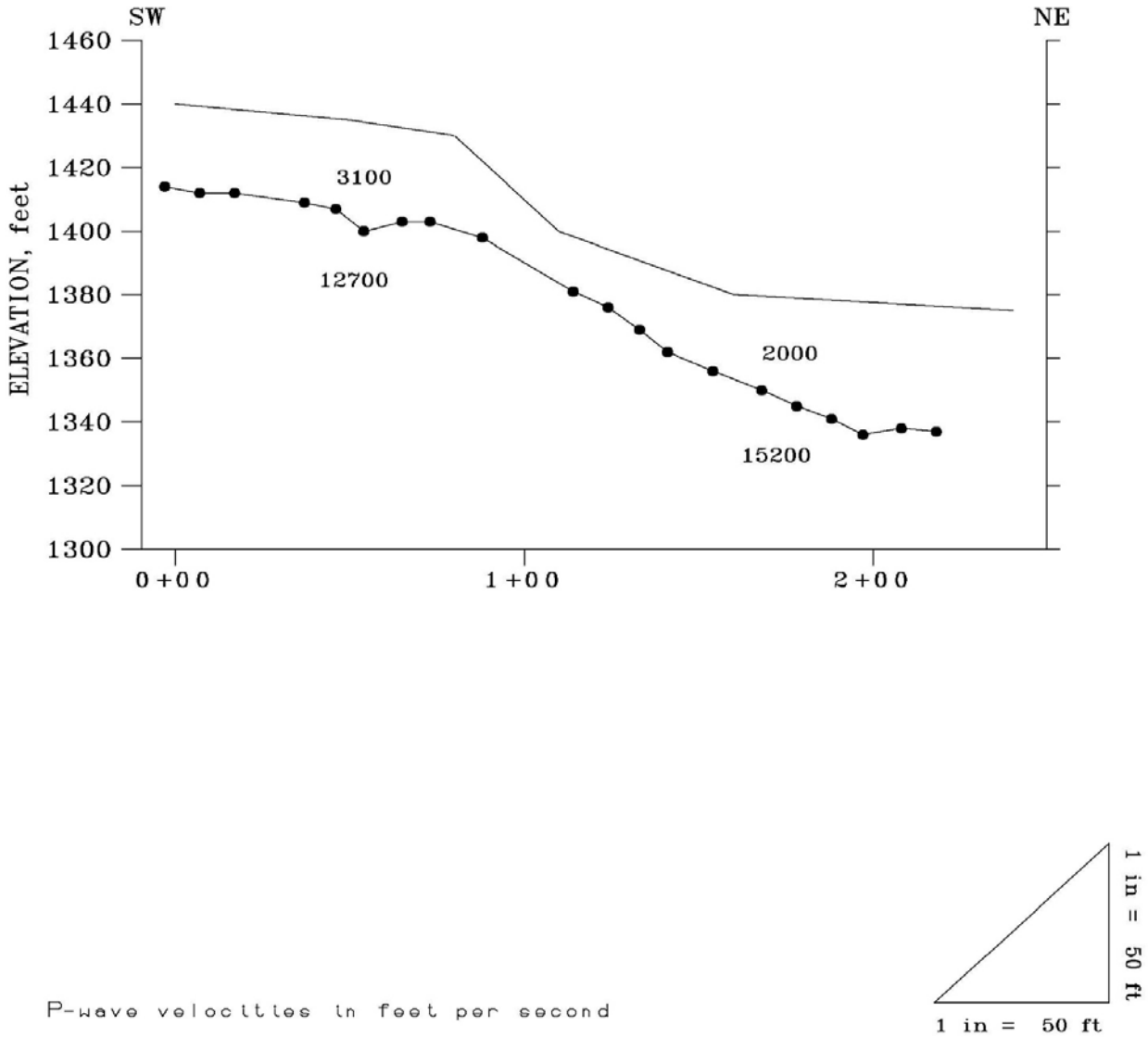
Rancho California Water District

AECOM

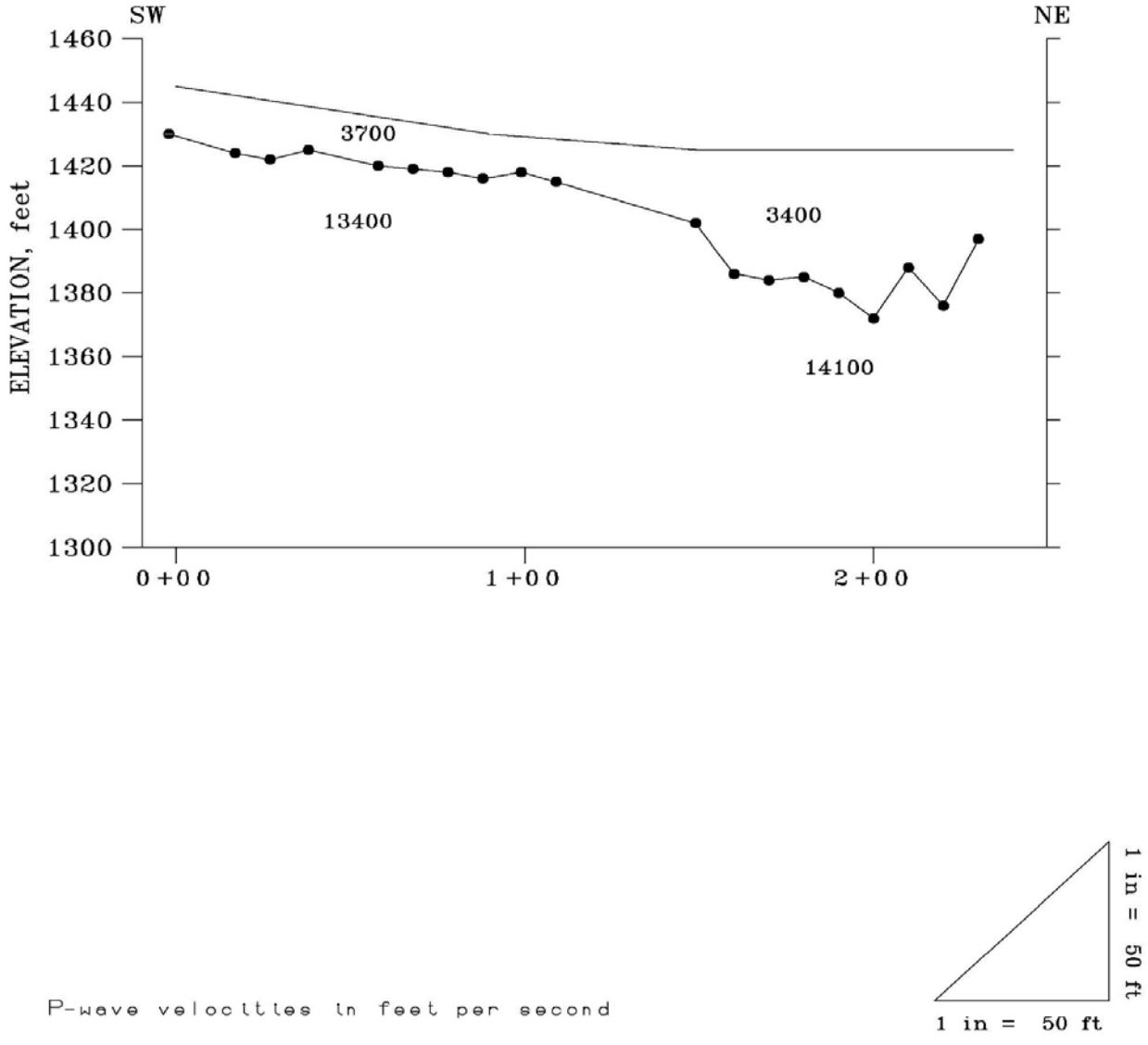
SEISMIC REFRACTION KEY

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: E. Marquez	DATE: 10/16/2017	FIGURE NO: C-1
CHECKED BY: L. Handfelt	DATE: 8/21/2017	

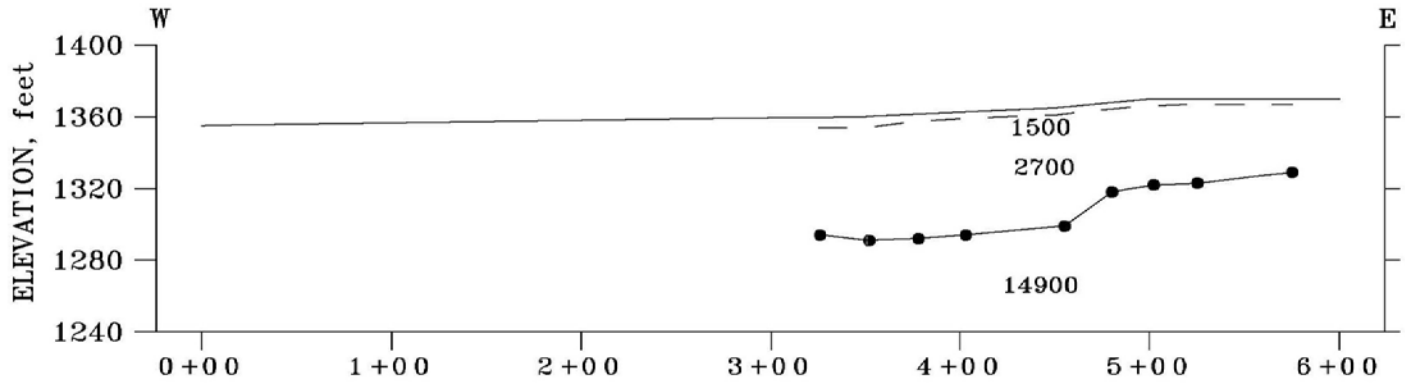


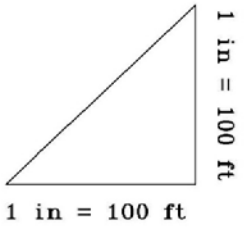
Rancho California Water District	AECOM	**RS-1 SEISMIC REFRACTION PROFILE** Vail Dam Geotechnical Investigation, Temecula, California		
		DRAWN BY: E. Marquez	DATE: 10/16/2017	FIGURE NO: C-2
		CHECKED BY: L. Handfelt	DATE: 8/21/2017	



Rancho California Water District	AECOM	**RS-2 SEISMIC REFRACTION PROFILE** Vail Dam Geotechnical Investigation, Temecula, California		
		DRAWN BY: E. Marquez	DATE: 10/16/2017	FIGURE NO: C-3
		CHECKED BY: L. Handfelt	DATE: 8/21/2017	

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P-wave velocities in feet per second

Rancho California Water District

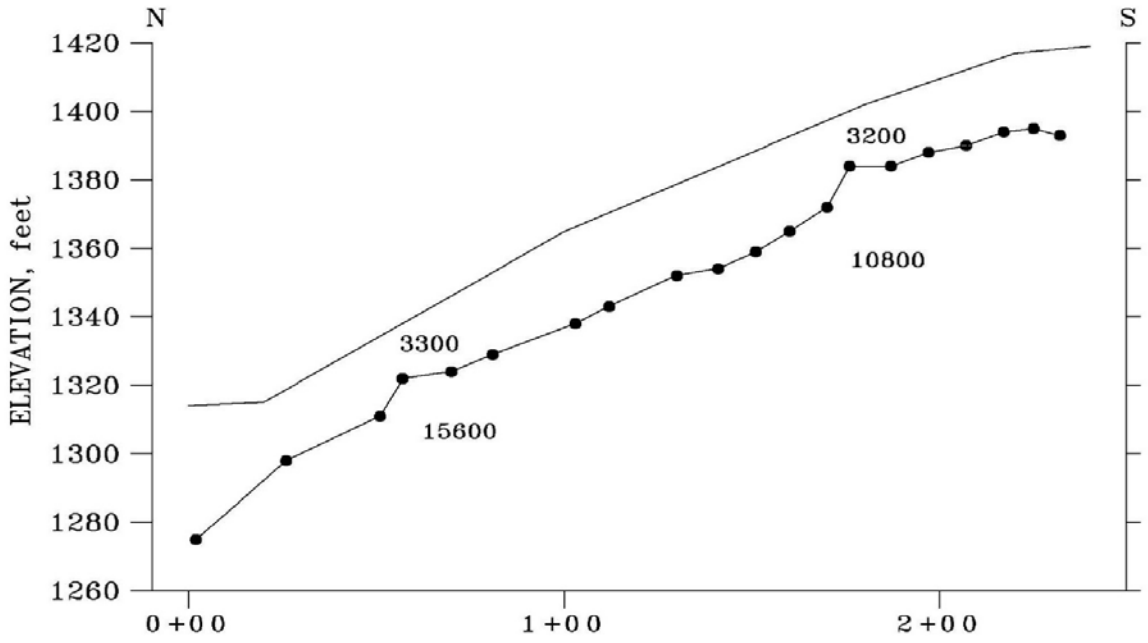
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RS-3 SEISMIC REFRACTION PROFILE

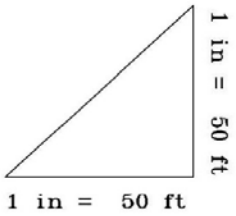
Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: E. Marquez	DATE: 10/16/2017	FIGURE NO: C-4
CHECKED BY: L. Handfelt	DATE: 8/21/2017	

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P-wave velocities in feet per second



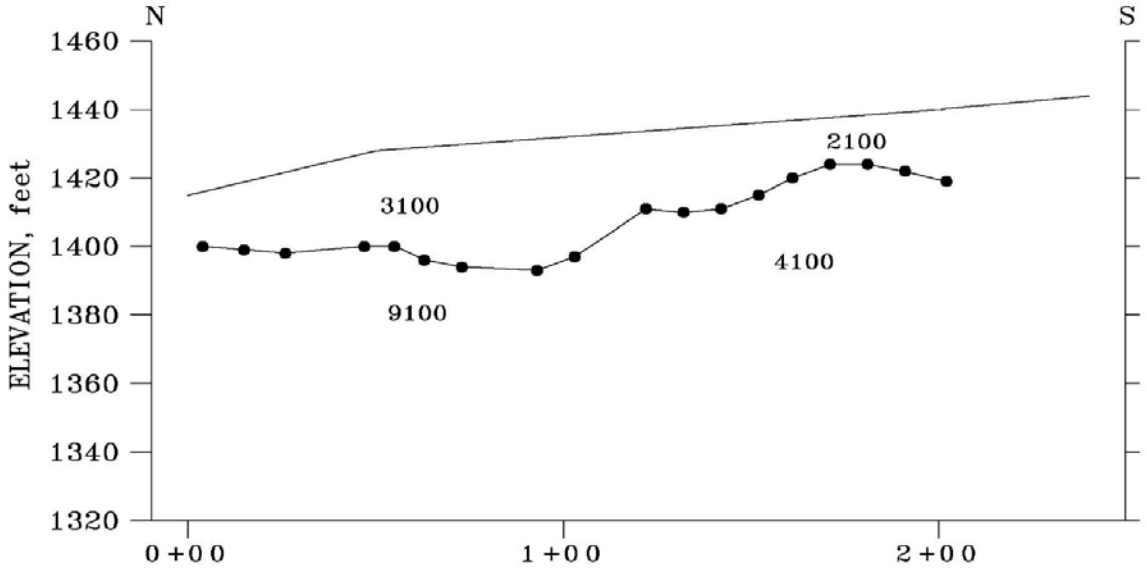
Rancho California Water District

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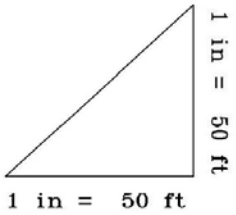
RS-4 SEISMIC REFRACTION PROFILE

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: E. Marquez	DATE: 10/16/2017	FIGURE NO: C-5
CHECKED BY: L. Handfelt	DATE: 8/21/2017	



P-wave velocities in feet per second



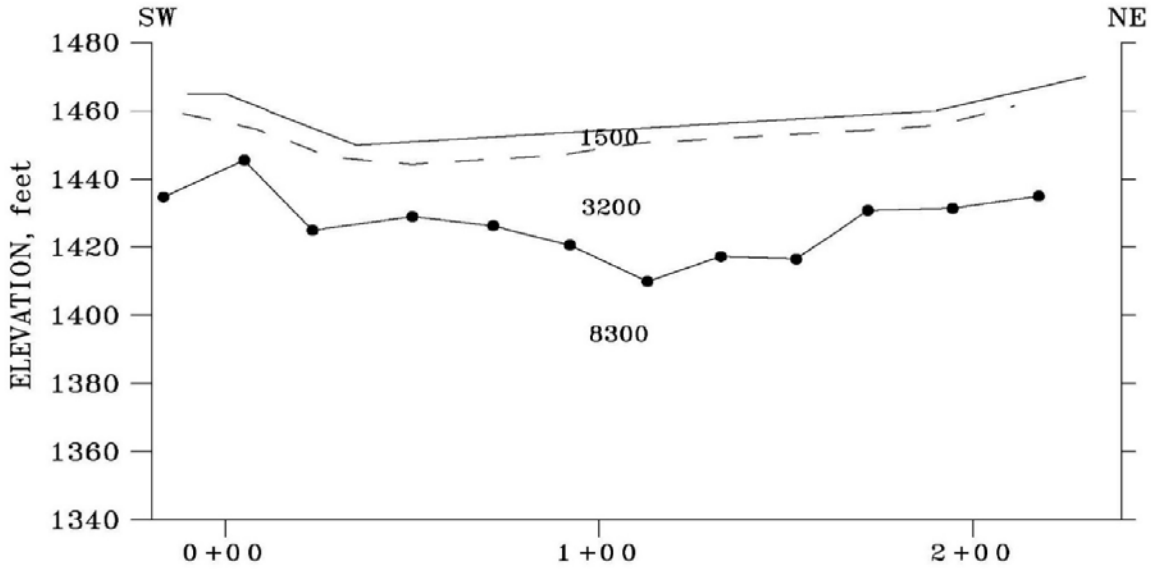
Rancho California Water District

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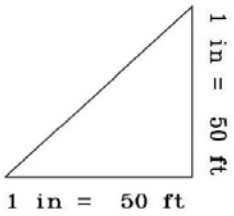
RS-5 SEISMIC REFRACTION PROFILE

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: E. Marquez	DATE: 10/16/2017	FIGURE NO: C-6
CHECKED BY: L. Handfelt	DATE: 8/21/2017	



P-wave velocities in feet per second



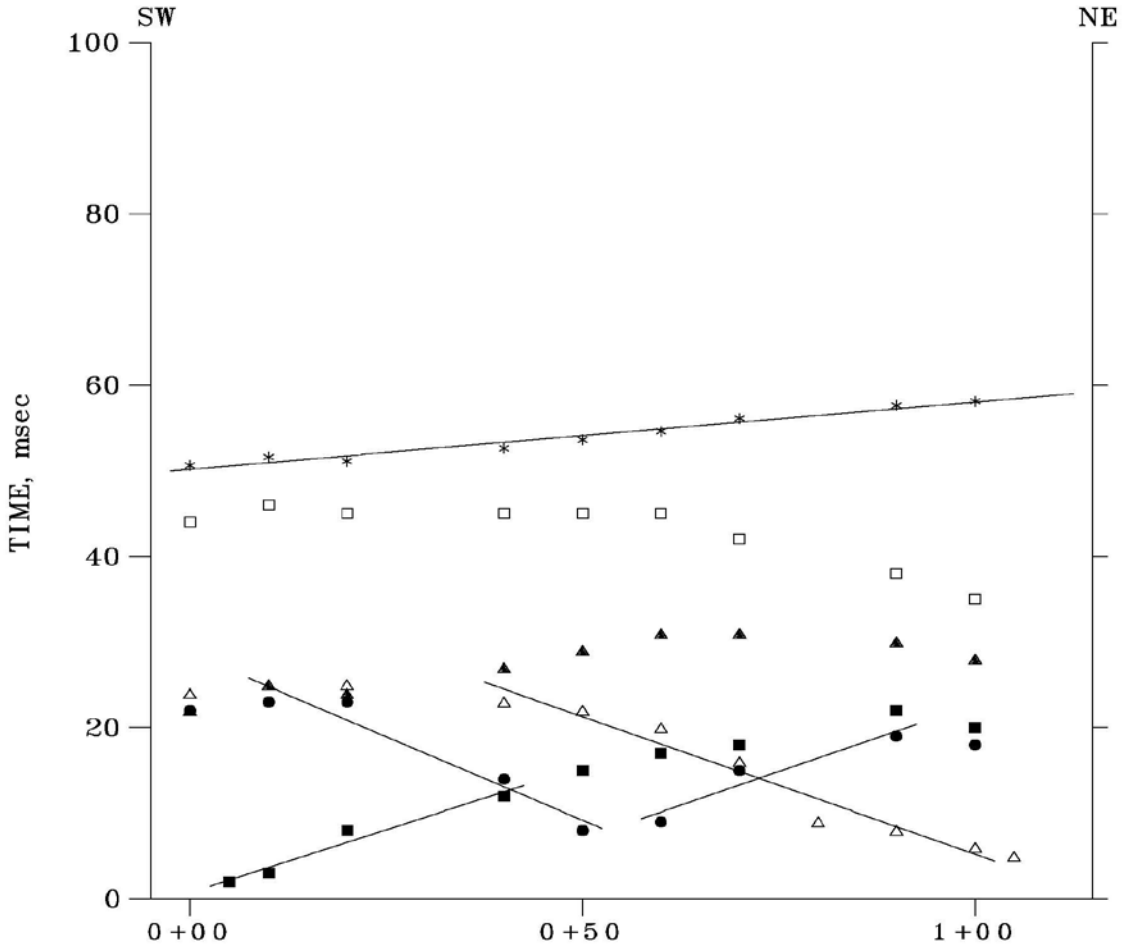
Rancho California Water District

AECOM

RS-6 SEISMIC REFRACTION PROFILE

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: E. Marquez	DATE: 10/16/2017	FIGURE NO: C-7
CHECKED BY: L. Handfelt	DATE: 8/21/2017	



Geophone spacing = 10 ft

Arrival Time, msec												
▲	22	25	24		27	29	31	31		30	28	
■	2	3	8		12	15	17	18		22	20	
●	22	23	23		14	8	9	15		19	18	
△	24	25	25		23	22	20	16	9	8	6	5
□	44	46	45		45	45	45	42		38	35	

t_{ab} = 23 msec; XY = 0

t_a =	14	17	16		19	21	23	23		22	20	
t_b =	24	25	25		25	25	25	22		18	15	
* ½△t =	−5	−4	−4½		−3	−2	−1	0½		2	2½	
t_g =	7½	9½	9		10½	11½	12½	11		8½	6	
t_c =	0	1	1	2	3	4	4	4	3	2	1	1

z_0 =	0	2	2		5	6	6	6		3	2	ft
z_1 =	26	28	26		28	28	34	29		24	18	ft
v_0 =						1500						fps
v_1 =			3400			2560			3180		3110	fps
v_2 =							12680					fps

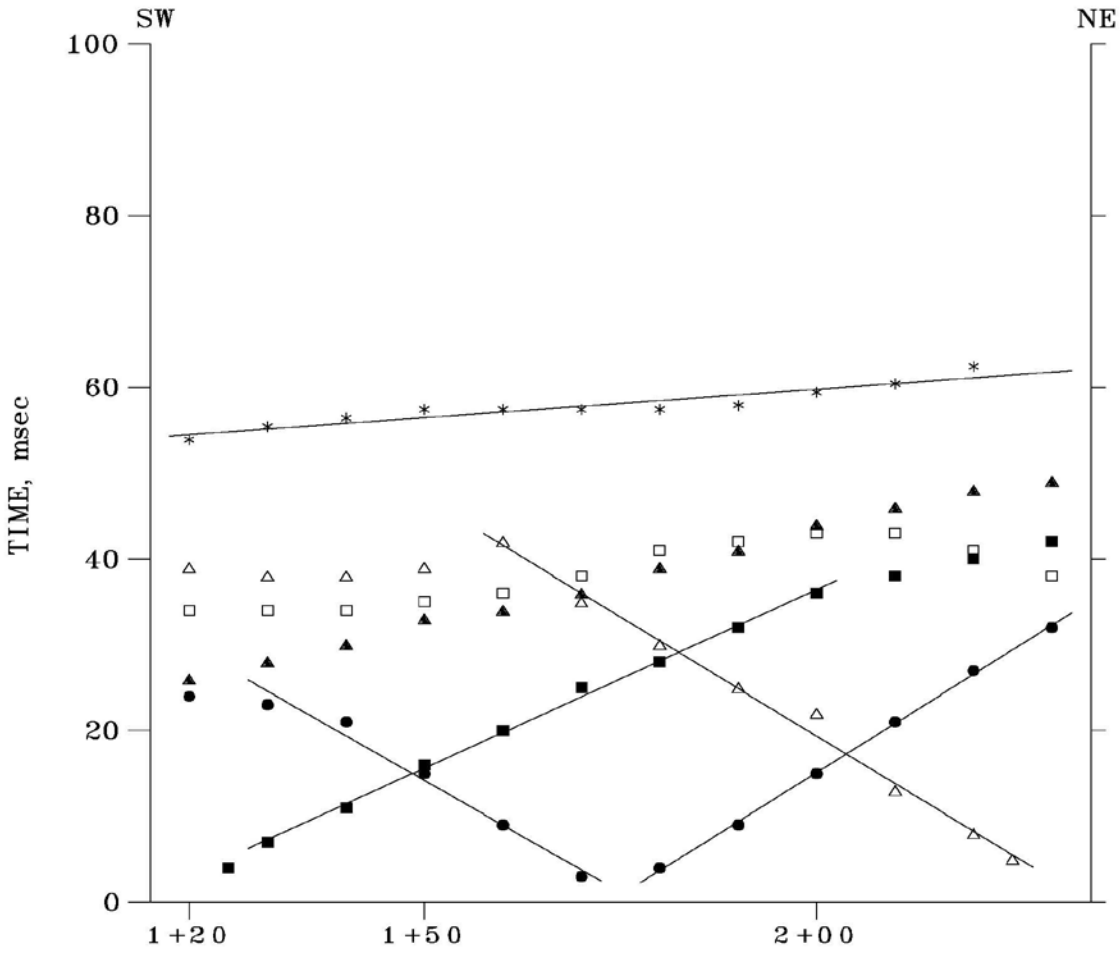
Rancho California Water District

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RS-1 SEISMIC REFRACTION INTERPRATIVE PLOT

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: E. Marquez	DATE: 10/16/2017	FIGURE NO: C-8
CHECKED BY: L. Handfelt	DATE: 8/21/2017	



Geophone spacing = 10 ft

Arrival Time, msec												
▲	26	28	30	33	34	36	39	41	44	46	48	49
■	4	7	11	16	20	25	28	32	36	38	40	42
●	24	23	21	15	9	3	4	9	15	21	27	32
△	39	38	38	39	42	35	30	25	22	13	8	5
□	34	34	34	35	36	38	41	42	43	43	41	38

t_{ab} = 40 msec; XY = 0

t_a =	17	19	21	24	25	27	30	32	36	38	40	42	
t_b =	39	38	38	39	40	42	45	46	47	47	45		
* $\frac{1}{2}\Delta t$ =	−11	−9½	−8½	−7½	−7½	−7½	−7½	−7	−5½	−4½	−2½		
t_g =	8	8½	9½	11½	12½	14½	17½	19	21½	22½	22½		
t_c =	2	1	1	1	1	1	1	1	1	1	1	1	
z_0 =	3	2	2	2	2	2	2	2	2	2	2		ft
z_1 =	16	18	20	24	25	29	35	38	43	40	40		ft
v_0 =						1500							fps
v_1 =		2410			1920			1750			1800		fps
v_2 =						15170							fps

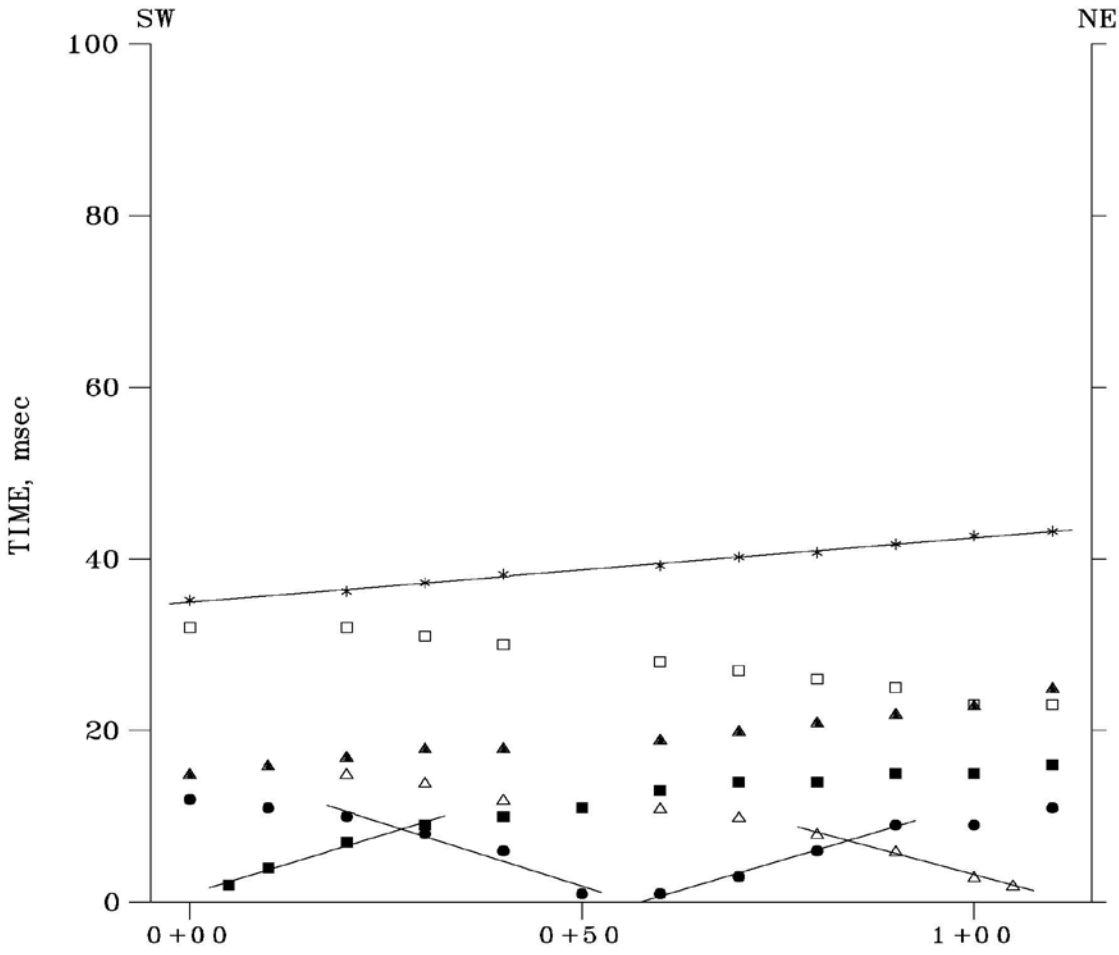
Rancho California Water District

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RS-1 SEISMIC REFRACTION INTERPRATIVE PLOT

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: E. Marquez	DATE: 10/16/2017	FIGURE NO: C-9
CHECKED BY: L. Handfelt	DATE: 8/21/2017	



Geophone spacing = 10 ft

Arrival Time, msec												
▲	15	16	17	18	18		19	20	21	22	23	25
■	2	4	7	9	10	11	13	14	14	15	15	16
●	12	11	10	8	6	1	1	3	6	9	9	11
△	15		15	14	12		11	10	8	6	3	2
□	32		32	31	30		28	27	26	25	23	23

t_{ab}= 16 msec; XY = 0

	t_a=	9	10	11	12	12	11	13	14	14	15	15	16	
	t_b=	15		15	14	12		11	10	9	8	6	6	
*	½△t=	−3		−2	−1	0		1	2	2½	3½	4½	5	
	t_g=	4		5	5	4		4	4	3½	3½	2½	3	
	t_c=	0	0	0	0	0	0	0	0	0	0	0	0	
	z_1=	15		18	18	14		15	15	14	14	11	13	ft
	v_1=		3600			3450			3700			4040		fps
	v_2=						13410							fps

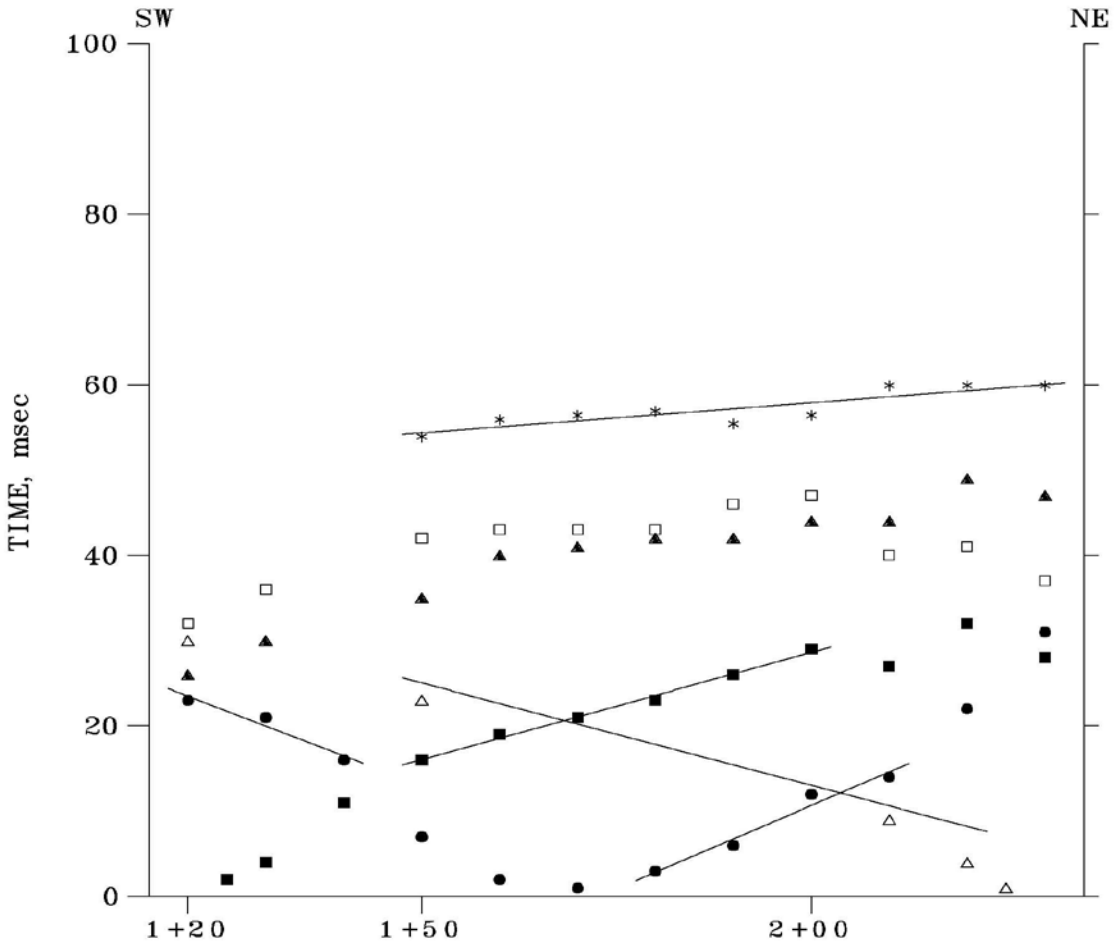
Rancho California Water District

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RS-2 SEISMIC REFRACTION INTERPRATIVE PLOT

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: E. Marquez	DATE: 10/16/2017	FIGURE NO: C-10
CHECKED BY: L. Handfelt	DATE: 8/21/2017	



Geophone spacing = 10 ft

Arrival Time, msec												
▲	26	30		35	40	41	42	42	44	44	49	47
■	2	4	11	16	19	21	23	26	29	27	32	28
●	23	21	16	7	2	1	3	6	12	14	22	31
△	30			23						9	4	1
□	32	36		42	43	43	43	46	47	40	41	37

t_{ab}= 29 msec; XY = 0

t_a=		16		21	26	27	28	28	31	31	32	28
t_b=	30			23	24	24	24	27	28	21	22	18
* ½△t=				−1	1	1½	2	0½	1½	5	5	5
t_g=				7½	10½	11	11½	13	15	11½	12½	8½
t_c=	4	4	3	3	2	2	1	1	1	1	2	3

z_0=			5	3	3	2	2	2	2	3	5	ft
z_1=			24	39	41	40	46	53	38	49	29	ft
v_0=					1500							fps
v_1=		3980			2860			2560		4170		fps
v_2=						14120						fps

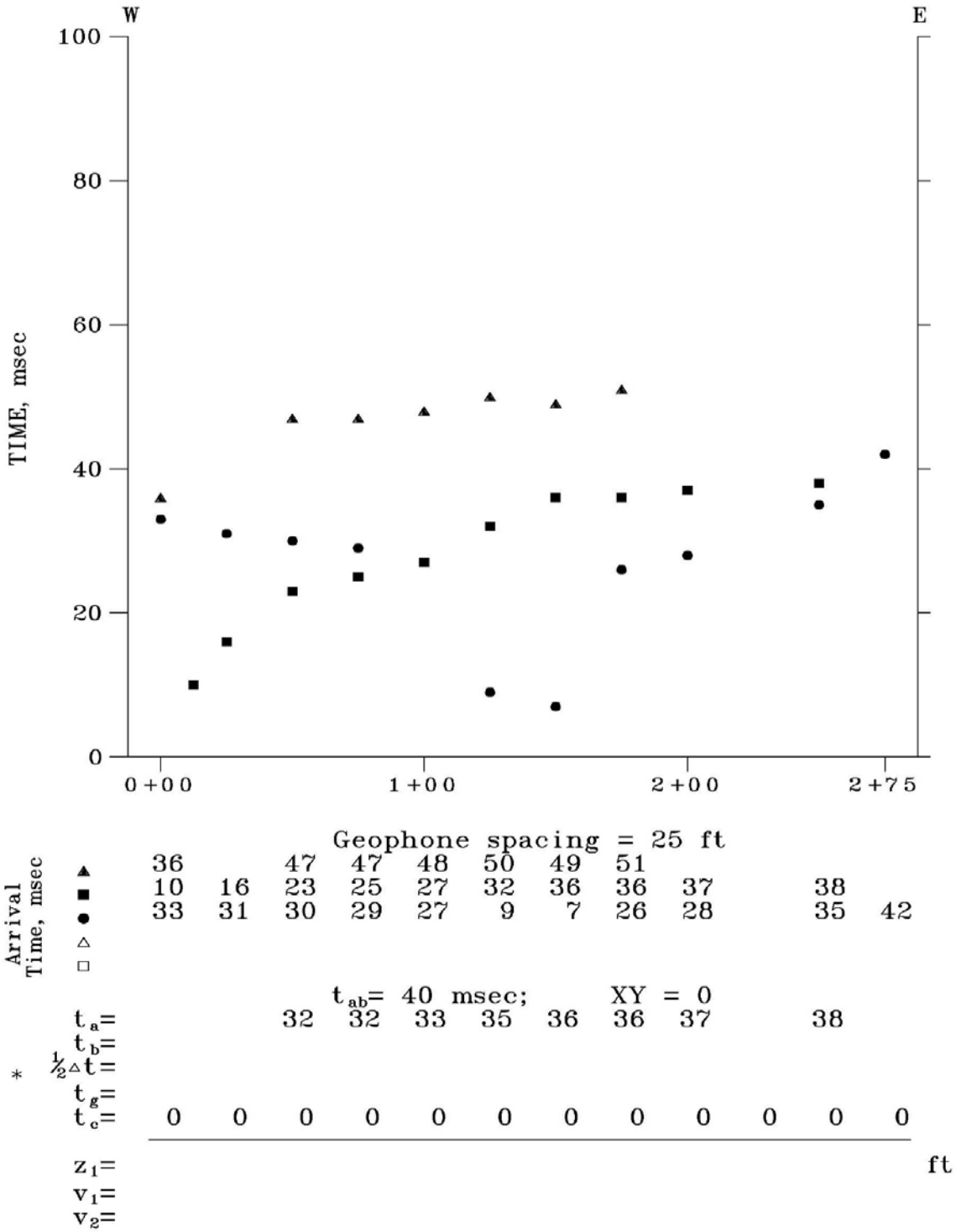
Rancho California Water District

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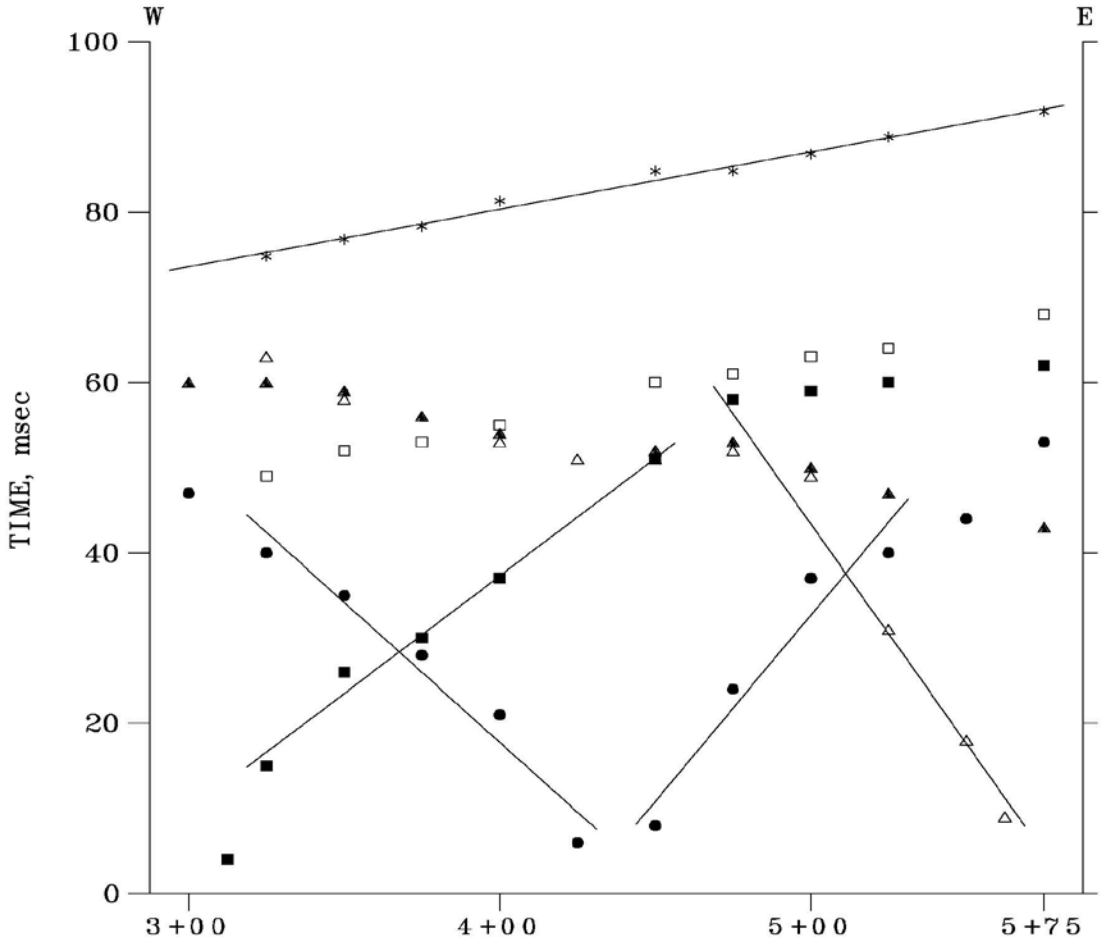
RS-2 SEISMIC REFRACTION INTERPRATIVE PLOT

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: E. Marquez	DATE: 10/16/2017	FIGURE NO: C-11
CHECKED BY: L. Handfelt	DATE: 8/21/2017	



Rancho California Water District / AECOM	**RS-3 SEISMIC REFRACTION INTERPRATIVE PLOT** Vail Dam Geotechnical Investigation, Temecula, California		
	DRAWN BY: E. Marquez	DATE: 10/16/2017	FIGURE NO: C-12
	CHECKED BY: L. Handfelt	DATE: 8/21/2017	



Geophone spacing = 25 ft

Arrival Time, msec													
▲	60	60	59	56	54		52	53	50	47		43	
■	4	15	26	30	37		51	58	59	60		62	
●	47	40	35	28	21	6	8	24	37	40	44	53	
△		63	58	56	53	51	51	52	49	31	18	9	
□		49	52	53	55		60	61	63	64		68	
				t_{ab}= 61 msec;				XY = 0					
	t_a=		45	48	49	52		57	58	59	60		62
	t_b=	59	59	58	56	53	51	51	52	49	46		42
*	½△t=		−7	−5	−3½	−0½		3	3	5	7		10
	t_g=		21½	22½	22	22		23½	24½	23½	22½		21½
	t_c=	5	4	4	3	3	3	3	3	3	2	2	2
	z_0=		6	6	5	5		5	5	5	3		3 ft
	z_1=		66	69	70	70		66	50	48	47		41 ft
	v_0=						1500						fps
	v_1=			3620			3050			2290		1940	fps
	v_2=						14890						fps

Rancho California Water District

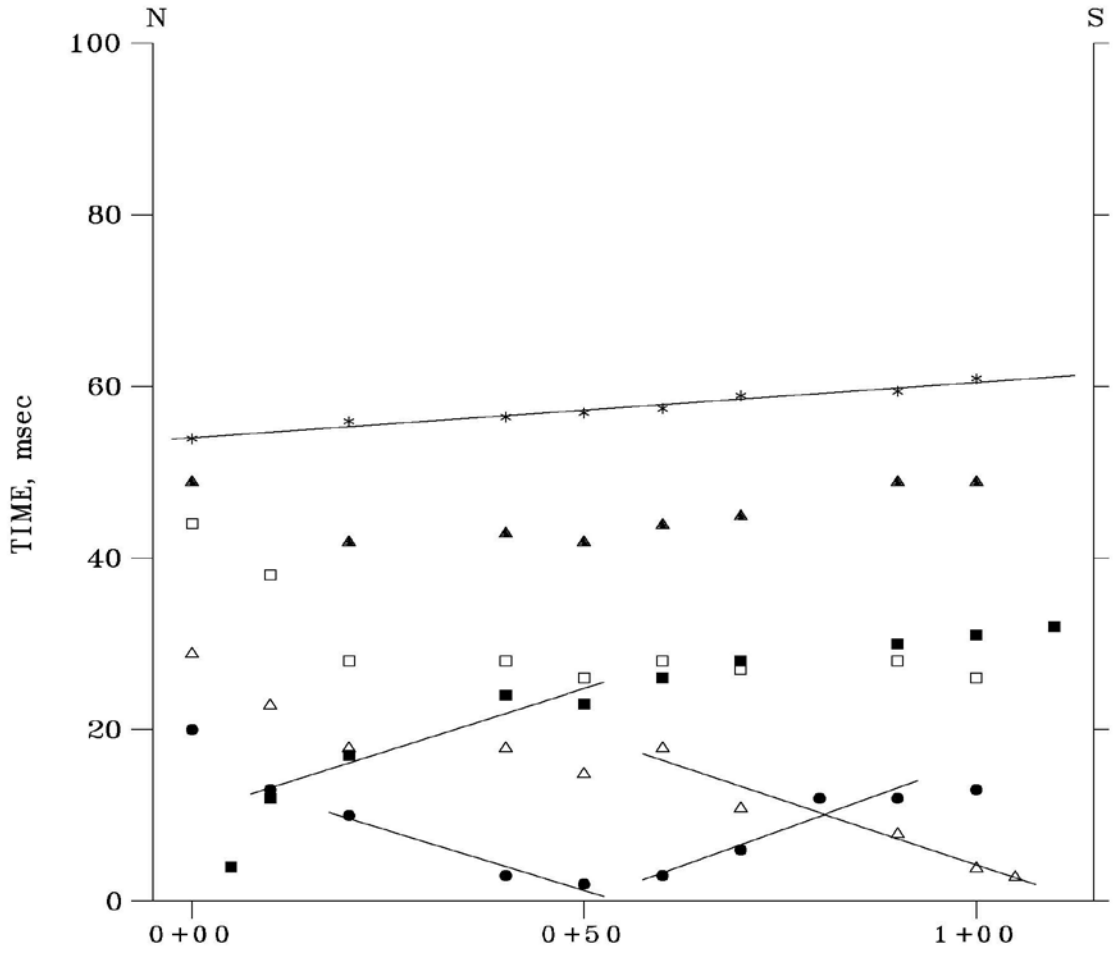
AECOM

RS-3 SEISMIC REFRACTION INTERPRATIVE PLOT

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: E. Marquez	DATE: 10/16/2017	FIGURE NO: C-13
CHECKED BY: L. Handfelt	DATE: 8/21/2017	

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Geophone spacing = 10 ft

Arrival Time, msec													
▲	49		42		43	42	44	45		49	49		
■	4	12	17		24	23	26	28		30	31	32	
●	20	13	10		3	2	3	6	12	12	13		
△	29	23	18		18	15	18	11		8	4	3	
□	44	38	28		28	26	28	27		28	26		

t_{ab} = 31 msec; XY = 0

t_a =	30		23		24	23	26	28		30	31	32	
t_b =	29	23	18		18	16	18	17		18	16		
* $\frac{1}{2}\Delta t$ =	0½		2½		3	3½	4	5½		6	7½		
t_g =	14		5		5½	4	6½	7		8½	8		
t_c =	5	2	0	0	0	0	1	1	1	1	1	1	
z_0 =	8		0		0	0	2	2		2	2		ft
z_1 =	39		18		20	14	19	21		26	25		ft
v_0 =						1500							fps
v_1 =			3450			3590		3030			3300		fps
v_2 =							15570						fps

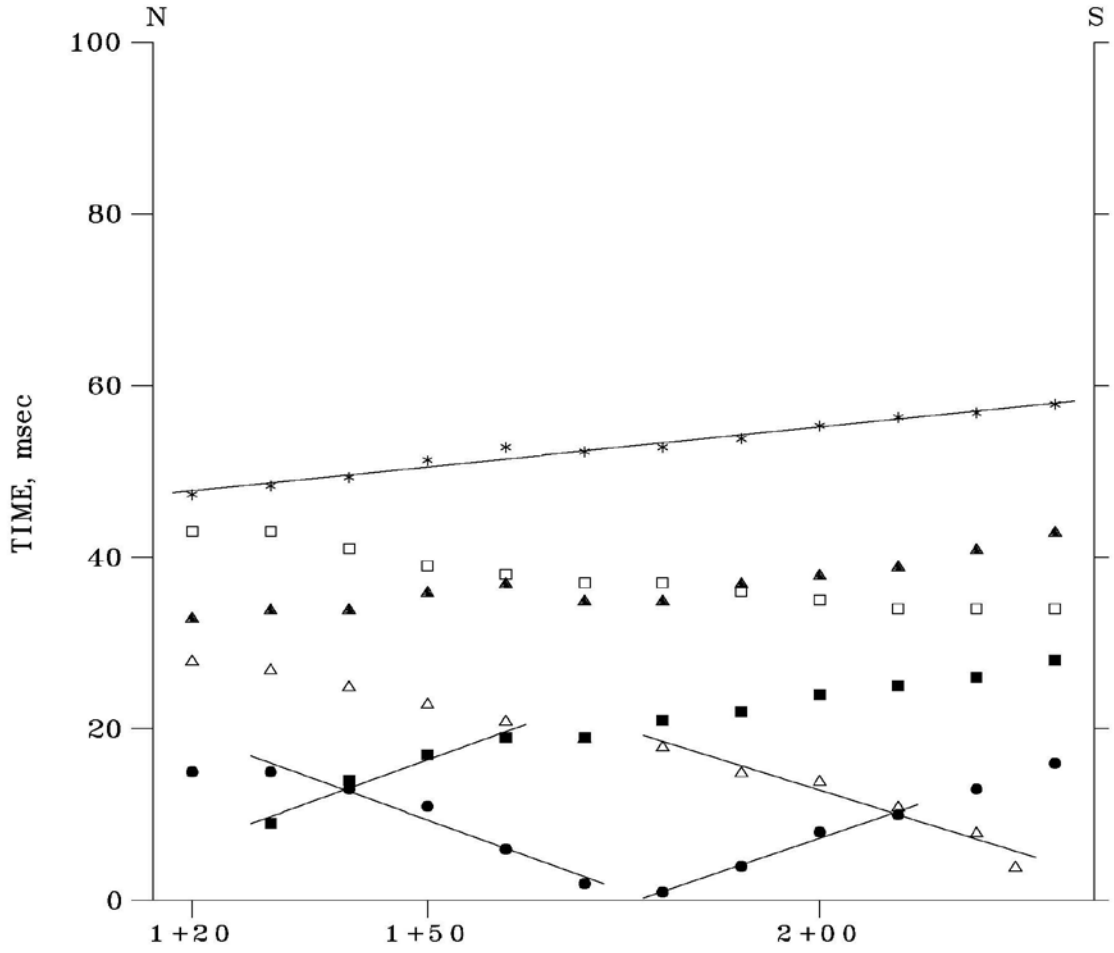
Rancho California Water District

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RS-4 SEISMIC REFRACTION INTERPRATIVE PLOT

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: E. Marquez	DATE: 10/16/2017	FIGURE NO: C-14
CHECKED BY: L. Handfelt	DATE: 8/21/2017	



Geophone spacing = 10 ft

Arrival Time, msec												
▲	33	34	34	36	37	35	35	37	38	39	41	43
■		9	14	17	19	19	21	22	24	25	26	28
●	15	15	13	11	6	2	1	4	8	10	13	16
△	28	27	25	23	21	19	18	15	14	11	8	4
□	43	43	41	39	38	37	37	36	35	34	34	34

t_{ab} = 28 msec; XY = 0

	t_a =	19	20	20	22	23	20	21	22	24	25	26	28	
	t_b =	28	27	25	23	21	19	19	18	17	16	16	16	
*	$\frac{1}{2}\Delta t$ =	−4½	−3½	−2½	−0½	1	0½	1	2	3½	4½	5	6	
	t_g =	9½	9½	8½	8½	8	5½	6	6	6½	6½	7	8	
	t_c =	3	2	0	1	1	1	1	1	1	1	1	2	
	z_0 =	5	3	0	2	2	2	2	2	2	2	2	3	ft
	z_1 =	25	27	27	25	24	16	19	19	21	21	24	25	ft
	v_0 =						1500							fps
	v_1 =			3030			3030			3230			3520	fps
	v_2 =						10810							fps

Rancho California Water District

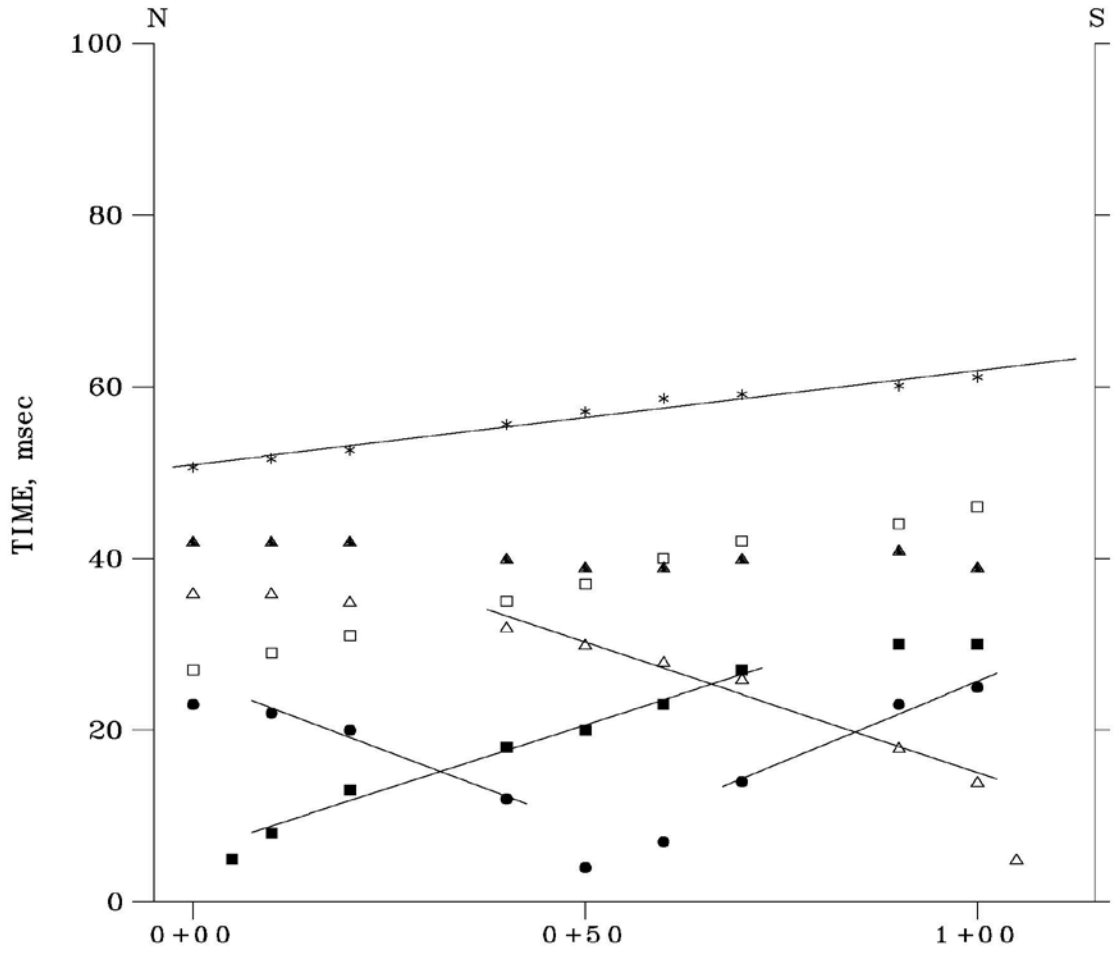
AECOM

RS-4 SEISMIC REFRACTION INTERPRATIVE PLOT

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: E. Marquez	DATE: 10/16/2017	FIGURE NO: C-15
CHECKED BY: L. Handfelt	DATE: 8/21/2017	

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Geophone spacing = 10 ft

Arrival Time, msec												
▲	42	42	42		40	39	39	40		41	39	
■	5	8	13		18	20	23	27		30	30	
●	23	22	20		12	4	7	14		23	25	
△	36	36	35		32	30	28	26		18	14	5
□	27	29	31		35	37	40	42		44	46	

t_{ab}= 33 msec; XY = 0

t_a=	12	14	16		20	22	25	27		30	30	
t_b=	34	34	34		32	31	31	32		33	31	
* ½△t=	−11	−10	−9		−6	−4½	−3	−2½		−1½	−0½	
t_g=	6½	7½	8½		9½	10	11½	13		15	14	
t_c=	3	3	3	3	3	4	4	4	4	5	5	6
z_0=	5	5	5		5	6	6	6		8	8	ft
z_1=	16	20	23		27	28	33	36		39	36	ft
v_0=						1500						fps
v_1=			3400		2920			2640		3300		fps
v_2=						9130						fps

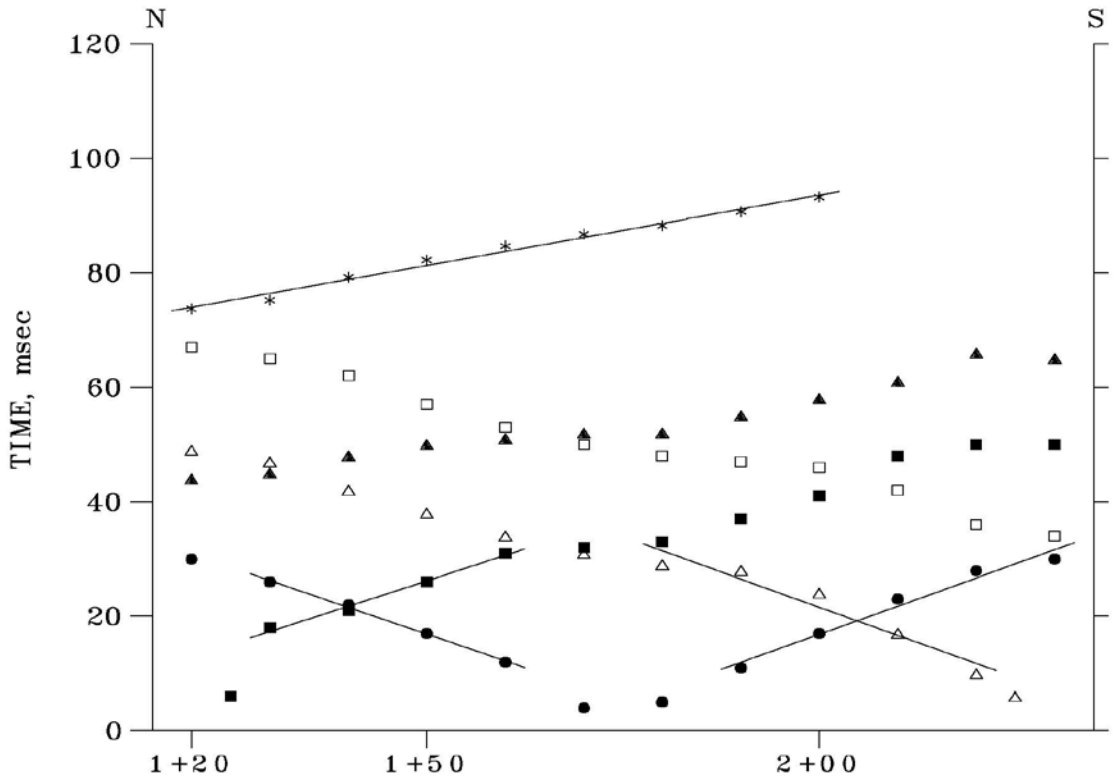
Rancho California Water District

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RS-5 SEISMIC REFRACTION INTERPRATIVE PLOT

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: E. Marquez	DATE: 10/16/2017	FIGURE NO: C-16
CHECKED BY: L. Handfelt	DATE: 8/21/2017	



Geophone spacing = 10 ft

Arrival Time, msec												
▲	44	45	48	50	51	52	52	55	58	61	66	65
■	6	18	21	26	31	32	33	37	41	48	50	50
●	30	26	22	17	12	4	5	11	17	23	28	30
△	49	47	42	38	34	31	29	28	24	17	10	6
□	67	65	62	57	53	50	48	47	46	42	36	34

t_{ab}= 49 msec; XY = 0

	t_a=	24	25	28	30	31	32	33	37	41	48	50	50	
	t_b=	49	47	42	38	34	31	29	28	27				
*	½△t=	−12½	−11	−7	−4	−1½	0½	2	4½	7				
	t_g=	12	11½	10½	9½	8	7	6½	8	9½				
	t_c=	7	5	3	3	3	3	2	2	2	2	2	3	
	z_0=	11	8	5	5	5	5	3	3	3				ft
	z_1=	24	24	24	21	18	14	14	17	21				ft
	v_0=						1500							fps
	v_1=			2270			2130			2040			2040	fps
	v_2=						4080							fps

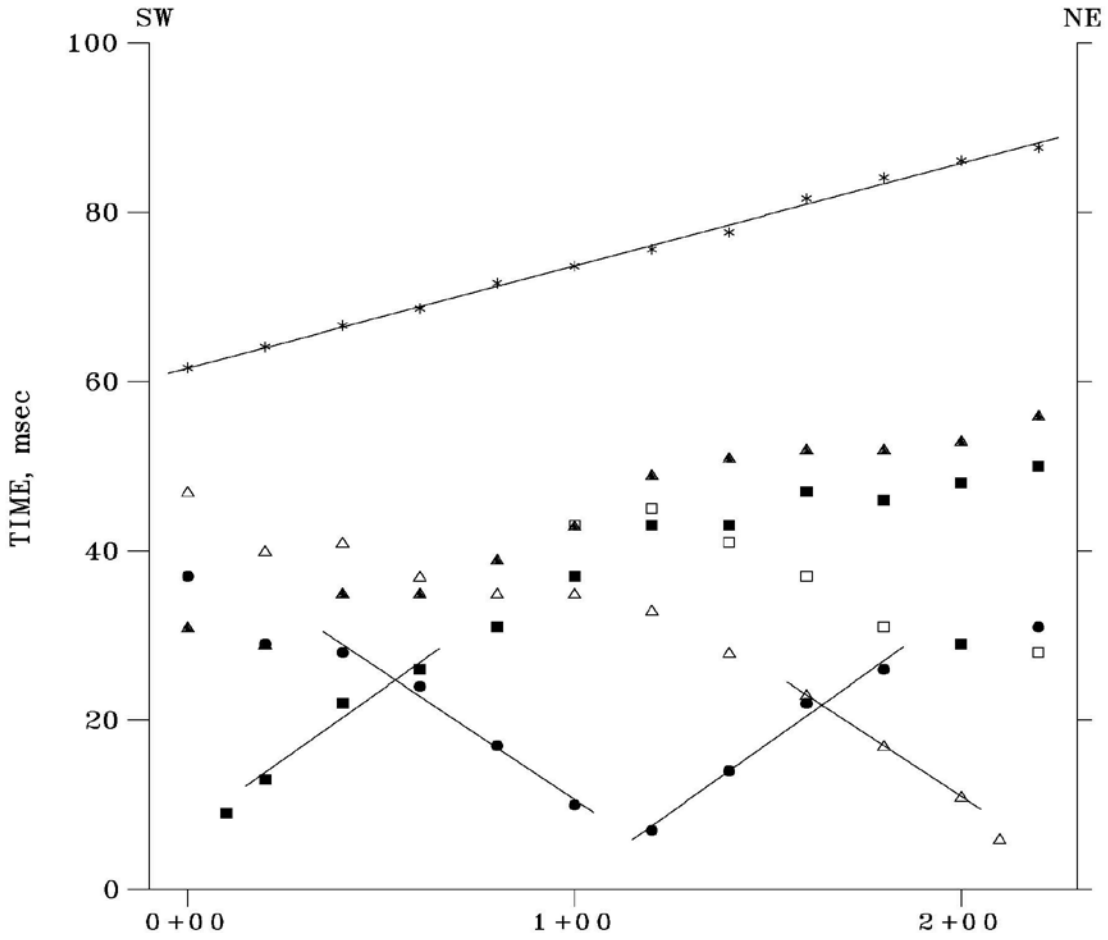
Rancho California Water District

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RS-5 SEISMIC REFRACTION INTERPRATIVE PLOT

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: E. Marquez	DATE: 10/16/2017	FIGURE NO: C-17
CHECKED BY: L. Handfelt	DATE: 8/21/2017	



Geophone spacing = 20 ft

Arrival Time, msec												
▲	31	29	35	35	39	43	49	51	52	52	53	56
■	9	13	22	26	31	37	43	43	47	46	48	50
●	37	29	28	24	17	10	7	14	22	26	29	31
△	47	40	41	37	35	35	33	28	23	17	11	6
□						43	45	41	37	31	29	28

t_{ab}= 49 msec; XY = 0

t_a=	25	23	29	29	33	37	43	43	47	46	48	50	
t_b=	47	40	41	37	35	35	37	33	29	23	21	20	
* ½△t=	−11	−8½	−6	−4	−1	1	3	5	9	11½	13½	15	
t_g=	11½	7	10½	8½	9½	11½	15½	13½	13½	10	10	10½	
t_c=	4	4	4	4	4	4	3	3	3	3	3	3	
z_0=	6	6	6	6	6	6	5	5	5	5	5	5	ft
z_1=	31	16	28	22	26	33	46	39	41	29	30	32	ft
v_0=						1500							fps
v_1=		3080			3280			3080			3330		fps
v_2=						8270							fps

Rancho California Water District

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RS-6 SEISMIC REFRACTION INTERPRATIVE PLOT

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: E. Marquez	DATE: 10/16/2017	FIGURE NO: C-18
CHECKED BY: L. Handfelt	DATE: 8/21/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix C - Seismic Refraction Surveys\Appendix C - Seismic Refraction Surveys.xlsx\RS-6_1

Appendix D

Boring and Test Pit Logs

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Appendix D
Boring and Test Pit Logs

Drilling exploration, consisting of nine core borings, was performed from July 12 to August 20, 2017 under the supervision of AECOM. A site reconnaissance was performed by an AECOM geologist prior to the drilling exploration to identify and stake the locations of exploratory borings. Underground Service Alert (Dig Alert) was notified to coordinate with various utility companies to locate and clear existing underground lines in the vicinity of the planned exploration. The nine core borings were drilled by Ruen Drilling Inc. using Longyear LF70 drill rig. For four of the nine borings the drill rig was mobilized to the drill site by helicopter and for the other five borings the drill rig was placed on a trailer and towed by a support vehicle to the drill sites.

An AECOM geologist maintained field boring logs and visually classified the soil and rock according to the key to log of borings presented as Figure D-1 in this appendix. After completion of drilling and sampling operations and downhole testing in selected borings (i.e., packer testing, acoustic televiewer surveys, seismic velocity testing) the borings were backfilled with a cement/bentonite grout mixture that was tremied with the drill rod from the bottom of the boring. Vibrating-wire pressure transducers were installed in Borings B-103 and B-105 to measure groundwater levels over time.

The logs of the borings are included in this appendix as Figures D-2 through D-10. Table D-1 provides a summary of the completed borings.

Table D-1. Summary of Completed Borings

Boring No.	Total Depth (ft)	Depth to Top of Rock (ft)	Boring Backfill	Top Elevation (ft NAVD88)	Date Boring Started
B-101	150.5	10.7	cement-bentonite grout	1437	07/17/2017
B-102	200.0	20.2	cement-bentonite grout	1377	07/27/2017
B-103	200.0	40.4	pressure transducer with cement-bentonite grout	1373	08/01/2017
B-104	150.0	1.1	cement-bentonite grout	1465	07/22/2017
B-105	100.2	3.5	pressure transducer with cement-bentonite grout	1380	08/15/2017
B-106	100.7	30.2	cement-bentonite grout	1363	08/19/2017
B-107	100.3	34.3	cement-bentonite grout	1374	08/17/2017
B-201	103.0	0.0	cement-bentonite grout	1430	07/14/2017
B-202	150.5	10.7	cement-bentonite grout	1437	07/17/2017

Test pits were excavated upstream for the existing right gravity abutment to depths ranging from 7.5 feet to 13.0 feet. Excavator refusal was reached at the total depths reported for each test pit. The floor and walls of the test pits were cleaned with hand tools, leaf blowers and vacuums

DRAFT

to produce a clean exposure suitable for logging. Logs of the Test Pits are presented as Figures D-11 through D-13. Field photographs of the test pits are presented in Appendix I as Figures I-13 through I-20.

DRAFT

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Key to Log of Core Boring

Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND OTHER TESTS
1	2	3	4	5	6	7	8	9 10	11	12	13	14	15

COLUMN DESCRIPTIONS

1 **Elevation:** Elevation (in feet) referenced to mean sea level (MSL).

2 **Depth:** Distance (in feet) below the collar of the borehole.

3 **Run No.:** Number of the individual coring interval.

4 **Box No.:** Number of the core box which contains core from the corresponding run.

5 **Recovery:** Amount (in percent) of core recovered from the coring interval; calculated as length of core recovered divided by run length.

6 **Fractures per Foot:** (Fracture Frequency) The number of naturally occurring fractures in each foot of core; does not include mechanical breaks (induced by drilling) or healed fractures. "NA" = not applicable due to lack of core recovery. "?" = uncertain due to core condition

7 **R Q D:** (Rock Quality Designation) Amount (in percent) of intact core (pieces of sound core greater than 4 inches in length) in the coring interval; calculated as the sum of lengths of intact core divided by the run length.

8 **Fracture Drawing:** Sketch of the naturally occurring fractures and mechanical breaks, showing the angle of the fractures relative to the cross-sectional axis of the core. "NR" indicates no recovery.

9 **Fracture Number:** Location of each naturally occurring fracture (numbered) and mechanical break (labeled "M"). Naturally occurring fractures are described in Column 11 (keyed by number) using descriptive terms defined on Sheet 2 (Items a through g).

10 **Lithology:** A graphic log of material encountered using symbols to represent differing soil and rock types; symbols are explained below.

11 **Description:** Lithologic description in this order: rock type, color, texture, grain size, weathering, strength, and other features; descriptive terms are defined on Sheet 2. A detailed description of overburden material is not necessarily provided. Also, abbreviated description of fractures numbered in Column 9 using terms defined on Sheet 2.

12 **Well or Hole Completion:** Schematic of piezometer or well construction installation or hole backfill; graphic symbols are explained below.

13 **Packer Test Intervals:** A vertical bar depicts the interval over which a packer test is performed. The test identification number and depth range is printed above the bar symbol.

14 **Drill Rate:** Drill rate (in feet per hour) calculated as (60 min x length of run in feet) divided by minutes required to drill run.

15 **Field Notes and Other Tests:** Comments regarding drilling and sampling made by driller or field personnel. Also a record of tests performed using the abbreviations listed below.

TYPICAL MATERIAL GRAPHIC SYMBOLS

Fill


Gneiss (KJm1)


Migmatitic Gneiss (KJm2)


Tonalite (Kt)

TYPICAL WELL GRAPHIC SYMBOLS


Piezometer wire in cement-bentonite grout.


Pressure transducer in cement-bentonite grout.

Cement-bentonite grout backfill.

LABORATORY TEST ABBREVIATIONS

UCS: Unconfined compressive strength, q_u [psi]
SG: Specific gravity (apparent)
PA: Petrographic Analysis

OTHER GRAPHIC SYMBOLS

Water level recorded with sounder next day after completion of borehole to total depth.

Water level based off of pressure transducer reading.

Change in material properties within a stratum

Inferred contact or gradational change in lithology

Material descriptions and stratum lines are interpretive; field descriptions may have been modified to reflect lab test results. Descriptions on these logs apply only at the specific boring locations and at the time the borings were advanced, and are not warranted to be representative of subsurface conditions at other locations or times.

Figure D-1

Project: RCWD - Vail Dam Project Location: Temecula, CA Project Number: 60539527	**Key to Log of Core Boring** Sheet 2 of 2

KEY TO DESCRIPTIVE TERMS USED ON CORE LOGS

DISCONTINUITY DESCRIPTORS

a Dip of discontinuity, measured relative to a plane normal to the core axis.

b **Discontinuity Type:**

- F - Fault
- J - Joint
- Sh - Shear
- Fo - Foliation
- V - Vein
- B - Bedding

c **Aperture (inches):**

- W - Wide (0.5-2.0)
- MW - Moderately Wide (0.1-0.5)
- N - Narrow (0.05-0.1)
- VN - Very Narrow (<0.05)
- T - Tight (0)

d **Type of Infilling:**

Bi	- Biotite	My	- Mylonite
Cl	- Clay	No	- None
Ca	- Calcite	Py	- Pyrite
Ch	- Chlorite	Qz	- Quartz
Ep	- Epidote	Sd	- Sand
Fe	- Iron Oxide	Se	- Serpentinite
H	- Healed	Si	- Silt
Mn	- Manganese	Uk	- Unknown

e **Amount of Infilling:**

- Su - Surface Stain
- Sp - Spotty
- Pa - Partially Filled
- Fi - Filled
- No - None

f **Surface Shape of Joint:**

- Pl - Planar
- Wa - Wavy
- St - Stepped
- Ir - Irregular

g **Roughness of Surface:**

- Slk - Slickensided [surface has smooth, glassy finish with visual evidence of striations]
- S - Smooth [surface appears smooth and feels so to the touch]
- SR - Slightly Rough [asperities on discontinuity surfaces are distinguishable and can be felt]
- R - Rough [ridges and side-angle steps are evident; asperities are clearly visible; surface feels very abrasive]
- VR - Very Rough [near-vertical steps and ridges occur on discontinuity surface]

ROCK FRACTURING

Description	Recognition
Intensely Fractured	Fractures spaced less than 2 inches apart
Highly Fractured	Fractures spaced 2 inches to 1 foot apart
Moderately Fractured	Fractures spaced 1 foot to 3 feet apart
Slightly Fractured	Fractures spaced 3 feet to 10 feet apart
Massive	Fracture spacing greater than 10 feet

ROCK WEATHERING / ALTERATION

Description	Recognition
Residual Soil	Original minerals of rock have been entirely decomposed to secondary minerals, and original rock fabric is not apparent; material can be easily broken by hand
Completely Weathered/Altered	Original minerals of rock have been almost entirely decomposed to secondary minerals, although original fabric may be intact; material can be granulated by hand
Highly Weathered/Altered	More than half of the rock is decomposed; rock is weakened so that a minimum 2-inch-diameter sample can be broken readily by hand across rock fabric
Moderately Weathered/Altered	Rock is discolored and noticeably weakened, but less than half is decomposed; a minimum 2-inch-diameter sample cannot be broken readily by hand across rock fabric
Slightly Weathered/Altered	Rock is slightly discolored, but not noticeably lower in strength than fresh rock
Fresh/Unweathered	Rock shows no discoloration, loss of strength, or other effect of weathering/alteration

ROCK STRENGTH

Description	Recognition	Approximate Uniaxial Compressive Strength (psi)
Extremely Weak Rock	Can be indented by thumbnail	35 - 150
Very Weak Rock	Can be peeled by pocket knife	150 - 700
Weak Rock	Can be peeled with difficulty by pocket knife	700 - 3,600
Moderately Strong Rock	Can be indented 5 mm with sharp end of pick	3,600 - 7,200
Strong Rock	Requires one hammer blow to fracture	7,200 - 14,500
Very Strong Rock	Requires many hammer blows to fracture	14,500 - 36,000
Extremely Strong Rock	Can only be chipped with hammer blows	>36,000

Report: GEO_CORE_4E_W_P_KEY; File: 60539527.GPJ; 10/26/2017 vailkey

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-101

Date(s) Drilled	**7/17/17 - 7/20/17**	Logged By	**A. Avakian**	Checked By	**C. Goetz**
Drilling Method	**Wireline Coring**	Drill Bit Size/Type	**HQ3**	Total Drilled Depth/Length	**150.5 feet**
Drill Rig Type	**Longyear LF70 - Helo Access**	Drilling Contractor	**Ruen Drilling Inc**	Approximate Surface Elevation	**1437 feet**
Groundwater Level	**Not Measured**	Location	**N: 33.495507 W: -116.977445**	Inclination from Horizontal/Bearing	**90**
Borehole Completion	**Tremie Backfilled with Cement-Bentonite Grout**				

Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	0								**FILL** Moist, brown, silty SAND with gravel, mostly fine sand, some fines, little fine to coarse gravel				
	1				N/A								
					N/A								
1435	2	1		0		N/A	NR					60	
					N/A								
	3												
					N/A								
	4												
	5				N/A								
					N/A								
	6		1										
		2		0	N/A	N/A	NR					75	
1430	7												
					N/A								
	8												
					N/A								
	9												
					N/A		NR						
	10												
					N/A								
	11	3		74		12	1 2		**GNEISS (KJm1)**, very dark gray, phaneritic, fine to medium grained, moderately weathered, moderately strong, moderately hard, sub-vertical foliation fabric			60	
					5		3						
1425	12						4 5		1) 5°/J/N/Sd/Pa/Pl/Sr 2) 85°/J/N/Sd/Pa/Pl/Sr 3) 5°/J/Vn/No/N/Pl/Sr				
					6		6		4) 80°/J/Vn/Fe/Sp/Wa/Sr				
	13						7		5) 85°/J/Vn/Fe/Sp/Pl/Sr				

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Figure D-2

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-101

Sheet 2 of 10

Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	13								Gneiss (KJm1) continued...				
		3		74	4	12			6) 55°/J/Vn/Fe+Sd/Sp/Pl/Sr			60	
	14								7) 65°/J/Vn/Fe+Sd/Sp/Pl/Sr				
									8) 60°/J/Vn/Fe+Sd/Sp/Pl/Sr				
									9) 5°/J/N/Fe/Sp/Pl/Sr				
					4				10) 45°/J/Vn/Fe+Sd/Sp/Pl/Sr				
	15								1) 75°/J/Vn/Fe/Su/Pl/Sr				
									2) 5°/J/Vn/Fe/Su/Pl/Sr				
					5				3) 5°/J/Vn/No/N/Pl/Sr-R				
									4) 5°-30°/J/Vn/Fe/Sp/Pl-Wa/Sr-R				
	16								5) 80°/J/N/Fe/Sp/Pl-Wa/Sr-R				
									6) 55°/J/Vn/Fe/Su/Pl/Sr				
		4		100	8	7			7) 5°/J/N/Fe/Sp/Pl/R			100	
									8) 30°/J/N/Fe/Sp/Pl/R				
1420	17								9) 10°/J/N/No/N/Pl-Wa/R				
									becomes moderately strong to strong				
					7								
	18		1						10) 5°/J/N/Fe/Sp/Pl/R				
									11) 10°/J/Vn/Fe/Sp/Wa/Sr				
					6				12) 5°/J/Vn/No/N/Pl/Sr				
									13) 30°/J/Vn/Fe/Sp/Pl/Sr-R				
	19												
									1) 5°/J/Vn/No/N/Pl/-				
					3				2) 30°/J/Vn/No/N/Pl-St/R				
									3) 35°/J/Vn/Fe/Sp/Pl/R				
	20								becomes moderately to slightly weathered				
									4) 60°/J/Vn/Fe/Su/Pl/Sr				
					5				5) 30°/J/N/Fe/Sp/Pl/Sr				
									6) 70°/J/Vn/Fe/Su/Pl/Sr				
	21								7) 30°/J/N/Fe/Sp/Pl/R				
									8) 50°/J/Vn/Fe/Su/Pl/Sr				
		5		100	3	30			9) 20°/J/N/Fe/Sp/Pl/R				
									10) 90°/J/Vn/Fe/Su/Pl-Wa/Sr			75	
1415	22								11) 20°/J/N/Fe/Sp/Pl/R				
									12) 60°/J/N/Fe/Sp/Pl-St/R				
					4								
	23												
					3								
	24												
									1) 10°/J/N/Fe/Su/Pl/Sr				
					2				2) 50°/J/Vn/Fe/Sp/Pl/R				
									3) 25°/J/Vn/Fe/Sp/Pl/R				
	25								4) 20°/J/Vn/Fe/Sp/Pl/Sr				
									5) 60°/V-J/Mw/Qz/Fi/Pl/R				
					4				becomes moderately strong				
	26												
									6) 40°/J/Vn/Fe/Su/Pl/R				
		6	2	100	3	40			7) 30°/J/N/Fe/Su/Pl/R				
									8) 5°/J/Vn/No/N/Ir/Vr				
									9) 30°/J/Vn/Fe/Sp/Pl/Sr			75	
									10) 20°/J/Vn/Fe/Su/Pl/Sr				
1410	27								11) 60°/J/Vn/Fe/Sp/Pl/Sr				UCS = 6,800 psi
					1				12) 60°/J/Vn/No/N/Pl/Sr				
									13) 10°/J/Vn/No/N/Pl/R				
	28								14) 40°/J/Vn/Fe/Sp/Pl/Sr-R				
					6								
	29												

Packer Test Interval #1

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Figure D-2

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-101

Sheet 3 of 10

Elevation, feet	Depth, feet	Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	29				6		12 14 1		Very intensely fractured zone				
	30				3		2 1		Gneiss (KJm1) continued... 1) 55°/J/Vn/No/N/Pl/R 2) 20°/J/Vn/No/N/Pl/R 3) 10°/J/Vn/Fe/Su/Pl/R 4) 70°/J/Vn/Fe/Su/Pl/Sr				
	31	7		100	10+	22	3 4 6		5) 60°/J/Vn/Fe/Su/Pl/Sr			100	
1405	32				10+		5 5 8		Very intensely fractured zone				
	33				5		7 9 10		6) 85°/J/Vn/Fe/Su/Pl/R 7) 80°-90°/J/Vn/Fe/Su/Pl-Wa/Sr 8) 65°/J/Vn/Fe+Ca-H/Fi/Pl/Sr 9) 40°/J/Vn/Fe/Su/Pl/Sr				
	34						9 M		10) 20°/J/Vn/Fe/Su/Ir/Vr				
	35	8	2	60	8 10+	0	1 4 2 3		1) 5°/J/N/Fe/Su/Pl/R 2) 5°/J/N/Fe/Su/Pl/R 3) 30°-45°/J/Vn/Fe/Su/Pl/Sr 4) 75°-85°/J/Vn/Fe+Ca-H/Fi/Pl-Ir/Sr		Packer Test Interval #2	50	
1400	36 37				10+ N/A		3 3		Material is completely weathered to sandy SILT (ML) with highly weathered rock fragments, very soft, extremely weak				
	38						NR						
	39				N/A								
	40	9		40	10+ 10+	0	1		Very intensely fractured zone			43	
1395	41 42				N/A		NR		1) 70°/J/Vn/Fe/Su/Pl/Sr				
	43				N/A								
	44	10	3	100	10+	53	1 2		1) 70°/J/Vn/Fe/Su/Pl/Sr 2) 30°/J/Vn/Fe/Sp/Pl/Sr			60	
	45												

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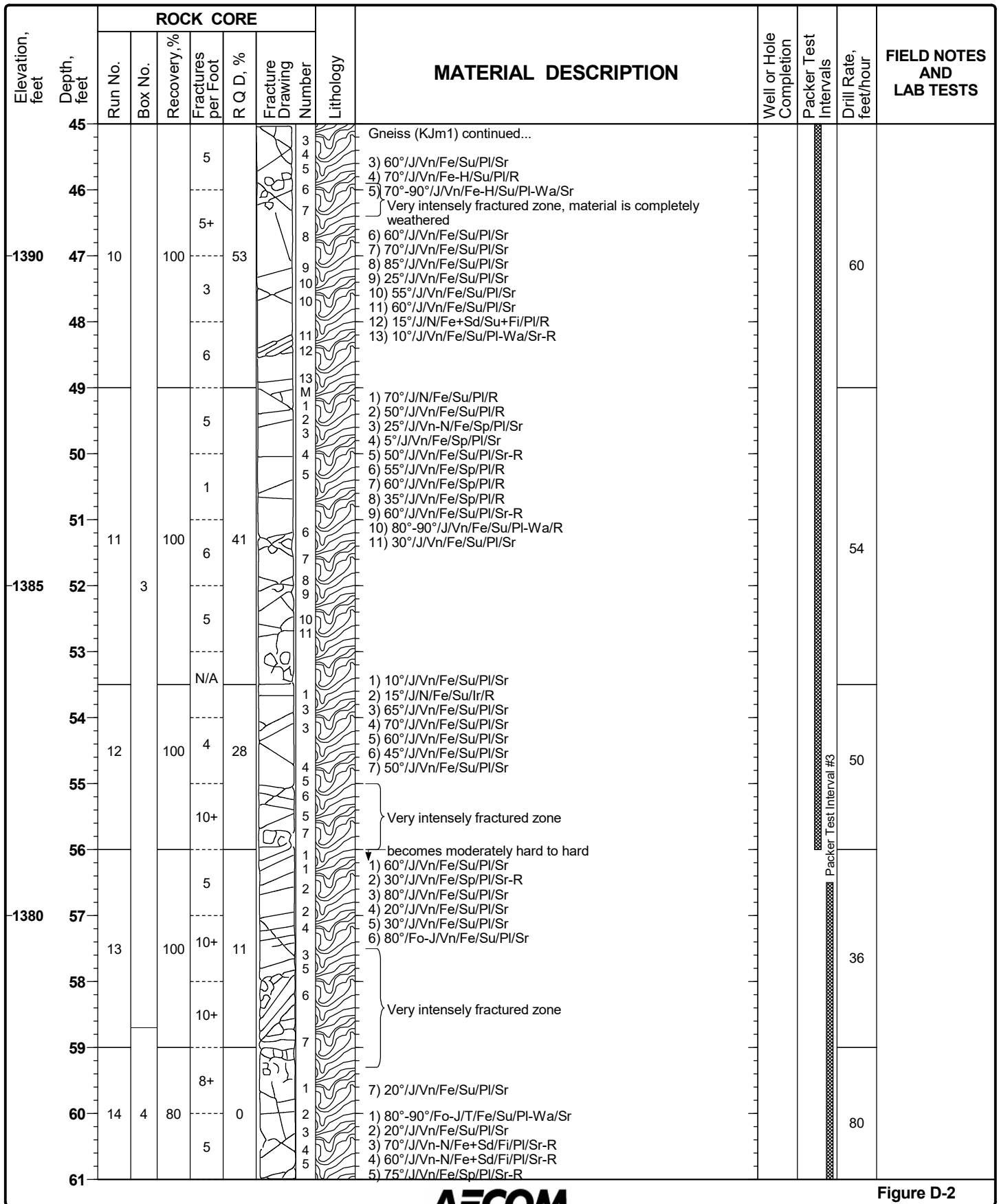
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Figure D-2

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-101

Sheet 4 of 10



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Figure D-2

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-101

Sheet 5 of 10

Elevation, feet	Depth, feet	Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
				ROCK CORE									
	61						2 5 1		GNEISS (KJm1), very dark gray, phaneritic, fine to medium grained, moderately to slightly weathered, strong, moderately hard to hard, sub-vertical foliation fabric continued...				
1375	62	14		80	5 / N/A	0	NR					80	
	63				1		1		becomes hard				
	64				3		2 1		1) 25°/J/Vn/Fe/Su/Pl/R 2) 50°-60°/J/Vn/Fe/Su/Pl/Sr 3) 60°-70°/J/Vn/Fe/Su/Pl/Sr 4) 5°-10°/J/Vn-N/Fe/Su/Pl/Sr-R				
	65	15		100	4	65	3 4					60	
	66				4		4 3						
1370	67		4		3		1 4						
	68				2		M						
	69				2		1 2		1) 10°-15°/J/Vn/No/N/Pl/Sr-R 2) 80°-90°/J/Vn/Fe/Su/Pl-Wa/Sr-R 3) 40°-45°/J/Vn/Fe/Su/Pl-Wa/Sr-R 4) 45°/J/Vn-T/Fe/Su/Pl/Sr 5) 70°/Fo-J/Vn-T/Fe/Sp/Pl-Wa/Sr				
	70	16		100	3	75	1 3					38	
	71				4		3 2 3 4						
1365	72				2		5 1		becomes slightly weathered, few moderately wide quartz veins, sub-vertical foliation				
	73				2		M						
	74	17	5	100	0	97	1		1) 5°-10°/J/Vn-N/Fe/Su/Pl/Sr 2) 15°/J/Vn/No/N/Pl/Sr			60	
	75				1		2						
	76						M						
1360	77	18		100	1	100	1				Packer Test Interval #4	N/A	

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Figure D-2

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-101

Sheet 6 of 10

Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
1360	77				1		1		GNEISS (KJm1), very dark gray, phaneritic, fine to medium grained, slightly weathered, strong, hard, sub-vertical foliation fabric continued...				
	78				1		2		1) 10°-20°/J/Vn/Fe/Su/Pl/Sr 2) 5°/J/Vn/No/N/Pl-Wa/Sr 3) 30°/J/Vn/Fe/S/Pl/R 4) 40°/J/Vn/Fe/Sp/Pl/Sr				
	79	18		100	1	100	3					N/A	
	80				1								
	81				1		4 M						
					2		1 1						
1355	82	19	5	100	6	53	1 5 1 M		1) 20°-30°/J/Vn/Fe/Su/Pl/Sr-R 2) 80°/J/Vn/Fe/Sp/Pl/Sr 3) 60°/J/Vn/Fe/Su/Pl/Sr 4) 5°/J/Vn/Fe/Su/Pl/Sr 5) 85°/J/Vn/Fe-H/Su/Pl/Sr			60	
	83				4		2 M 3						
	84				2		4 1 2						
	85				1		3		1) 15°/J/Vn/Fe/Su/Pl/Sr-R 2) 85°-90°/J/Vn-T/Fe/Su/Pl/Sr-R 3) 45°/J/Vn/Fe/Sp/Pl/Sr 4) 10°/J/Vn/No/N/Pl/Sr				
	86	20		100	1	82	3 M					60	
1350	87				2		1 1						
	88				1		4						
	89				1		M 1						
	90		6		5		1 2		1) 30°/J/Vn/Fe/Sp/Pl/Sr 2) 5°-10°/J/Vn-N/Fe/Su/Pl/Sr-R 3) 70°/J/Vn/Fe/Su/Pl/Sr 4) 60°/J/Vn/No/N/Pl/Sr 5) 20°/J/Vn/No/N/Pl/Sr				
	91	21		100	1	82	3					50	
1345	92				1		1						
					2		M 4						
	93												

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Figure D-2

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-101

Sheet 7 of 10

Elevation, feet	Depth, feet	Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	93												
		21		100	2	82	5 5 M		GNEISS (KJm1), very dark gray, phaneritic, fine to medium grained, slightly weathered, strong, hard, sub-vertical foliation fabric continued...			50	
	94				1		1		1) 10°/J/Vn/Ch/Su/Pl/Sr-R				
	95	22		100	2	88	2 2		2) 5°/J/Vn/Ch/Sp/Pl/Sr			30	
	96				1		M 1						
1340	97		6		2		M 2 1						
	98	23		100	2	93	3		← chlorite mineralization			43	
	99				2		4		1) 5°-10°/J/Vn/No/N/Pl-Ir/Vr 2) 60°/J/Vn/Ch/Sp/Pl/Sr-R 3) 50°/J/Vn/No/N/Pl/R				
	100				1		4 4		4) 20°-40°/J/Vn/Ch/Sp/Pl/Sr				
	101				1		M 1						
1335	102	24		100	2	94	2		1) 80°-90°/Fo-J/T/H/N/Pl-Wa/Sr 2) 65°/J/Vn/Fe/Sp/Pl/Sr-R 3) 30°/J/Vn/Ch/Sp/Pl/Sr 4) 30°/J/Vn/Ch/Sp/Pl/Sr 5) 85°/J/Vn/H/N/Pl/Sr			36	
	103				2+		3 5 4						
	104				5		1		1) 20°-30°/J/Vn/Fe/Sp/Pl/Sr-R 2) 65°-70°/J/Vn/Ch/Sp/Pl/Sr-R 3) 80°-90°/Fo-J/T-Vn/No/N/Pl-Wa/Sr				
	105		7		2		2						
	106	25		100	4+	50	1 2 1 2		Intensely fractured zone			35	
1330	107				2		3						
	108	26		100	1	83	1 2					60	
	109												

Packer Test Interval #5

Report: GEO_CORE_4E; File: 60539527.GPJ; 10/26/2017 B-101

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Figure D-2

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-101

Sheet 8 of 10

Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	109				0				GNEISS (KJm1), very dark gray, phaneritic, fine to medium grained, slightly weathered, strong, hard, sub-vertical foliation fabric continued...				
	110						M 3		1) 80°/J/Vn/Ch/Sp/Pl/Sr-R 2) 25°/J/Vn/Fe/Sp/Pl/R				
		26		100	2	83	4		3) 60°/J/Vn/Fe+Ch/Sp/Pl/Sr			60	
	111						5		4) 35°/J/Vn/Ch/Sp/Pl/Sr 5) 25°/J/Vn/Ch/Sp/Pl/Sr				
					2		6		6) 40°-50°/J/Vn/Ch/Sp/Pl-Ir/R				
1325	112		7				6						
					6		M 1		Intensely fractured zone				
	113						2 3						
					3		2						
	114								1) 40°/J/Vn/No/N/Pl/R 2) 30°/J/Vn/Ch/Sp/Pl/Sr-R				
		27		100	0	64	M		3) 85°/J/Vn/Ch+Fe/Sp/Pl/Sr 4) 20°/J/Vn/Ch/Sp/Pl/Sr			106	
	115						4						
					2		2						
	116						M 1						
					2		2						
1320	117								1) 40°/J/Vn/Fe+Ch/Sp/Pl/Sr 2) 70°/J/Vn/Fe/Sp/Pl-Ir/Sr-R				
					1				3) 25°/J/Vn/Ch/Sp/Pl/Sr				
	118						3						
		28		100	1	77						N/A	
	119						3						
					2								
	120		8				1		Strong rock				UCS = 11,500 psi
					1								
	121						M 1 2						
					3								
1315	122						2 3		1) 55°/J/Vn/Ch/Sp/Pl/Sr 2) 30°-40°/J/Vn/Ch+Fe/Sp/Pl/Sr				
		29		100	4	83			3) 20°/J/Vn/Ch/Sp/Pl/Sr-R			N/A	
	123						2						
					3		2						
	124						2						
		30		100	3	53						38	
	125						1						

Packer Test Interval #6

Report: GEO_CORE_4E; File: 60539527.GPJ; 10/26/2017 B-101

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Figure D-2

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-101

Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	125				7		2 3 4 5						
	126				7		5 5 5		Intensely fractured zone				
1310	127	30	8	100	2	53	6		Gneiss (KJm1) continued...			38	
	128				1		4		1) 70°/J/Vn/Ch/Sp/Pl/Sr 2) 60°/J/Vn/Ch/Sp/Pl/R 3) 10°/J/Vn/Ch/Sp/Pl/Sr-R 4) 30°/J/Vn/Ch/Sp/Pl/R 5) 45°/J/Vn/Ch+Fe/Sp/Pl/Sr 6) 85°/J/Vn/Fe/Sp/Pl/Sr				
	129				1		M 1						
	130				2		2 3		1) 10°/J/Vn-N/Fe/Su/Pl/Vr 2) 40°/J/Vn-N/Fe/Sp/Pl/Vr 3) 40°-50°/J/Vn/Ch/Sp/Pl/Sr 4) 60°/Fo-J/Vn/No/N/Pl/Sr				
	131	31		100	3	65	M 4		5) 50°/J/Vn-N/Fe+Ch/Sp/Pl/Sr			48	
1305	132				8		3 3 5						
	133				2		3 1 1		1) 55°/J/Vn-N/Ch/Sp/Pl/R 2) 40°/J/Vn/No/N/Pl-St/R 3) 80°/J/Vn/Ch/Sp/Pl/Sr 4) 60°/J/Vn/Ch+Ca+Fe/Sp-Su/Pl/Sr 5) 15°/J/Vn/Ch+Fe/Sp/Pl/R				
	134	32		100	6+	31	3 1 2					91	
	135		9		6+		4 4 4 4				Packer Test Interval #7		
	136				6		5 1 1		1) 25°-40°/J/Vn/Ca+Ch/Sp/Pl/Sr 2) 80°-90°/J/Vn/H/-/Pl-Wa/Sr 3) 85°/J/Vn/Ch/Su/Pl/Sr 4) 50°/J/Vn/Fe-Ch/Su/Pl/Sr				
1300	137				6		1 1 2						
	138	33		100	10+	0	1 3					35	
	139				10+		4 1		very intensely fractured with sandy SILT (ML) infilling between rock fragments				
	140	34		80	5	23	2 3 6 3 4		1) 65°/J/Vn/Ch-H/Fi/Pl/Sr 2) 40°/J/Vn/Ch+Ca-H/Fi/Pl/Sr 3) 30°-45°/J/Vn/Ch+Fe/Sp/Pl/Sr 4) 20°/J/Vn/Fe+Ch/Sp/Pl/Sr-R			76	
	141												

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Figure D-2

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-101

Sheet 10 of 10

Elevation, feet	Depth, feet	Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
				ROCK CORE									
	141						4		Gneiss (KJm1) continued...				
		34		80	N/A	23	5		5) 70°/J/Vn/Ch/Sp/Pl/Sr			76	
1295	142		9				NR		6) 80°/J/Vn/No/N/Pl/Sr-R				
					2		1						
	143						2		1) 65°/J/Vn/Ch+Fe/Sp/Pl/Sr-R				
		35		100	1	83			2) 45°/J/Vn/Ch/Sp/Pl/Sr-R			N/A	
							3		3) 10°/J/Vn/No/N/Pl/Sr				
	144				0		M						
	145												
					1		1						
	146								1) 30°/J/Vn/No/N/Pl/Sr				
					0				2) 25°/J/Vn/No/N/Pl/Sr-R				
		36		100		97			3) 30°/J/Vn/Ch/Sp/Pl/Sr				
1290	147		10				2		4) 60°/J/Vn/Ch/Su/Pl/Sr			38	
					1		M						
	148						3						
					1								
	149						4						
					2								
	150	37		100		100						60	
					N/A								
	151								Bottom of boring at 150.5 feet below ground surface. Acoustic televiewer survey completed from 12 fbgs to 150.5 fbgs.				
1285	152												
	153												
	154												
	155												
	156												
1280	157												

Report: GEO_CORE_4E; File: 60539527.GPJ; 10/26/2017 B-101

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Figure D-2

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-102

Date(s) Drilled	**7/27/17 - 7/31/17**	Logged By	**A. Avakian**	Checked By	**C. Goetz**
Drilling Method	**Wireline Coring**	Drill Bit Size/Type	**HQ3**	Total Drilled Depth/Length	**200.0 feet**
Drill Rig Type	**Longyear LF70**	Drilling Contractor	**Ruen Drilling Inc**	Approximate Surface Elevation	**1377 feet**
Groundwater Level	**20.2 ft bgs (recorded with sounder on 8/1/2017)**	Location	**N: 33.495790 W: -116.977296**	Inclination from Horizontal/Bearing	**90**
Borehole Completion	**Tremie Backfilled with Cement-Bentonite Grout**				

Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	0								**FILL** Moist, brown, silty SAND with gravel, mostly fine sand, some fines, little fine to coarse gravel, gravel is typically of gneissic source				
	1				N/A								
					N/A		NR						
1375	2	1		25		N/A						34	
					N/A								
	3												
					N/A								
	4												
	5				N/A								
					N/A								
	6		1										
		2		0	N/A	N/A	NR					75	
1370	7												
					N/A								
	8												
					N/A								
	9												
					N/A								
	10												
					N/A		NR						
	11	3		30		N/A						N/A	
					N/A								
1365	12												
					N/A								
	13												

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Figure D-3

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-102

Sheet 2 of 13

Elevation, feet	Depth, feet	Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	13												
		3		30	N/A	N/A			**FILL** Moist, brown, silty SAND with gravel, mostly fine sand, some fines, little fine to coarse gravel, gravel is typically of gneissic source continued...			N/A	
	14												
					N/A								
	15												
					N/A								
	16						NR						
		4		16	N/A	0						75	
1360	17												
					N/A								
	18												
					N/A								
	19												
					N/A		NR						
	20		1										
					2+		1		**GNEISS (KJm1)**, gray to black, phaneritic, fine to medium grained, slightly weathered, moderately strong, moderately hard to hard, few iron oxide staining, sub-vertical foliation and flow banding fabric				
	21	5		73		22	2 4 3					45	
					4		5						
1355	22						6 7 7		1) 80°-90°/Fo-J/Vn-T/Fe/Su/Pl-Wa/St 2) 20°/J/Vn-N/Fe/Su/Pl/St 3) 5°-10°/J/Vn/Fe/Su/Pl/St-R 4) 60°/J/Vn-T/H-Fe/Sp/Pl/St 5) 85°-90°/J/Vn/Fe/Su/Pl/St-R 6) 20°/J/T/H/-/Pl/- 7) 25°-30°/J/Vn/Fe/Su/Pl/St 8) 70°-90°/J/Vn-N/Fe/Su/Pl/St-R				
					5+		7						
	23						8						
					3+		M						
	24						1						
					3+		2						
	25												UCS = 6,800 psi
					2		3						
		6		100		75	4					60	
	26						M		1) 75°-90°/J/Vn-N/Fe/Su/Pl-Wa/St 2) 60°/J/-/Fe/Su/Pl/R 3) 45°/J/Vn/Fe/Su/Pl/St 4) 50°/J/T/H-Fe/-/Pl/- 5) 20°/J/T/H-Fe/-/Pl/- 6) 10°/J/Vn/Fe/Sp/Pl/St-R				
					1		3						
1350	27						M						
					1		5						
	28						6						
					1		M						
		7		100		85	M					43	
	29						1						

Report: GEO_CORE_4E; File: 60539527.GPJ; 10/26/2017 B-102

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Figure D-3

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-102

Sheet 3 of 13

Elevation, feet	Depth, feet	Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	29								GNEISS (KJm1), gray to black, phaneritic, fine to medium grained, slightly weathered, strong, moderately hard to hard, few iron oxide staining, sub-vertical foliation and flow banding fabric continued ...				
	30		1		4								
	31	7		100	1	85			1) 60°/J/Vn/H-Fe/Su/Pl/Sr 2) 80°-90°/Fo-J/T/H-Fe/-/Pl-Wa/- 3) 15°/J/Vn/H-Fe/Su/Pl/Sr-R 4) 55°/J/Vn/Fe/Sp/Pl/Sr 5) 40°/J/Vn/Fe/Su/Pl/Sr			43	
1345	32				0								
	33				5								
	34	8	2	100	2	97			1) 30°/J/Vn/Fe/Sp/Pl/Sr-R 2) 50°/J-Fo/T-Vn/Fe/-/Pl/- 3) 5°/J/Vn-N/Fe/Su/Pl/Sr-R 4) 70°/J/Vn/Fe/Su/Pl/R 5) 45°/J/Vn/Fe/Su/Pl/R 6) 45°/J/Mw-W/Fe+crushed rock/Fi/Pl/Sr 7) 60°/J/T/H/-/Pl/- 8) 70°-90°/Fo-J/T/-/-/Pl-Wa/-			60	
	35				2								
1340	36				2								
	37				5								
	38				1				flow banding				
	39	9		100	3+	80			flow banding			75	
	40				3								
	41				1				1) 30°/J/T/H/-/Pl/- 2) 20°/J/Vn/Fe/Sp/Pl/Sr 3) 10°-30°/J/T/H/-/Pl/- 4) 45°/J/Vn/Fe+Ch/Su/Pl/Sr 5) 60°/J/Vn/H-Fe/-/Pl/- 6) 50°/J/Vn/Fe/Su/Pl-Wa/R 7) 25°-30°/J/Vn/Ch+Fe/Sp/Pl/Sr 8) 5°/J/Vn/Fe/Su/Pl/R 9) 40°/J/Vn/Fe/Su/Pl/R 10) 5°/J/Vn/Fe/Su/Pl/Sr-R 11) 55°/J/Vn/Fe/Su/Pl/Sr				
1335	42				5								
	43		3		3								
	44	10		100	4	77						75	
	45												

ROCK CORE

Packer Test Interval #1

Report: GEO_CORE_4E; File: 60539527.GPJ; 10/26/2017 B-102

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Figure D-3

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-102

Sheet 4 of 13

Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	45								GNEISS (KJm1), gray to black, phaneritic, fine to medium grained, slightly weathered, strong, moderately hard to hard, few iron oxide staining, sub-vertical foliation and flow banding fabric continued ...				
	46	10		100	2	77			1) 60°/J/Vn/Fe/Su/Pl/Sr 2) 10°/J/Vn/No/N/Pl/Sr-R 3) 90°/J/Vn/Fe/Su/Pl/Sr-R			75	
1330	47				6				4)70°/J/Vn/Fe/Sp/Pl/Sr-R 5) 5°/J/Vn/Ch/Sp/Pl/R 6) 20°/J/T/H/-/Pl/- 7) 55°/J/Vn/No/N/Pl/Sr 8) 10°/J/Vn/Ch/Sp/Pl/Sr-R				
	48	11		100	3	83			1) 10°/J/Vn/Fe+Ch/Su/Pl/Sr		Packer Test Interval #2	30	
	49				0								
	50		3		1								
	51	12		100	2	90			1) 10°/J/Vn/No/N/Pl/Sr 2) 15°/J/Vn/No/N/Pl/Sr-R 3) 30°/J/N/Ch/Su/Pl/Sr 4) 35°/J/Vn/Ch/Su/Pl/Sr			60	
1325	52				2				5) 30°/J/Vn/Fe/Sp/Pl/R				
	53				1								
	54	13		100		93			1) 30°/J/Vn/Fe/Sp/Pl/Sr-R 2) 75°/Fo-J/Vn-T/No/N/Pl-Wa/Sr 3) 20°-25°/J/Vn/Ch/Sp/Pl/Sr 4) 55°/J/Vn/No/N/Pl/Sr 5) 15°/J/Vn-N/Ch/Su/Pl/Sr-R 6) 15°/J/-/Mn/Su/Pl/Sr		Packer Test Interval #3	60	
1320	57												
	58												
	59	14	4	100	0	88			1) 30°/J/Vn/Ch/Sp/Pl/Sr-R 2) 20°/J/Vn-N/Ch/Sp/Pl/Sr 3) 25°/J/Vn-N/Ch/Sp/Pl/Sr 4) 50°/J/Vn/Ch/Su/Pl/Sr 5) 30°/J/Vn/No/N/Pl/Sr 6) 35°/J/W/Ch/Su/Pl/Sr			60	
	60				3								
	61												

Report: GEO_CORE_4E; File: 60539527.GPJ; 10/26/2017 B-102

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Figure D-3

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-102

Sheet 5 of 13

Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	61						3		GNEISS (KJm1), gray to black, phaneritic, fine to medium grained, slightly weathered, strong, moderately hard to hard, few iron oxide staining, sub-vertical foliation and flow banding fabric continued ...				
					1								
1315	62	14		100	2	88	4 5					60	
	63				1								
	64						6						
					0								
	65		4				1						
					2		2						
	66								1) 10°/J/Vn-N/Ch/Su/Pl/R 2) 45°/J/Vn-N/Ch/Sp/Pl/Sr 3) 20°/J/Vn-N/Fe/Sp/Pl/R 4) 45°/J/Vn-N/Ch/Sp/Pl/Sr 5) 10° 80°/J/Vn-N/Ch/Sp/Pl-Ir/Sr-R 6) 5°/J/Vn/Ch/Su/Pl/Sr 7) 25°/J/Vn/Ch/Su/Pl/R 8) 45°/J/Vn/Ch/Su/Pl/Sr				
		15		100	1	78	1					75	
1310	67						3						
					4		4 5						
	68												
					4		6 7						
	69						8						
					3		1 2						
	70												
					1								
	71						3						
		16		100	1	62	4		1) 75/J/Vn/No/N/Pl/Sr-R 2) 20°/J/W/Crushed Rock/Fi/Pl/Sr 3) 65°/J/Vn/H ... +/R 4) 25°-35°/J/Vn/Fe+Cl/Sp/Pl/Sr 5) 80°/J/Vn/No/N/Pl-Ir/R 6) 65°/J/Vn/Fe+Ch/Sp/Pl/Sr-R 7) 5°/J/Vn/No/N/Pl/Sr 8) 45°/J/-/Fe+Ch/Sp/Pl/Sr			50	
1305	72						4						
					3		5						
	73						4						
			5		4		7						
							6						
	74						8						
							M		1) 35°/J/Vn/Ch+Mn/Su/Pl/Sr 2) 20°/J/Vn/No/N/Pl/Sr 3) 70°-90°/Sh/Vn/-/-/Pl-Wa/Slk 4) 25°/J/Vn/No/N/Pl/Vr 5) 10°/J/Vn-N/Fe/Sp/Pl/R 6) 35°/J/Vn/Ch+Mn/Su/Pl/Sr				
					2		1						
	75						2						
		17		100	2	63	2					50	
							3						
	76						4		Foliation parallel shear zone; zone is highly to moderately weathered, soft to moderately soft, flow banding of minerals				
					2+								
1300	77												

Packer Test Interval #4

Report: GEO_CORE_4E; File: 60539527.GPJ; 10/26/2017 B-102

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Figure D-3

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-102

Sheet 6 of 13

Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
1300	77				4+		5		Foliation parallel shear zone; zone is highly to moderately weathered, soft to moderately soft, flow banding of minerals				
	78	17		100	2	63	6		GNEISS (KJm1), gray to black, phaneritic, fine to medium grained, slightly weathered, strong, moderately hard to hard, few iron oxide staining, sub-vertical foliation and flow banding fabric continued...			50	
	79				0		M						
	80		5		1		1						
	81	18		100	4	97	2 3 4		1) 45°/J/Vn/Fe/Sp/Pl/Sr 2) 5°/J/Vn/Fe+Ch/Sp/Pl/R 3) 30°/J/Vn/Ch+Cl/Su/Pl/Sr-R 4) 55°/J/T/H/-/Pl/-			60	
1295	82				2		5		5) 75°/J/T/H/-/Pl/- 6) 30°/J/Vn/Mn/Su/Pl/Sr 7) 10°/J/Vn/Ch+Cl/Su/Pl/Sr-R 8) 35°/J/-/Ch/Su/Pl/Sr				
	83				4		6 7						
	84						8 1						
	85				4		2 3 4						
	86	19		100	2	90	4		1) 55°/J/T/H/-/Pl/- 2) 30°/J/Vn/Fe/Sp/Pl/R 3) 5°/J/N/Ch/Sp/Pl/R 4) 40°/J/Vn/Ch/Su/Pl/Sr 5) 10°/J/Vn/Ch/Su/Pl-St/Sr 6) 5°/J/Vn/No/N/Pl/R			75	
1290	87				1		5						
	88				0		M						
	89		6		1		6 M						
	90				1		1 2						
	91	20		100	1	97			1) 35°/J/T/H/-/Pl/- 2) 30°/J/Vn/Ch+Mn+fe/Su/Pl/Sr 3) 90°/J/Vn/Ch+Fe/Sp/Pl/Sr 4) 25°/J/N/Fe/Sp/Pl/R 5) 25°/J/N-Mw/Fe/Sp/Pl/R			60	
1285	92				2		M 3 4						
	93				0								

Packer Test Interval #5

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Figure D-3

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-102

Sheet 7 of 13

Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	93												
		20		100	1	97			GNEISS (KJm1), gray to black, phaneritic, fine to medium grained, slightly weathered, strong, moderately hard to hard, few iron oxide staining, sub-vertical foliation and flow banding fabric continued...			60	
	94				7+								
	95		6		4								
	96	21		100	6	37			1) 20°/J/Vn/Ch/Su/Pl/Sr 2) 85°/J-Fo/Vn/Ch+Fe/Sp/Pl/Sr 3) 60°/J/Vn/Ch/Sp/Pl/Sr-R 4) 40°/J/Vn/Ch+Fe/Sp/Pl/Sr 5) 80°/J/Vn/Ch+Fe/Sp/Pl/Sr 6) 15°/J/Vn/Ch/Sp/Pl/Sr 7) 10°/J/Vn/Ch/Su/Pl/Sr 8) 10°/J/Vn/Ch/Sp/Pl/Sr			45	
1280	97				5								
	98				5+								
	99				5								
	100				2								
	101	22		100	4	63			1) 70°/J/Vn/Ch/Su/Pl/Sr 2) 40°/J/Vn/Ch+Mn/Su/Pl/Sr 3) 20°/J/Vn/Ch/Su/Pl/Sr 4) 70°/J/Vn/No/N/Pl/Sr 5) 10°/J/Vn/Ch+Mn/Su-Sp/Pl/Sr 6) 45°/J/Vn/Ch/Su/Pl/Sr 7) 35°/J/-/No/N/Pl/Sr			50	
1275	102				2								
	103				2				becomes slightly weathered to fresh, strong, hard				
	104		7		4								
	105				4								
	106	23		100	0	88			1) 30°/J/Vn/Mn/Su/Pl/Sr 2) 15°/J/Vn/H-Ch/Pl/Sr 3) 5°/J/Vn-N/Ch+Py/Sp/Pl/Sr-R 4) 20°/J/Vn/Py/Su-Sp/Pl/Sr 5) 5°/J/W/Py+Ch/Sp/Pl/R			N/A	
1270	107				2								
	108				2								
	109	24		100		0			1) 5°/J/Vn/Mn+Py/Su-Sp/Pl/Sr			N/A	

Packer Test Interval #6

Report: GEO_CORE_4E; File: 60539527.GPJ; 10/26/2017 B-102

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Figure D-3

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-102

Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	109						M 1		GNEISS (KJm1), gray to black, phaneritic, fine to medium grained, slightly weathered to fresh, strong, hard, few iron oxide staining, sub-vertical foliation and flow banding fabric continued...				
	110		7		2		2						
					3		3 4						
	111						1 1						
		25		100	3	47	1		1) 20°-30°/J/Vn/Ch+Py/Sp/Pl/Sr 2) 5°/J/N/Ch/Su/Pl/R 3) 60°/J/Vn/Ch+Py+Mn/Su-Sp/Pl/Sr 4) 5°/J/Vn/Py/Sp/Pl/Sr 5) 60°/J/Vn/Py/Sr/Pl/Sr-R 6) 45°/J/Vn/Ch/Sp/Pl/Sr			50	
1265	112						1						
					5		1						
	113						1						
					3		5						
	114						6						
					1		1						
	115						2						
					1		M						
	116						3						
		26		100	1	100			1) 70°/J/Vn/Ch+Py/Sp/Pl/Sr 2) 25°/J/Vn/Py+Ch/Sp/Pl/Sr 3) 5°/J/Vn/Mn+Py/Su/Pl/Sr			50	
1260	117												
					0								
	118		8										
					0								
	119						M						
					1		1						
	120												
					0								
	121						2						
		27		100	4	73	3		1) 5°/J/Vn/Mn+Ch+Py/Su/Pl/Sr 2) 55°/J/Vn/Ch/Sp/Pl/Sr-R 3) 50°/J/Vn/Py/Sp/Pl/Sr 4) 40°/J/N/Cl+Ch/Fi/Pl/Sr 5) 30°/J/Vn/Py/Sp/Pl/Sr 6) 45°/J/Vn/Ch+Py/Sp/Pl/Sr 7) 15°/J/Vn/Ch/Sp/Pl/Sr			60	
1255	122						4 5						
					1								
	123												
					3		6						
	124						7						
		28		100	1	50						50	
	125						1						

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Figure D-3

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-102

Sheet 9 of 13

Elevation, feet	Depth, feet	Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	125								GNEISS (KJm1), gray to black, phaneritic, fine to medium grained, slightly weathered to fresh, strong, hard, few iron oxide staining, sub-vertical foliation and flow banding fabric continued...				
	126		8		7								
					4								
1250	127	28		100		50			1) 55°/J/Vn/Ch+Py/Sp/Pl/Sr 2) 35°/J/Vn/No/N/Pl/Sr 3) 85°/J/Vn/No/N/Pl/Sr 4) 20°/J/Vn/Ch+Py/Sp/Pl/Sr 5) 5°/J/Vn/Ch+Py/Sp/Pl/Sr 6) 45°/J/Vn/Ca+Py/Sp/Pl/Sr 7) 5°/J/Vn/Py/Sp/Pl/Sr 8) 75°/Fo-J/Vn/Py+Ch/Sp/Pl/Sr		Packer Test Interval #7	50	
					6								
	128				4								
	129				5								
	130				2								
	131	29		100	3	57			1) 45°/J/Vn/Ch+Py/Sp/Ir/Vr 2) 15°/J/Vn/Py/Sp/Pl/Sr 3) 85°/J/Vn/Py/Sp/Pl/Sr-R 4) 20°/J/Vn/Py+Ch/Sp/Pl/Sr 5) 25°/J/Vn/Py/Sp/Pl/Sr 6) 80°/J/Vn/Py+Ch+Ca/Sp/Pl/Sr 7) 30°/J/Vn/Ca/Su/Pl/Sr 8) 60°/J/Vn/Ca/Su/Pl/R			30	
1245	132				6+								
	133				2								
	134		9		1								
	135				4								
	136	30		100	2	72			1) 30°/J/Vn/Ch+Py/Sp/Pl/R 2) 40°/J/Vn/Ch+Py/Sp/Pl/Sr-R 3) 30°/J/Vn/Ch/Sp/Pl/Sr-R 4) 35°/J/Vn-N/Py/Sp/Pl/Sr-R 5) 65°/J/Vn/Ch/Sp/Pl/R 6) 65°/J/Vn/H-Ch+Ca/Sp/Pl/Sr			60	
1240	137												
	138				2								
	139				3								
					0								
	140	31		100		100						43	
			10		1								
	141												

Report: GEO_CORE_4E; File: 60539527.GPJ; 10/26/2017 B-102

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Figure D-3

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-102

Sheet 10 of 13

Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	141				0		M		GNEISS (KJm1), gray to black, phaneritic, fine to medium grained, slightly weathered to fresh, strong, hard, few iron oxide staining, sub-vertical foliation and flow banding fabric continued...				
1235	142	31		100	1	100	2		1) 5°/J/Vn-N/Ch+Py/Su/Pl/Sr 2) 20°/J/Vn/Py+Ch/Sp/Pl/Sr 3) 20°/J/Vn/No/N/Pl/Sr			43	
	143				1		3						
	144						M						
	145				0								
	146				0								
		32		100	0	100	M					60	
1230	147		10								Packer Test Interval #8		
	148				0								
					0		M						
	149						M						
	150				0								
					0								
	151	33		100	0	93			1) 15°/J/Vn/Py/Sp/Pl/Sr			38	
1225	152												
					0								
	153				3								
	154						1						
					0								
	155	34		100	0	100						50	
	156		11										
					0								
1220	157												

Report: GEO_CORE_4E; File: 60539527.GPJ; 10/26/2017 B-102

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Figure D-3

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-102

Sheet 11 of 13

Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
1220	157				0				GNEISS (KJm1), gray to black, phaneritic, fine to medium grained, slightly weathered to fresh, strong, hard, few iron oxide staining, sub-vertical foliation and flow banding fabric continued...				
	158	34		100	0	100	M					50	
	159				2		M 1 1						
	160				0								
	161	35		100	0	93			1) 30°/J/Vn-N/Py+Ch/Sp/Pl/Sr 2) 15°/J/Vn/Py+Ch/Sp/Pl/Sr 3) 25°/J/Vn/Ch/Sp/Pl/Sr 4) 35°/J/Vn/Ch/Su/Pl/R			60	
1215	162		11		2		1 2						
	163				2		3 4						
	164						M						
	165				0								
	166				1		1						
	167	36		100	1	100	2		1) 55°/J/Vn/Ca/Sp/Pl/Sr 2) 15°/J/Vn/H-Ch+Py/Sp/Pl/Sr 3) 30°/J/Vn/No/N/Pl/Sr-R 4) 5°/J/Vn/Ch+Py/Sp/Pl/Sr			50	
1210	168				1								
	169				2		3 4						
	170				1		M M 1 2						
	171	37	12	100	2	100			1) 55°/J/Vn-T/Ch/Pa/Ir 2) 30°/J/Vn/Ch+Py/Sp/Pl/Sr 3) 15°/J/N/Ch+Py/Sp/Ir/S 4) 40°/J/N/Ch+Py/Sp/Pl/S			30	
	172				0		3						
1205	173				2		4						

Packer Test Interval #9

Report: GEO_CORE_4E; File: 60539527.GPJ; 10/26/2017 B-102

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Figure D-3

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-102

Sheet 12 of 13

Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	173	37		100	0	100			GNEISS (KJm1), gray to black, phaneritic, fine to medium grained, slightly weathered to fresh, strong, hard, few iron oxide staining, sub-vertical foliation and flow banding fabric continued...			30	
	174				1		1		1) 60°/J/Vn/Cl+Py/Sp/Pl/Sr 2) 40°/J/Vn/Cl/Sp/Pl/Sr 3) 80°/J/-/Cl+Py/Sp/Pl/Sr				
	175				5+		1						
	176	38		100	5+	37			moderately weathered zone			38	
1200	177				5+								
	178		12		5+		2 M 3						
	179				2		1						
	180				1		2						
	181	39		100	2	94	3		1) 80°/J/-/Cl+Py/Sp/Pl/Sr 2) 10°/J/Vn/Cl+Py/Sp/Pl/Sr 3) 20°/J/Vn/No/N/Pl/Sr 4) 50°/J/Vn/Cl+Py/Sp/Pl/Sr 5) 30°/J/Vn/Cl+Py/Sp/Pl/Sr			54	
1195	182				2		4 5						
	183				1		M 1						
	184	40		100	3	20	2					50	
	185				3								
	186		13		2		3 4		1) 70°/J/Vn/Cl+Py/Sp/Pl/Sr 2) 10°/J/Vn/Cl+Py/Sp/Pl/Sr 3) 40°/J/T/ /Fi/Pl-Wa 4) 50°/J/T/ /Fi/Pl-Wa 5) 70°/J/Vn/Cl+Py/Sp/Pl/Sr				
1190	187				1		5						
	188				1		M						
	189	41		100		100							

Packer Test Interval #10

Report: GEO_CORE_4E; File: 60539527.GPJ; 10/26/2017 B-102

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Figure D-3

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-102

Sheet 13 of 13

Elevation, feet	Depth, feet	Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	189						NR						
					N/A				GNEISS (KJm1), gray to black, phaneritic, fine to medium grained, slightly weathered to fresh, strong, hard, few iron oxide staining, sub-vertical foliation and flow banding fabric continued...				UCS = 6,500 psi
	190				2		1						
	191						1		1) 30°/J/N/Cl+Py/Sp/Pl/Sr				
		42		94	4	77	2		2) 40°/J/Vn/Cl+Py/Sp/Pl/Sr			60	
1185	192						3		3) 35°/J/Vn/Py/Sp/Pl/Sr				
					2		4		4) 55°/J/Vn/Py+Cl/Sp/Pl/Sr				
	193		13				4						
					0								
	194												
					1		1						
	195												
					2		2						
	196												
		43		100	1	95	3		1) 10°/J/Vn/Cl+Py/Sp/Pl/Sr			60	
1180	197								2) 45°/J/N/Cl+Py/Sp/Pl/Sr				
					2				3) 60°/J/N/Cl+Py/Sp/Pl/Sr				
	198						4		4) 30°/J/Mw/Cl+Py/Sp/Pl/Sr				
							5		5) 50°/J/Vn/Cl+Py/Sp/Pl/S				
			14		0								
	199												
		44		80	0	80	M					30	
	200								Bottom of boring at 200.0 feet below ground surface. Down-hole acoustic televiewer survey and seismic velocity survey performed prior to backfilling hole.				
	201												
1175	202												
	203												
	204												
	205												

ROCK CORE

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Figure D-3

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-103

Date(s) Drilled	**8/1/17 - 8/4/17**	Logged By	**A. Avakian**	Checked By	**C. Goetz**
Drilling Method	**Wireline Coring**	Drill Bit Size/Type	**HQ3**	Total Drilled Depth/Length	**200.0 feet**
Drill Rig Type	**Longyear LF70**	Drilling Contractor	**Ruen Drilling Inc**	Approximate Surface Elevation	**1373 feet**
Groundwater Level	**12.0 ft bgs (recorded from transducer on 8/23/2017)**	Location	**N: 33.495990 W: -116.977273**	Inclination from Horizontal/Bearing	**90**
Borehole Completion	**VW Piezo tremie backfilled with Cement-Bentonite Grout**				

Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	0				N/A				**FILL** Moist, brown, silty SAND, mostly fine to medium sand, some fines				
	1				N/A								
	2	1		0	N/A	N/A	NR					100	
1370	3				N/A								
	4				N/A								
	5				N/A				contains some fine to coarse gravel and cobbles of gneissic source				
	6		1		N/A			1					
	7	2		40	N/A	N/A	NR					100	
1365	8				N/A								
	9				N/A								
	10				N/A								
	11	3		60	N/A	N/A	NR					60	
	12				N/A								
1360	13												

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Figure D-4

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-103

Sheet 2 of 13

Elevation, feet	Depth, feet	Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
				ROCK CORE									
1360	13				N/A				**FILL** Moist, brown, silty SAND, mostly fine to medium sand, some fines continued...				
	14	3		60	N/A	N/A	M					60	
	15				N/A								
	16				N/A								
	17	4		30	N/A	N/A	NR					75	
1355	18				N/A								
	19				N/A								
	20		1		N/A								
	21				N/A		NR						
	22	5		68	N/A	N/A						50	
1350	23				N/A				fractured boulder				
	24				N/A								
	25				N/A				**ALLUVIUM**				Driller communicated very soft drilling
	26				N/A								
	27	6		0	N/A	N/A	NR					60	
1345	28				N/A								
	29				N/A								

Report: GEO_CORE_4E; File: 60539527.GPJ; 10/26/2017 B-103

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Figure D-4

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-103

Sheet 3 of 13

Elevation, feet	Depth, feet	Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	29	6		0	N/A	N/A	NR		alluvium continued...			60	
	30								contains little fine to coarse gravel, some clasts are sub-rounded, metamorphic and granitic source				
	31				N/A								
	32	7		24	N/A	N/A	NR					60	
1340	33				N/A								
	34				N/A				fine to coarse gravel, mixed source rock (metamorphic and granitic)				
	35		1		N/A								
	36				N/A								
	37	8		26	N/A	N/A	NR					75	
1335	38				N/A								
	39				N/A				fine to coarse gravel, some cobbles, mixed rock type				
	40				N/A		1						
	41				1		2		**GNEISS (KJm1)**, gray to black, phaneritic, fine to medium grained, slightly weathered, strong, hard, sub-vertical foliation and flow banding fabric				
	42	9	2	100	1	93	3		1) 30°/J/-/Ch/Sp/Pl/Sr 2) 5°-10°/J/Vn-N/Ch/Sp/Pl/Sr 3) 60°/J/Vn/Py/Sp/Pl/R 4) 45°/J/Vn/Py+Ch/Sp/Pl/Sr-R			38	
1330	43				2		2						
	44				1		4						
	45						4						
							M						

Report: GEO_CORE_4E; File: 60539527.GPJ; 10/26/2017 B-103

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Figure D-4

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-103

Sheet 4 of 13

Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	45								GNEISS (KJm1), gray to black, phaneritic, fine to medium grained, slightly weathered, strong, hard, sub-vertical foliation and flow banding fabric continued...				
	46								1) 80°-90°/Fo-J/Vn/Fe/Sp/Pl-Wa/Sr				
									2) 10°/J/Vn/Ca+Ch/Sp/Pl/Sr				
									3) 45°/J/Vn/No/N/Pl/Sr				
	47								4) 70°/J/Vn-N/Ca+Ch/Sp/Pl/Sr-R				
									5) 15°/J/Vn/Fe/Sp/Pl/Sr				
									6) 45°/J/Vn/No/N/Pl/Sr				
									7) 80°/J/Vn/Fe/Sp/Pl/Sr-R				
									8) 20°/J/Vn/Fe/Sp/Pl-Ir/R				
									9) 40°-50°/J/Vn/Fe+Ch/Sp/Pl/Sr				
		10		100	5	53						38	
1325	48								becomes slightly weathered to fresh				
					1								
	49												
					5								
	50		2										
					1								
	51								1) 20°/J/Vn-N/Ch+Py/Sp/Pl/Sr-R				
					1				2) 10°/J/Vn/Ch/Sp/Pl/R				
									3) 20°/J/Vn/No/N/Pl/Sr				
	52												
		11		100	2	90						43	
1320	53												
					0								
	54												
					0								
	55												
					0								
	56												
					0								
	57								1) 10°/J/Vn/Py/Sp/Pl/Sr				
		12		100	2	97						50	
1315	58		3										
					0								
	59												
					0								
	60												
		13		100	1	97						50	
	61												

Packer Test Interval #1

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Figure D-4

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-103

Sheet 5 of 13

Elevation, feet	Depth, feet	Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	61												
	62				2		1 2		GNEISS (KJm1), gray to black, phaneritic, fine to medium grained, slightly weathered to fresh, strong, hard, sub-vertical foliation and flow banding fabric continued...				
1310	63	13		100	2	97	3 4 5		1) 10°/J/Vn/Ch/Sp/Pl/Sr 2) 15°/J/Vn/Ch+Py/Sp/Pl/Sr 3) 15°/J/Vn/Ch/Sp/Pl/Sr 4) 70°/J/Vn/H/-/Pl/- 5) 70°/J/Vn/Ch/Sp/Pl/Sr-R 6) 20°/J/Vn/Py/Sp/Pl/Sr 7) 70°/J/Vn/H/-/Pl/-			50	
	64		3		2		6 7						
	65				1		M						
	66	14		100	4	73	1 2 1 3 4		1) 30°/J/Vn/Ch/Sp/Pl/Sr 2) 20°/J/Vn/Ch/Sp/Pl/Sr 3) 35°/J/Vn/Ch/Sp/Pl/Sr 4) 35°/J/Vn/Ch/Sp/Pl/Sr		Packer Test Interval #2	50	
	67				1								
1305	68				1								
	69				2		1 2						
	70	15		100	3	70	3 3 3		1) 65°/J/Vn/No/N/Pl/R 2) 20°/J/Vn/Ch/Sp/Pl/Sr 3) 25°-30°/J/Vn/Ch+Py/Sp/Pl/Sr 4) 80°-85°/J/N/Ch+Mn+Fe/Su/Pl/Sr 5) 10°/J/Vn/Ch/Su/Pl/Sr			60	
	71				2		3 4 5						
	72				2								
	73		4		3		5 M 1		becomes slightly weathered				
1300	74	16		100	4	37	2 3 4 5		1) 70°/J/Vn/Ch/Sp/Pl/Sr 2) 75°/J/Vn/No/N/Pl/Sr 3) 75°/J/Vn/No/N/Pl/Sr 4) 45°/J/Vn/Ch+Mn/Su/Pl/Sr 5) 30°/J/Vn/No/N/Pl/Sr-R 6) 75°/J/Vn/Fe/Sp/Pl/Sr 7) 50/J/Vn-N/Fe/Sp/Pl/Sr 8) 75°/J/-/Fe/Sp/Pl/Sr			50	
	75				6		6 7 8 1						
	76	17		100	5	27	1 2 1 3		1) 15°-25°/J/Vn/Fe+Ch/Su/Pl/Sr 2) 50°/J/Vn/Fe+Ch/Sp/Pl/Sr 3) 80°/J/Vn/Fe+Ch/Su/Pl/Sr 4) 80°/J/Vn/Fe+Ch/Sp/Pl/Sr			33	
	77												

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Figure D-4

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-103

Sheet 6 of 13

Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	77						1		5) 40°/J/Vn/Ch/Sp/Pl/R				
					6		4						
1295	78						3		GNEISS (KJm1), gray to black, phaneritic, fine to medium grained, slightly weathered, strong, hard, sub-vertical foliation and flow banding fabric continued...				
		17		100	5	27	1					33	
	79		4				1						
					5		5						
							3						
	80						1		1) 15°-25°/J/Vn-N/Fe+Ch/Sp/Pl/Sr-R 2) 35°-45°/J/Vn-N/Fe+Ch/Sp/Pl/Sr-R 3) 85°-90°/J/Vn/Ch+Fe/Sp/Pl/Sr				
					4		1						
	81						1						
					4+		2						
							1						
	82	18		93		9			very intensely fractured zone			34	
					5+		1						
1290	83						2						
							3						
					5+		1						
	84												
					N/A		NR						
	85						1		1) 30°/J/-/No/N/Pl/R 2) 40°/J/Vn/Ch/Sp/Pl/Sr 3) 70°/J/Vn/No/N/Pl/R 4) 70°-90°/J/Vn/No/N/Pl/Sr				
							2						
		19		100	5+	17	3					40	
							1						
	86						4						
					5+		1						
	87	20	5	100		0						60	
					6+		1		very intensely fractured zone 1) 30°-45°/J/Vn-N/Fe+Ch/Sp/Pl/Sr 2) 70°-80°/J/Vn-N/Fe+Ch/Sp/Pl/Sr				
							2						
1285	88						1						
					5+		3						
							2						
	89	21		100		13	3					60	
					4+				1) 70°-80°/J/Vn/Fe/Sp/Pl/Sr 2) 70°-80°/Fo-J/Vn/Fe/Sp/Pl-Wa/Sr 3) 10°-30°/J/Vn/Fe/Sp/Pl/Sr 4) 65°/J/Vn/Fe/Sp/Pl/Sr				
	90						3						
							3						
					3+		2						
	91						4		very intensely fractured				
					3+								
	92						1						
		22		100		48	1		1) 20°/J/Vn-N/No/N/Pl/Sr 2) 10°/J/Vn/No/N/Pl/Sr-R 3) 80°-85°/J/Vn/Fe+Ch/Sp/Pl/Sr 4) 80°-85°/J-Fo/Vn/Fe+Ch/Sp/Pl-Wa/Sr			70	
					3								
1280	93												

Packer Test Interval #3

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Figure D-4

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-103

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Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
1280	93				4+		2 3 2 2		GNEISS (KJm1), gray to black, phaneritic, fine to medium grained, slightly weathered, strong, hard, sub-vertical foliation and flow banding fabric continued...				
	94	22	5	100	3+	48	4 2 M					70	
	95				2+		2 1		1) 10°/J/Vn/Ch/Sp/Pl/Sr 2) 80°-90°/Fo-J/Vn/Ch/Su/Pl-Wa/Sr 3) 40°-50°/J/Vn/Mn+Ch/Su/Pl/Sr 4) 70°/J/Vn/Ch/Sp/Pl/Sr 5) 10°/J/Vn/Ch+Mn/Su/Pl/Sr 6) 80°-90°/J/Vn/Fe/Sp/Pl/Sr 7) 70°-75°/J/N-Mw/Ch+Cl+Fe/Fi/Pl/Sr 8)75°/J/Vn/-/-/Pl/Sr-R				
	96						4 3 5						
	97	23		100	6+	23	3 6 7					48	
1275	98				5+		8 7 3						
	99				5+								
	100	24		100	4+	11	111 2 3		Foliation parallel shear/gouge; very intensely fractured with clay and chlorite infilling 1) 80°-90°/Sh-Fo/W-Mw/Cl/Fi/Pl/Slk - Foliation parallel shear/gouge 2) 60°/J/N/Ch+Cl/Su/Pl/Sr			36	
	101				4+		4 5		3) 40°/J/Vn/No/N/Pl/R 4) 30°/J/Vn/No/N/Pl/R 5) 70°/J-Fo/Vn-N.Ch+Cl/Su/Pl/Sr 6) 45°/J/Vn/-/-/Pl/Sr				
	102		6		4+		6 5		moderately weathered zone, medium strong, modertely soft to moderately hard				
1270	103	25		100	N/A 2	69	1 1		1) 20°/J/Vn/Ch+Fe/Sp/Pl/Sr 2) 60°-90°/Fo-J/ Vn-T/Fe/Sp/Pl-Wa/Sr			60	
	104				1		2 M						
	105						M 1		1) 85°/J/Vn/Fe/Sp/Pl/Sr				
	106	26		100	5 4	63	2 3 4		2) 40°/J/Vn/Ch+Fe/Sp/Pl/Sr 3) 75°/J/Vn/Ch/Sp/Pl/Sr 4) 25°/J/Vn/Ch/Sp/Pl/R 5) 85°/J/Vn/Ch+Fe-H/Sp/Pl/Sr			75	
	107				2		5						
1265	108	27		100	5+	63	M 1 2		very intensely fractured zone of slickensided shear surfaces, 1"- 2" wide			50	
	109		7										

Packer Test Interval #4

Report: GEO_CORE_4E; File: 60539527.GPJ; 10/26/2017 B-103

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Figure D-4

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-103

Elevation, feet	Depth, feet	Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	109						1		very intensely fractured zone of slickensided shear surfaces, 1"- 2" wide				
					3+		3		GNEISS (KJm1), gray to black, phaneritic, fine to medium grained, slightly weathered, strong, hard, sub-vertical foliation and flow banding fabric continued...				
	110	27		100	1	63			1) 85°/Sh/N-Mw/Ch+Fe-H/Sp/Pl/Slk			50	
							3		2) 15°/J/Vn/No/N/Pl/Sr				
	111				3		4		3) 30°/J/Vn/Fe+Mn/Su/Pl/Sr 4) 45°/J/Vn/Ch+Cl/Fi/Pl/Sr				
							3		5) 5°/J/Vn-N/Fe+Ch/Sp/Pl/R				
	112				2		5		6) 25°/J/-/No/N/Pl/Sr				
							6						
1260	113								becomes slightly weathered to fresh				
		28		100	0	100						76	
	114								1) 30°/J/Vn/Mn+Py/Sp/Pl/Sr				
					1		1						
	115		7				M						
					0								
	116												
					0								
							M						
	117						1		1) 25°/J/Vn/Ch+Mn/Sp/Pl/Sr				
		29		100	5	92	2		2) 40°/J/Vn/Ch+Mn/Su/Pl/Sr 3) 10°/J/Vn/Ch+Mn/Su/Pl/Sr			60	
							3		4) 45°/J/Vn/Ch/Su/Pl/Sr				
1255	118												
					1								
	119						4						UCS = 13,900 psi
					1								
	120						3						
					0								
	121												
					0								
	122												
		30		100	1	100	1		1) 15°/J/Vn/Ch/Su/Pl-Ir/Sr 2) 35°/J/Vn/Ch/Su/Pl/Sr			75	
1250	123												
					1		2						
	124		8										
					0								
	125												

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Figure D-4

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-103

Sheet 9 of 13

Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	125						M 1		GNEISS (KJm1), gray to black, phaneritic, fine to medium grained, slightly weathered to fresh, strong, hard, sub-vertical foliation and flow banding fabric continued...				
	126	31		100	1 / 0	100			1) 20°/J/Vn/Mn+Ch/Su/Pl/Sr 2) 20°/J/Vn/Py/Sp/Pl/Sr		Packer Test Interval #5	76	
	127				2		2						
1245	128						M 1		1) 35°/J/Vn/Ch/Su/Pl/Sr 2) 35°/J/Vn/H/-/Pl/Sr 3) 55°/J/Vn/Ch/Sp/Pl/Sr 4) 60°/J/Vn-T/H/-/Pl/Sr 5) 50°/J/-/Ch/Su/Pl/Sr				
	129				0		1						
	130	32	8	100	3 / 1	95	2 / 2 / 1					N/A	
	131				2		2 / 3						
	132				3		4						
1240	133						5 / 1		1) 30°/J/Vn/No/N/Pl/Sr 2) 65°/Fo-J/Vn/Fe/Sp/Pl/Sr 3) 5°-10°/J/Vn/Py+Ch/Su/Pl/Sr				
	134	33		100	2 / 3	60	2					N/A	
	135						3						
	136				1 / 2		1 / 2		1) 35°/J/Vn/Py/Sp/Pl/Sr-R 2) 10°/J/Vn/Py/Sp/Pl/Sr				
	137	34		100	1	100	2 / 1					75	
1235	138				0								
	139		9		0								
	140												
	141	35		100	1	53	1					N/A	

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Figure D-4

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-103

Sheet 10 of 13

Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	141						2		GNEISS (KJm1), gray to black, phaneritic, fine to medium grained, slightly weathered to fresh, strong, hard, sub-vertical foliation and flow banding fabric continued...				
	142				2								
					6		3 1 4 5		1) 20°/J/Vn-N/Ch/Su/Pl/Sr-R 2) 60°/J/Vn-Mw/Ch/Su/Pl/Sr 3) 5°/J/Vn/Fe/Sp/Pl/R 4) 50°/J/Vn/Ch+Fe/Sp/Pl/Sr				
1230	143	35		100	5	53	10 6 7 6		5) 70°-90°/J/Vn-N/Ch/Su/Wa/Sr-R 6) 30°-50°/V-J/W/Qz/Fi/Pl/Sr 7) 60°/J/Vn/Ch/Su/Pl/Sr 8) 70°/J/N/Ch+Cl/Fi/Pl/Sr			N/A	
	144				4+		7 8 9		9) 30°/J/Vn/Ch/Su/Pl/Sr 10) 45°/J/Vn/No/N/Pl/Sr				
	145		9		3		1		1) 75°/Fo-J/Vn/No/N/Pl/Sr				
	146	36		100	2	87	2 3 4		2) 10°/J/Vn/Py/Sp/Pl/Sr-R 3) 5°/J/Vn/Ch+Py/Sp/Pl/Sr 4) 15°/J/Vn/Py/Sp/Pl/Sr		Packer Test Interval #6	50	
	147				1		M						
1225	148				0		1		1) 5°/J/Vn/Ch/Sp/Pl/Sr 2) 55°/J/Vn/Py/Sp/Pl/Sr				
	149				0								
	150	37		100	1	100	2 M M					60	
	151				0								
	152				0		M						
1220	153				1								
		38		100		100						76	
	154		10		0		1		1) 5°/J/Vn/Ca/Su/Pl/R				
	155						M M						
					1		1		1) 20°/J/Vn/Ch+Py/Sp/Pl/Sr 2) 50°/J/Vn/Ch+Py/Sp/Pl/Sr				
	156	39		100		98						50	
					1		1						
	157												

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Figure D-4

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-103

Sheet 11 of 13

Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	157				1		1		GNEISS (KJm1), gray to black, phaneritic, fine to medium grained, slightly weathered to fresh, strong, hard, sub-vertical foliation and flow banding fabric continued...				
1215	158	39		100	1	98	1		1) 20°/J/Vn/Ch+Py/Sp/Pl/Sr 2) 50°/J/Vn/Ch+Py/Sp/Pl/Sr			50	
	159				3		1 2						
	160		10				2						
	161				1		1		1) 30°/J/Vn/Py+Ca/Sp/Pl/Sr 2) 10°/J/Vn/Py/Sp/Pl/Sr				
	162	40		100	2	97	1					75	
1210	163				0		2						
	164				1		2						
	165				1		M						
	166	41		100	1	100	1		1) 10°/J/Vn/Py/Sp/Pl/Sr 2) 60°/J/Vn/Ch+Py/Sp/Pl/Sr			50	
	167				0		2						
	168		11		1		M						
1205	169				1		1 M		1) 70°/J/Fo-J/Vn/Py/Sp/Pl/Sr 2) 15°-20°/J/Vn/Py/Sp/Pl/Sr 3) 70°/J/Vn/Py+Ch/Sp/Pl/Sr 4) 85°/J/Vn/Ch+Cl/Fi/Pl/Sr 5) 75°/J/Vn/Ch+Mn/Su/Pl/Sr-R				
	170	42		100	4	80	2 3 2					60	
	171				0								
	172				2		M 4						
					3		5 M						
1200	173	43		100		93	1						

Packer Test Interval #7

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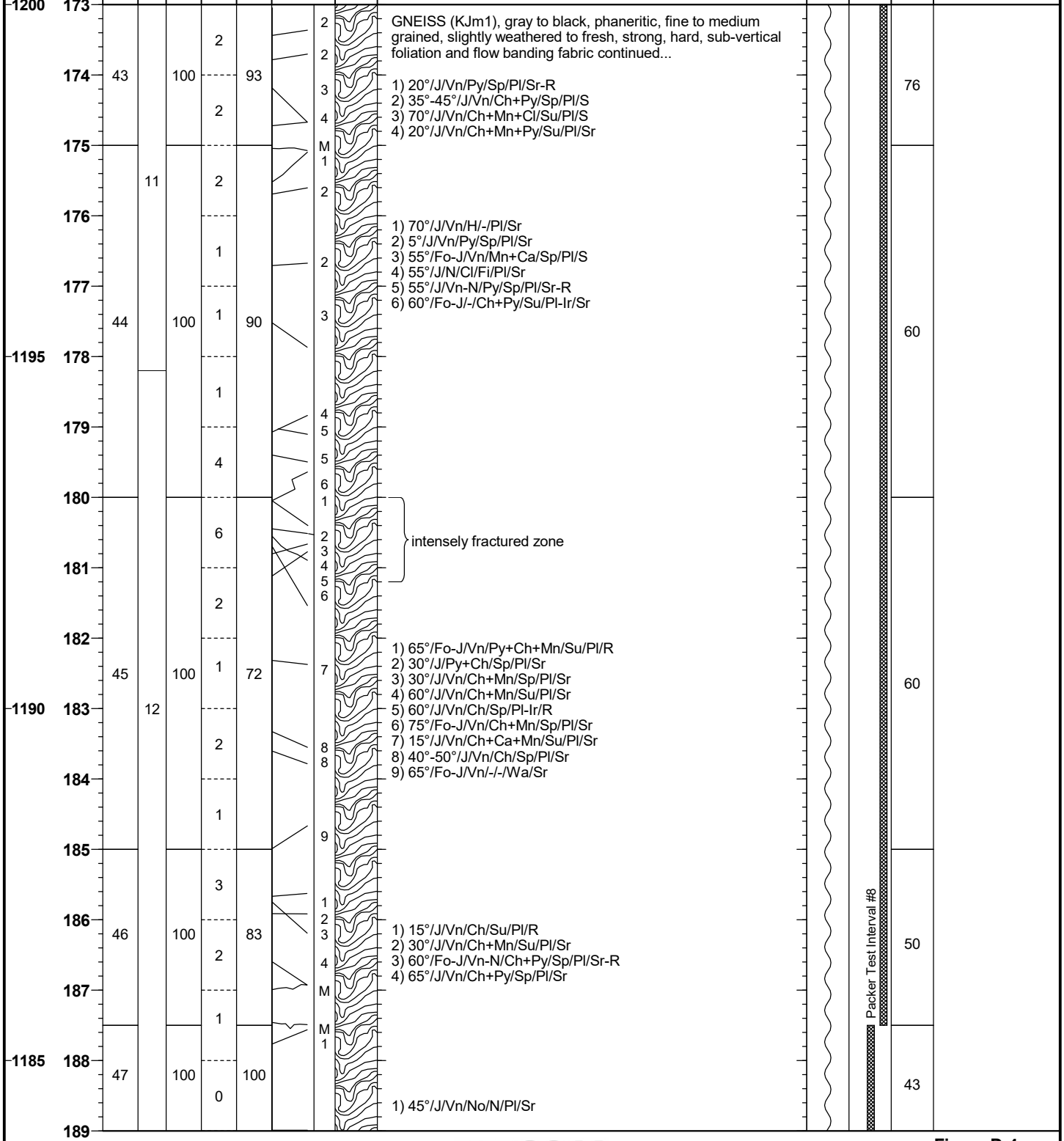
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Figure D-4

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-103

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Figure D-4

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-103

Sheet 13 of 13

Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	189												
	190								GNEISS (KJm1), gray to black, phaneritic, fine to medium grained, slightly weathered to fresh, strong, hard, sub-vertical foliation and flow banding fabric continued...				
		47	12	100	0	100	M					43	
	191				0		2		2) 20°/J/Vn/No/N/Pl/R				
	192				1								
					0		M						
1180	193						M						
		48		100	0	100						76	
	194				1		1		1) 40°/J/Vn/Ch/Sp/Pl/Sr				
	195						1						
					2				1) 50°/J/Vn/No/N/Pl/Sr 2) 10°/J/Vn/Fe+Py/Sp/Pl/Sr 3) 30°/J/Vn/No/N/Pl/Sr 4) 55°/J/Vn/Py+Ch/Sp/Pl/Sr 5) 40°-45°/J/Vn-N/Ch/Sp/Pl/Sr 6) 20°/J/N/Ch/Su/Pl/R 7) 60°/J/N-Mw/Cl/Fi/Pl/Sr-R 8) 70°/J/Vn/Ch/Su/Pl/Sr				
	196		13										
					0								
	197												
		49		100	1	72	2					50	
1175	198						3						
					5		4						
	199						5						
							6		} very intensely fractured zone with clay infilling				
					5+		7						
	200						8						
							M						
									Bottom of boring at 200.0 feet below ground surface. Down-hole acoustic televiewer and seismic velocity survey completed. Vibrating wire transducer installed at approximately 195 feet below ground surface.				
	201												
	202												
1170	203												
	204												
	205												

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Figure D-4

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-104

Sheet 1 of 10

Date(s) Drilled	**7/22/17 - 7/25/17**	Logged By	**A. Avakian**	Checked By	**C. Goetz**
Drilling Method	**Wireline Coring**	Drill Bit Size/Type	**HQ3**	Total Drilled Depth/Length	**150.0 feet**
Drill Rig Type	**Longyear LF70 - Helo Access**	Drilling Contractor	**Ruen Drilling Inc**	Approximate Surface Elevation	**1465 feet**
Groundwater Level	**Not Measured**	Location	**N: 33.496395 W: -116.977255**	Inclination from Horizontal/Bearing	**90**
Borehole Completion	**Tremie Backfilled with Cement-Bentonite Grout**				

Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
1465	0				N/A		NR		**FILL** Moist, brown, silty SAND with gravel, mostly fine sand, some fines, little fine to coarse gravel				
	1				5		1 M 1 2		**GNEISS (KJm1)**, very dark gray to very dark grayish brown, phaneritic, fine to medium grained, moderately weathered, moderately strong to strong, weak, sub-vertical foliation				
	2	1		78	4	45	1 1 M 3		1) 5°-10°/J/Vn-N/Fe/Sp/Pl/Sr-R			N/A	
	3				3		M 4 5 4		2) 50°/J/Vn/Fe/Su/Pl/Sr 3) 60°/J/Vn/Fe-H/-/Pl/Sr 4) 20°/J/Vn/Fe/Su/Pl/Sr				
	4				4		4 3 6 6 6		5) 40°/J/Vn/Fe/Sp/Pl/R 6) 30°/J/Vn/Fe/Su/Pl/Sr				
1460	5				3		1 2						
	6		1		1		3 M						
	7						8 1						UCS = 2,500 psi
		2		100	2	85	M 4		1) 80°/J/Vn/Fe/Su/Pl/Sr 2) 30°/J/Vn-N/Fe/Su/Pl/Sr			60	
	8						M M		3) 30°/J/Vn-N/Fe+Sd/Sp/Pl/R 4) 85°-90°/J/Vn/Fe/Su/Pl/Sr				
					2				5) 70°/J/Vn/Fe/Sp/Pl/S 6) 15°/J/Vn/H/-/Pl/Sr				
	9						6 7		7) 60°/J/Vn/Fe/Su/Pl/Sr 8) 75°-90°/Fo-J/T/H/-/Pl-Wa/Sr				
					3		4						
1455	10						M 1 2				Packer Test Interval #1		
	11				2								
		3		92	2	47	3		1) 80°-90°/J/Vn/Fe/Su/Pl/Sr 2) 80°/J/Vn/Fe/Su/Pl/Sr			60	
	12								3) 60°/J/Vn/Fe/Su/Pl/Sr 4) 20°-35°/J/Vn/Fe/Sp/Pl/Sr-R				
					2		4		5)15°/J/Vn/Fe/Su/Pl/Sr				
	13						4						

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Figure D-5

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-104

Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	13								GNEISS (KJm1), very dark gray to very dark grayish brown, phaneritic, fine to medium grained, moderately weathered, moderately strong to strong, moderately hard, sub-vertical foliation continued ...				
	14	3	1	92	4 N/A	47	NR					60	
1450	15				2+				1) 60°/J/Vn-N/Fe/Su/Pl/Sr 2) 85°-90°/V/Mw/Qz/Fi/Pl-Wa/Sr-R				
	16				0								
	17	4		88	N/A	29			becomes slightly weathered, strong, dark gray to very dark gray, moderately hard to hard, few dark greenish gray staining			48	
	18				N/A		NR						
	19				6								
1445	20				4								
	21	5	2	100	0	75			1) 40°-55°/J/Vn/Fe/Su/Pl/Sr 2) 85°/J/Vn/Fe/Su/Pl/Sr 3) 15°/J/Vn/Fe/Su/Pl/Sr 4) 90°/J/Vn/Fe/Su/Pl/Sr 5) 10°-50°/J/Vn/H/-/Pl-St/Sr 6) 60°/J/Vn/H-Fe/Su/Pl/Sr			43	
	22				0								
	23				2+								
	24	6		100	3	50			1) 20°/J/Vn/Fe/Su/Pl/Sr 2) 85°/J/Vn/Fe/sp/Pl/Sr			60	
1440	25				2								
	26				4								
	27	7		100	1	81			1) 10°/J/Vn-N/Fe/Su/Pl/Sr-R 2) 20°-80°/J/Vn/Fe/Su/Pl/Sr 3) 30°/J/Vn/Fe/Sp/Wa/R 4) 45°/J/Vn/Fe/Su/Pl/Sr			54	
	28				3								
	29												

Report: GEO_CORE_4E; File: 60539527.GPJ; 10/26/2017 B-104

Figure D-5

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

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Sheet 3 of 10

Elevation, feet	Depth, feet	Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	29	7	2	100	3	81	2 4 M 1		GNEISS (KJm1), very dark gray to very dark grayish brown, phaneritic, fine to medium grained, slightly weathered, strong, moderately hard to hard, sub-vertical foliation continued... 1) 40°/J/Vn/Fe/Su/Pl/Sr			54	
		8		100		100						30	
1435	30				0								
	31				2		1 2						
	32	9		100	3	88	3 6 3 2 3		1) 35°/J/Vn/N/Fe/Sp/Pl/R 2) 30°-35°/J/Vn/Fe/Su/Pl/Sr 3) 5°-10°/J/Vn/Fe/Su/Pl/Sr 4) 25°/J/Vn/Fe/Sp/Pl/Sr-R 5) 55°/J/Vn/Fe/Su/Pl/R 6) 85°/J/Vn/Fe/Su/Pl/Sr-R			60	
	33				1								
	34				2		4 5						
1430	35						1 1 2						
	36		3		4		1 3						
	37				3		4						
		10		100	2	53	5		1) 30°/J/Vn/Fe/Su/Pl/Sr 2) 70°/J/T/H/-/Pl/- 3) 50°/J/Vn/Fe/Su/Pl/Sr 4) 60°/J/Vn/Fe/Su/Wa/R 5) 35°/J/Vn/Fe/Sp/Pl/R 6) 85°/J/Vn/Fe/Su/Pl/Sr 7) 70°/J/Vn/Fe/Su/Pl/Sr			75	
	38				2		6						
	39				4		1 1 7						
1425	40				3+		7 1 2		1) 70°/J/Vn/Fe/Su/Pl/Sr 2) 55°/J/Vn/Fe/Su/Pl/Sr 3) 10°/J/Vn/Fe/Su/Pl/Sr 4) 35°/J/Vn/Fe/Su/Pl/Sr 5) 50°/J/Vn/Fe/Su/Pl/Sr 6) 50°/J/Vn/Fe/Su/Pl/Sr				
	41						3						
		11		100	4+	42	4					91	
	42				5		2 5 6		very intensely fractured zone				
	43				N/A		4						
		12	4	100		21	M M 1		1) 60°/J/Vn/Fe/Su/Pl/Sr 2) 75°/J/Vn/Fe/Su/Pl/Sr			61	
					5+								
1420	45						2						

Report: GEO_CORE_4E; File: 60539527.GPJ; 10/26/2017 B-104

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Figure D-5

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-104

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Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
1420	45				3+		1 1 1		GNEISS (KJm1), very dark gray to very dark grayish brown, phaneritic, fine to medium grained, slightly weathered, strong, moderately hard to hard, sub-vertical foliation continued...				
	46				2								
	47	13		100	3	67	2 3		1) 30°/J/Vn/Fe/Su/Pl/Sr 2) 45°/J/Vn/Fe/Su/Pl/Sr 3) 60°/J/Vn/Fe/Su/Pl/Sr			75	
	48				4		2						
	49				2		2 1 3						
1415	50		4		3+		1 2				Packer Test Interval #3		
	51				2		2 3						
	52	14		96	3	57	M 4 4		1) 60°/J/Vn/Fe/Su/Pl/Sr 2) 20°-30°/J/Vn-N/Fe/ /Sr-R 3) 80°-90°/J/Vn/Fe/Su/Pl-Wa/Sr-r 4) 5°-10°/J/Vn/Fe/Sp/Pl/Sr-R 5) 65°/J/Vn/Fe/Su/Pl/Sr-R 6) 60°/J/Vn/Fe/Su/Pl-Wa/Sr-R 7) 90°/J/Vn/Fe/Su/Pl/Sr-R			30	
	53				4		M 2 4 5						
	54				2		2 6 7						
1410	55						NR						
	56				3		1						
	57	15		100	5	62	2 1 2 2 3 2		1) 65°-70°/J/Vn/Fe/Su-Sp/Pl/Sr 2) 20°/J/Vn/Fe/Su/Pl/Sr 3) 45°/J/Vn/Fe/Su/Pl/Sr 4) 75°/J/Vn/Fe/Sp/Pl/Sr 5) 15°/J/Vn/Fe/Sp/Pl/Sr 6) 10°/J/N/Cl+ ... /Ir/R			60	
	58				3								
	59		5		2		1 3 4						
	60				3		6 5						
1405	61	16		109	3	67	1 2 1					45	

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Figure D-5

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-104

Sheet 5 of 10

Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	61												
	62	16		109	5+	67			GNEISS (KJm1), very dark gray to very dark grayish brown, phaneritic, fine to medium grained, slightly weathered, strong, moderately hard to hard, sub-vertical foliation continued... 1) 25°/J/Vn/Fe/Su/P/Sr 2) 55°-60°/J/N/Fe/Sp/Pl/R 3) 60°/J/Vn/Fe-H/Su/Pl/Sr			45	
	63				5				4) 65°/J/Vn/Fe/Su/Pl/Sr 5) 65°/J/Vn/Fe/Su/Pl/Sr 6) 10°-15°/J/Vn/H/-/Pl/Sr-R 7) 85°-90°/J/Vn/H/-/Pl/Sr-R 8) 60°/J/Vn/Fe/Sp/Pl/Sr				
	64				1+								UCS = 12,000 psi
1400	65		5		5								
	66				1								
	67	17		100	2	90			1) 30°/J/Vn/Fe/Sp/Pl/R 2) 35°-45°/J/Vn/Fe/Su/Pl/St 3) 20°/J/Vn/Fe/Sp/Pl/Sr 4) 70°-90°/Fo-J/Vn-T/Fe/Sp/Pl-Wa/Sr			60	
	68				1								
	69				1								
		18		100		100						30	
1395	70				2						Packer Test Interavl #4		
	71				4								
	72	19		100	3	68			1) 15°-25°/J/Vn/Fe/Su/Pl/Sr 2) 40°-45°/J/Vn/Fe/Su-Sp/Pl/Sr-R 3) 60°-90°/J/Vn/Fe/Su/Pl/Sr 4) 25°/J/Vn/Fe/Su/Pl/Sr-R 5) 25°/J/N/Fe/Sp/Pl/R 6) 70°/J/Vn/Fe/Su/Pl/Sr-R			50	
	73		6		2								
	74				4+								
1390	75												
	76	20		100	4	68						50	
	77				3								

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Figure D-5

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-104

Sheet 6 of 10

Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	77						1						
					5		2 1		GNEISS (KJm1), very dark gray to very dark grayish brown, phaneritic, fine to medium grained, slightly weathered, strong, moderately hard to hard, sub-vertical foliation continued...				
	78						1						
		20		100	3	68	1						
							5		1) 40°-50°/J/Vn/Fe/Su/Pl/Sr			50	
	79						5		2) 80°-90°/J-Fo/Vn-T/Fe-H/Su/Pl-Wa/Sr				
									3) 10°/J/N-Mw/Fe/Sp/Pl/R				
					1		1		4) 10°/J/Vn/Fe/Su/Pl/Sr				
1385	80								5) 30°/J/Vn/Fe/Su/Pl/Sr				
			6										
					1		1						
	81						1						
							2						
					3		3						
	82						2						
		21		100	3	90	2						
							2		1) 40°/J/Vn/Fe/Sp/Pl-Ir/Sr-R			60	
	83								2) 25°-35°/J/Vn/Fe/Su/Pl/Sr				
					0				3) 50°/J/Vn/Fe/Su/Pl/Sr				
									4) 40°/J/Vn/Fe/Su/Pl/Sr				
	84												
					2		4						
1380	85						4						
							1						
					3				1) 70°/J/Vn/Fe/Su/Pl/Sr				
	86						2		2) 25°-35°/J/Vn/Fe/Su/Pl/Sr				
									3) 40°/J/Vn/Fe-H/-/Pl-Ir/Sr				
									4) 60°/J/Vn/Fe/Su/Pl/Sr				
					5		2		5) 10°/J/Vn/Fe/Su/Pl/Sr-R				
							2		6) 75°/J/Vn/Fe/Su/Pl/Sr				
	87						3		7) 80°-90°/J/T/Fe-H/-/Pl-St/Sr-R				
							7						
		22		100	6	68	2						
							4					50	
							2						
	88						2						
							4						
			7		3								
							5						
	89						6						
					2		M						
1375	90						M						
							1						
					3		2		1) 50°/J/Vn/Fe/Su/Pl/Sr				
	91						3		2) 15°/J/N-Mw/Fe/Su/Pl/Sr				
									3) 60°-70°/J/Vn/Fe-H/Su/Pl/Sr				
		23		100	2	87	4		4) 15°-25°/J/Vn/Fe/Su/Pl/Sr				
									5) 10°/J/Vn-Mw/Fe/Su/Pl/Sr			60	
	92						4						
					4		4						
							4						
	93						5						

Packer Test Interval #5

Report: GEO_CORE_4E; File: 60539527.GPJ; 10/26/2017 B-104

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Figure D-5

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-104

Sheet 7 of 10

Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	93								GNEISS (KJm1), very dark gray to very dark grayish brown, phaneritic, fine to medium grained, slightly weathered, strong, moderately hard to hard, sub-vertical foliation continued...				
	94	23		100	0 2	87	3 6		6) 5°/J/Vn/Fe/Sp/Pl/R			60	
1370	95		7				M						
	96				2 1		1		1) 40°/J/Vn/Fe/Su/Pl/Sr-R 2) 80°-90°/J/Vn/Fe/Su/Wa/Sr 3) 55°/J/Vn/Fe/Su/Pl-Wa/Sr-R				
	97				1		M		4) 75°/J/Vn/Fe/Su/Pl/Sr 5) 30°/J/Vn/Fe/Sp/Pl-St/R				
	98	24		100	2	85	1 2					60	
	99				2		3 1 1						
	100				4		4 5 1		becomes strong, hard				
1365	101				1 1		1		1) 60°//J/Vn/Fe/Su/Pl/Sr-R 2) 30°/J/Vn/Fe/Su/Pl/Sr 3) 30°/J/Vn/Fe/Su/Pl/Sr 4) 85°-90°/J/Vn/Fe-H/Su/Pl/Sr-R				
	102						2						
	103	25	8	104	1 4	98	2 3					60	
	104				0		4 3						
1360	105						M 8						
	106				1 5		1		1) 15°-85°/J-Fo/Vn/Fe-H/-/Pl-Ir/Sr 2) 70°-90°/J-Fo/Vn/Fe-H/Su/Pl-Wa/Sr 3) 10°/J/Vn/Fe/Sp/Pl/Sr 4) 55°/J/T/Fe-H/Su/Pl/Sr				
	107	26		96		83	2 3					N/A	
	108				5 2		3 4						
	109												

Report: GEO_CORE_4E; File: 60539527.GPJ; 10/26/2017 B-104

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Figure D-5

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-104

Sheet 8 of 10

Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	109												
		26		96	3	83			GNEISS (KJm1), very dark gray to very dark grayish brown, phaneritic, fine to medium grained, slightly weathered, strong, moderately hard to hard, sub-vertical foliation continued...			N/A	
1355	110		8						5) 60°/J/Vn/Fe/Su/Pl/Sr 6) 30°/J/Vn/No/N/Pl/Sr 7) 85°/J-Fo/T/H/-/Pl/Sr 8) 15°/J/Vn-N/Fe/Su/Pl/Sr-R				
					2								
	111								1) 85°/J/T/H/-/Pl/Sr 2) 50°/J/T/H/-/Pl/Sr 3) 5°/J/Vn/Fe/Sp/Pl/Sr 4) 30°/J/Vn/Fe-H/-/Pl/Sr 5) 15°/J/Vn/Fe/Su/Pl/Sr 6) 65°/J/Vn/Fe/Su/Pl/Sr 7) 30°/J/Vn/Fe/Su/Pl/Sr 8) 30°/J/T/Fe-H/Wa/- 9) 55°/J/Vn/Fe/Su/Pl/Sr 10) 70°/J/Vn/Fe/Su/Wa/Sr 11) 80°-90°/J/Vn/Fe/Su/Wa/Sr 12) 10°-15°/J/Vn/Fe+Cl/Su/Pl/S 13) 15°/J/Vn/Fe/Su/Pl/Sr 14) 15°/J/Mw/Cl+Sd/Fi/Pl/S-Sr				
	112				7								
		27		104	3	54						50	
	113				5+								
	114												
					6+								
1350	115												
					5								
	116												
					3								
	117								1) 70°/J/T-Vn/Fe-H/Su/Pl/Sr 2) 60°/J/Vn/Fe/Su/Pl/Sr-R 3) 85°-90°/J/T/H/-/-/-				
		28		100	3	72			4) 10°/J/Vn/Fe/Su/Pl/Sr 5) 55°/J/Vn/Fe/Su/Pl/Sr 6) 70°-80°/J/Vn-N/Fe/Su/Pl/Sr			60	
	118		9						7) 25°/J/Vn/Fe/Sp/Pl/R 8) 10°/J/Vn/Fe/Su/Pl-Ir/Sr-R 9) 30°/J/Vn/Fe/Sp/Pl/Sr				
					2+								
	119												
					3								
1345	120												
					5								
	121								1) 50°/J/Vn/Fe-H/-/Pl/Sr 2) 20°-30°/J/Vn-N/Fe/Su/Pl/Sr 3) 25°/J/Vn-N/Fe/Su/Pl-Ir/Sr				
					5				4) 85°-90°/J/Vn/Fe/Su/Pl/Sr 5) 35°/J/Vn/Fe-H/-/Pl/Sr-R 6) 50°/J/Vn/Fe/Su/Pl/Sr				
	122												
		29		100	1	70			7) 80°-90°/J/Vn/Fe/Su/Pl-Wa/Sr 8) 80°/J/Vn/Fe/Su/Pl/Sr 9) 25°/J/Vn/Fe/Su/Pl/Sr			60	
	123												
					3								
	124												
					5+								
1340	125												

Report: GEO_CORE_4E; File: 60539527.GPJ; 10/26/2017 B-104

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Figure D-5

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-104

Sheet 9 of 10

Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
1340	125						1		GNEISS (KJm1), very dark gray to very dark grayish brown, phaneritic, fine to medium grained, slightly weathered, strong, moderately hard to hard, sub-vertical foliation continued...				
					4+		2						
	126						3		1) 30/J/Vn/Fe/Su/Pl/Sr				
					6+		3		2) 80°-90°/J/Vn/Fe+Cl/Su/Pl-Wa/Sr				
							M		3) 10°/J/Vn/Fe/Su/Pl/Sr				
	127						5		4) 25°/J/Vn-N/Fe/Su/Pl/Sr				
		30		100	4	70			5) 45°/J/Vn/Fe/Sp/Pl/Sr			60	
							4						
	128				2		4						
							M						
	129				1								
							M						
1335	130						M						
					2		1						
							3						
	131				3		2		1) 80°-90°/J/Vn/Fe/Su/Pl-Wa/Sr				
									2) 35°/J/Vn/Fe/Su/Pl/Sr				
									3) 65°/J/Vn/Fe/Su/Pl/Sr				
	132		10										
		31		100	0	82						50	
	133						M						
					0								
	134						M						
							2						
					2		3						
							M						
1330	135						M		becomes slightly weathered to fresh, gray to black				
					0								
	136								1) 35°/J/Vn/Fe/Sp/Pl/Sr				
					1		M		2) 50°/J/Vn/No/N/Pl-Wa/Sr				
							1		3) 65°/J/T/H/-/Pl/Sr				
	137								4) 35°/J/Vn/No/N/Pl/Sr-R				
									5) 50°-90°/J/T/H/-/Pl-Ir/-				
		32		100	1	100						50	
	138						2						
					2		3						
							4						
	139						5						
					1		M						
							M						
1325	140						M						
			11				1						
		33		100	2	93			1) 25°/J/T/H/-/Pl/-			60	
	141						2		2) 5°/J/Vn-N/Fe/Sp/Pl/Sr				

Packer Test Interval #7 (Had to move packer down due to leakage)

Report: GEO_CORE_4E; File: 60539527.GPJ; 10/26/2017 B-104

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Figure D-5

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-104

Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	141												
	142				4		3 4 9 5 M		GNEISS (KJm1), very dark gray to very dark grayish brown, phaneritic, fine to medium grained, slightly weathered to fresh, strong, moderately hard to hard, sub-vertical foliation continued...				
	143	33		100	3	93	6 6 7 8 6		3) 15°/J/Vn/No/N/Pl/R 4) 60°/J/Vn/No/N/Pl/Sr 5) 25°/J/Vn/Fe+Ch/Sp/Pl/Sr 6) 80°/J-Fo/Vn/Ch/Sp/Pl/Sr 7) 45°/J/Vn/No/N/Pl/Sr 8) 15°/J/Vn/No/N/Pl/Ir 9) 55°/J/T/H/-/Pl/Sr			60	
	144				4		3						
	145				1		M						
1320	146		11		1		1 M						
	147				1				1) 70°-90°/J/Vn/H/-/Pl-Ir/- 2) 15°/J/Vn/Ch/Sp/Pl/Sr 3) 50°/J/Vn/Ch/Su/Pl/Sr 4) 45°/J/Vn/No/N/Pl/Sr				
	148	34		100	2	100	2 3					75	
	149				0		M						
	150				1		4 M						
1315	151								Bottom of boring at 150.0 feet below ground surface. Down-hole acoustic televiewer survey completed prior to backfilling hole.				
	152												
	153												
	154												
1310	155												
	156												
	157												

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Figure D-5

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-105

Sheet 1 of 7

Date(s) Drilled	**8/15/17 - 8/16/17**	Logged By	**A. Avakian**	Checked By	**C. Goetz**
Drilling Method	**Wireline Coring**	Drill Bit Size/Type	**HQ3**	Total Drilled Depth/Length	**100.2 feet**
Drill Rig Type	**Longyear LF70**	Drilling Contractor	**Ruen Drilling Inc**	Approximate Surface Elevation	**1380 feet**
Groundwater Level	**20.0 ft bgs (recorded from transducer on 9/18/2017)**	Location	**N: 33.495763 W: -116.977658**	Inclination from Horizontal/Bearing	**90**
Borehole Completion	**VW Piezo tremie backfilled with Cement-Bentonite Grout**				

Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
1380	0								**FILL** Moist, brown, silty SAND with gravel, mostly fine sand, some fines, little fine to coarse gravel, gravel is typically of gneissic source, some cobbles				
	1				N/A		NR						
	2	1		46	N/A	N/A						105	
	3				N/A								
	4				N/A								
		2		200		0			**GNEISS (KJm1)**, very dark gray to gray, phaneritic, fine to medium grained, slightly weathered, moderately strong to strong, hard, sub-vertical foliation fabric, little iron oxide staining			N/A	
					6		10						
							1						
							2						
1375	5						3						
					6		4						
	6		1				5		1) 70°-90°/J/N/Fe/Su/Pl-Wa/Sr-R				
									2) 10°-20°/J/Vn/Fe/Su/Pl/Sr				
									3) 70°/J/Vn-N/Fe/Su/Pl/R				
									4) 80°/J/Vn/Fe/Su/Pl/R				
		3		100	2	25	1		5) 10°-20°/J/Vn-N/Fe/Su/Pl/R				
									6) 10°/J/Vn/Fe/Sp/Pl-Wa/R			60	
	7						6		7) 50°/J/Vn-N/Fe/Su/Pl/R				
					4				8) 60°-70°/J/Vn-N/Fe/Sp/Pl/R				
									9) 5°/J/-/Fe/Su/Pl/R				
	8						5		10) 45°/J/-/Fe/Su/Pl/Sr				
					4		7						
							8						
	9						9						
					2		1						
							2						
1370	10						3		1) 65°/J/Vn/Fe/Su/Pl/R				
					2		3		2) 55°/J/Vn/Fe/Sp/Pl/R				
									3) 15°-20°/J/Vn/Fe/Sp/Pl/R				UCS = 4,500 psi
	11	4		100		62			4) 15°/J/Vn/Fe/Sp/Pl/Sr/R				
					0				5) 20°/J/Vn/Fe/Sp/Pl/R			152	
									6) 35°/J/Vn/H/-/Pl/-				
	12						4		7) 60°/J/Vn/Fe/Sp/Pl/Sr				
					6		5						
							4						
	13						6						

Report: GEO_CORE_4E; File: 60539527.GPJ; 10/26/2017 B-105

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Figure D-6

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-105

Sheet 2 of 7

Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	13												
		4		100	3	62	4 4		GNEISS (KJm1), very dark gray to gray, phaneritic, fine to medium grained, slightly weathered, strong, hard, sub-vertical foliation fabric, little iron oxide staining continued...			152	
	14		1				7 1 2						
					4								
1365	15						3 5 4 5		1) 25°/J/Vn/Fe/Su/Pl/Sr 2) 5°-10°/J/Vn/Fe/Su/Pl/Sr 3) 55°/J/Vn/Fe/Sp/Pl-St/Vr 4) 80°/J/Vn/Fe/Su/Pl/Sr-R 5) 5°/J/Vn/Fe/Su/Pl/Sr				
					4								
	16	5		100	2	59	5 6		6) 10°-20°/J/Vn/Fe/Su/Pl/Sr-R 7) 80°-90°/J/Vn/Fe/Su/Pl-Ir/Vr			73	
	17						6						
					3		7 6						
	18						6						
					2		6						
	19						M						
					1		1						
1360	20						2 3		1) 20°/J/Vn/No/N/Pl/R 2) 5°/J/Vn/Fe/Su/Pl/Sr 3) 20°/J/Vn/Fe/Su/Pl/Sr-R 4) 50°/J/Vn/Fe/Su/Pl/R 5) 75°/J/Vn/Fe/Su/Pl/R	▼			
					2								
	21	6		94	3	77	4 2 5					61	
	22		2										
					2		M						
	23						3 5						
					1		M						
	24												
					1								
1355	25						1		1) 5°-10°/J/Vn/Fe/Su/Pl/Sr-R 2) 70°-75°/Fo-J/Vn/Fe/Su/Pl-Wa/Sr 3) 20°/J/Vn/Fe/Su/Pl/Sr 4) 15°-20°/J/Vn/Fe/Sp-Su/Pl/Sr-R 5) 50°/J/Vn/Fe/Su/Pl/R				
					2		1						
	26	7		106	5	75	1 3 2					75	
	27												
					1		4						
	28						4						
					2								
	29						5						

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Figure D-6

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-105

Sheet 3 of 7

Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	29		2				M		GNEISS (KJm1), very dark gray to gray, phaneritic, fine to medium grained, slightly weathered, strong, hard, sub-vertical foliation fabric, little iron oxide staining continued...				
					2		1						
1350	30						2		1) 30°/J/Vn/Fe/Su/Pl/Sr 2) 5°-10°/J/Vn/Fe/Su/Pl/Sr 3) 20°/J/Vn/Fe/Su/Pl/R 4) 50°/J/Vn/Fe/Su/Pl/R				
					1		1						
	31	8		100	2	83	3					100	
	32				1		3						
							4						
	33				3								
							2						
	34						1						
					3		1						
1345	35						2		1) 25°/J/Vn/Fe/Sp/Pl/R 2) 30°/J/Vn/Fe/Sp/Pl/Sr 3) 55°/J/Vn/Fe/Su/Pl/Sr 4) 30°/J/N/Fe/Su/Pl/Sr 5) 25°/J/Vn/Fe/Sp/Pl/R				
					2		3						
	36		3				4						
		9		100	1	77	4		predominantly medium grained			75	
	37						5						
					1								
	38												
					0								
	39						M						
					0								
1340	40								1) 5°/J/Vn/Py/Sp/Ir/R 2) 35°/J/Vn/Py/Sp/Pl/Sr 3) 35°/J/Vn/Fe/Sp/Pl/R				
					0								
	41	10		100	1	100						60	
	42						1						
					1		2						
	43						3						
					1								
	44		4				M		predominantly fine grained				
		11		100	4	70	1					60	
1335	45						2		1) 75°-90°/J/Vn-N/Fe+Ch+Cl/Su/Pl-Ir/Sr-R				

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Figure D-6

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-105

Sheet 4 of 7

Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
1335	45						2		Gneiss (KJm1) continued...				
					3		1		2) 5°-10°/J/Vn/Fe/Su/Pl/Sr				
									3) 65°/J/Vn/Fe+Sd/Su/Pl/Sr				
	46						3		4) 70°/J/Vn/Fe/Su/Pl/Sr				
					5		2		5) 30°/J/Vn/Fe/Su/Pl/Sr				
							4		6) 45°/J/Vn/Fe/Su/Pl/R				
							5		7) 10°/J/Vn/Ch+Py/Sp/Pl/Sr				
	47	11		100		70	6		8) 65°/J/Vn/Ch/Sp/Pl/Sr-R			60	
					1								
	48						7						
					2								
	49						8						
					0								
1330	50						1		1) 5°-10°/J/Vn/Py/Sp/Pl/R				
			4		2				2) 60°/J/Vn/Py/Sp/Pl/Sr				
							2		3) 15°/J/Vn/No/N/Pl/Sr-R				
	51						1						
		12		100	2	97						60	
	52						1						
					0								
	53												
					1		3						
	54						M						
					1								
1325	55						1						
							2						
					6		3						
							4		moderately weathered, intensely fractured zone,				
	56						5		moderately strong				
							6						
		13		100	3	58	7					60	
	57								1) 70°/J/Vn/Py/Sp/Pl/Sr				
							7		2) 60°/J/Vn/Py/Sp/Pl/R				
					2				3) 50°/J/Vn/Ch/Sp/Pl/R				
	58						7		4) 70°/J/Vn/Ch+Py+Cl/Sp/Pl/Sr				
									5) 10°/J/Vn/Ch/Sp/Pl/Sr				
									6) 70°-90°/J/Vn/Py/Sp/Pl/Sr				
									7) 35°-50°/J/Vn/Py/Sp/Pl/Sr				
					1				8) 60°/J/Vn/Py/Sp/Pl/Sr				
							8						
	59		5						becomes slightly weathered to fresh, strong to very strong				
					1								
							1						
1320	60	14		100		100			1) 20°-30°/J/Vn/Py/Sp/Pl/Sr			60	
					2		1						
	61												

Report: GEO_CORE_4E; File: 60539527.GPJ; 10/26/2017 B-105

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Figure D-6

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-105

Sheet 5 of 7

Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	61								GNEISS (KJm1), very dark gray to gray, phaneritic, fine to medium grained, slightly weathered to fresh, strong to very strong, hard, sub-vertical foliation fabric, little iron oxide staining continued...				
	62	14		100	0, 1	100	2		2) 5°/J/Vn/Py/Sp/Pl/Sr			60	
	63				0								
	64						M						
1315	65		5		1		1		1) 20°/J/Vn/Py+Ch/Sp/Pl/Sr 2) 5°/J/Vn/Py/Sp/Pl/Sr 3) 40°/J/Vn/No/N/Pl/Sr				
	66	15		96	1	92	1					50	
	67				2		2, 3						
	68				0		1						
	69						N						
1310	70				0								
	71	16		104	0, 1	100	1		1) 10°/J/Vn/Py/Sp/Pl/Sr 2) 30°/J/Vn/No/N/Pl-Ir/Sr			60	UCS = 12,900 psi
	72						1						
	73				1		1						
	74						2, M						
1305	75	17	6	100	0, 1	92	1		1) 20°/J/Vn/Py/Sp/Pl/Sr			60	
	76				0								
	77												

Report: GEO_CORE_4E; File: 60539527.GPJ; 10/26/2017 B-105

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Figure D-6

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-105

Sheet 6 of 7

Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	77						2 3 4		GNEISS (KJm1), very dark gray to gray, phaneritic, fine to medium grained, slightly weathered to fresh, strong to very strong, hard, sub-vertical foliation fabric, little iron oxide staining continued...				
	78	17		100	3 2	92	4		2) 5°-10°/J/Vn/Py/Sp/Pl-Ir/R 3) 60°/J/Vn/Py+Ch/Sp/Pl/Sr 4) 20°/J/Vn/Py/Sp/Pl/Sr			60	
	79						4						
1300	80				0		1		1) 5°-10°/J/Vn/Py/Sp/Pl/Sr 2) 55°/J/Vn/Ch+Fe+Py/Sp/Pl/Sr 3) 25°/J/Vn/No/N/Pl/Sr				
	81		6		1		1						
	82	18		100	2	100	2					60	
	83				1		3						
	84				1		1 M						
	85				0								
1295	86				0								
	87	19		100	1	97	1		1) 5°/J/Vn/Py/Sp/Pl/Sr 2) 15°/J/Vn/Ch+Cl/Sp/Pl/Sr 3) 40°/J/Vn/No/N/Pl/Sr			50	
	88				2		2 6						
	89				0		M						
	90		7		0								
1290	91	20		100	0	97			1) 30°/J/Vn/Ch+Py/Sp/Pl/Sr-R 2) 35°/J/Vn/Ch/Sp/Pl/R			43	
	92				2		1 2						
	93				0								

Report: GEO_CORE_4E; File: 60539527.GPJ; 10/26/2017 B-105

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Figure D-6

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-105

Sheet 7 of 7

Elevation, feet	Depth, feet	Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
				ROCK CORE									
	93												
		20		100	3	97	1		GNEISS (KJm1), very dark gray to gray, phaneritic, fine to medium grained, slightly weathered to fresh, strong to very strong, hard, sub-vertical foliation fabric, little iron oxide staining continued...			43	
	94						1						
							3		3) 50°/J/Vn/Ch+Cl/Su/Pl/Sr-R				
							1						
					3		2						
1285	95						2		1) 35°/J/Vn/Ch/Su/Pl/R				
							3		2) 50°/J/Vn/Ch/Su/Pl/Sr				
					4		2		3) 50°/J/Vn/Ch/Su/Pl/Sr				
							4		4) 20°/J/Vn/Ch+Py/Sp/Pl/R				
	96		7				5		5) 50°/Fo-J/Vn/Ch+Mn/Su/Pl/R				
		21		100	1	47			6) 5°/J/Vn/No/N/Pl/Sr			60	
									7) 70°/Fo-J/Vn/Ch+Py/Sp/Pl/Sr				
	97								8) 20°-30°/J/Vn/Ch+Py/Sp/Pl/Sr				
									9) 45°/J/Vn/Ch+Py/Su/Pl/Sr				
					5		6						
							5						
							7						
	98						8						
					4		8						
							9						
	99												
							1						
		22		100	2+	47			1) 70°-90°/Fo-J/Vn/Cl-Mn/Su/Wa/Sr				
							2		2) 70°/J/-/Mn+Cl/Su/Pl/Sr			18	
1280	100												
	101								Bottom of boring at 100.2 feet below ground surface. Down-hole acoustic and optical televiewer survey completed. Vibrating wire transducer installed at approximately 95 feet below ground surface.				
	102												
	103												
	104												
1275	105												
	106												
	107												
	108												
	109												

Report: GEO_CORE_4E; File: 60539527.GPJ; 10/26/2017 B-105

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Figure D-6

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-106

Sheet 1 of 7

Date(s) Drilled	**8/19/17**	Logged By	**A. Avakian**	Checked By	**C. Goetz**
Drilling Method	**Wireline Coring**	Drill Bit Size/Type	**HQ3**	Total Drilled Depth/Length	**100.7 feet**
Drill Rig Type	**Longyear LF70**	Drilling Contractor	**Ruen Drilling Inc**	Approximate Surface Elevation	**1363 feet**
Groundwater Level	**19.8 ft bgs (recorded with sounder on 8/21/2017)**	Location	**N: 33.496099 W: -116.977628**	Inclination from Horizontal/Bearing	**90**
Borehole Completion	**Tremie Backfilled with Cement-Bentonite Grout**				

Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	0				N/A				**FILL** Moist, brown, silty SAND with gravel, mostly fine to medium sand, little fine to coarse gravel, little fines, some cobbles				
	1				N/A								
	2	1		22	N/A	N/A	NR					54	
1360	3				N/A								
	4				N/A				← concrete chunk				
	5				N/A								
	6	2	1	20	N/A	N/A	NR					152	
	7				N/A								
1355	8				N/A								
	9				N/A								
	10				N/A								
	11	3		20	N/A	N/A	NR					100	
	12				N/A								
1350	13												

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Figure D-7

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-106

Sheet 2 of 7

Elevation, feet	Depth, feet	Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
							ROCK CORE						
1350	13				N/A		NR		**FILL** Moist, brown, silty SAND with gravel, mostly fine to medium sand, little fine to coarse gravel, little fines, some cobbles continued...				
	14	3		20	N/A	N/A						100	
					N/A				**ALLUVIUM**				
	15												
					N/A								
	16												
					N/A								
	17	4		0		N/A	NR		loose sandy material			152	
					N/A								
1345	18												
					N/A								
	19												
					N/A								
	20		1										
					N/A								
	21						NR						
					N/A								
	22	5		20		N/A						75	
					N/A								
1340	23												
					N/A				fine to coarse gravel of mixed rock type, some cobbles				
	24												
					N/A								
	25												
					N/A		NR						
	26												
					N/A								
	27	6		44		N/A						50	
					N/A								
1335	28												
					N/A								
	29												

Report: GEO_CORE_4E; File: 60539527.GPJ; 10/26/2017 B-106

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Figure D-7

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-106

Sheet 3 of 7

Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	29	6		44	N/A	N/A			Alluvium continued...			50	
	30				N/A		1		**GNEISS (KJm1)**, very dark gray to gray, phaneritic, fine to medium grained, slightly weathered, moderately strong to strong, moderately hard to hard, sub-vertical foliation and flow banding fabric				
	31	7		100	4+	25	1 2 3 1		1) 10°/J/Vn/Py/Sp/Pl/Sr 2) 65°/J/Vn/Py/Sp/Pl/Sr 3) 80°-90°/J/Vn/No/N/Pl			45	
	32		1		2+		4 5		4) 45°/J/Vn/No/N/Pl/Sr 5) 55°/J/-/Sd/Sp/Pl/Sr				
1330	33	8		100	2	96	1 2 3		1) 30°/J/Vn/No/N/Pl/Sr 2) 50°/J/Vn/No/N/Pl/Sr 3) 55°/J/Vn/Py/Sp/Pl/Sr			40	
	34				2		4		4) 45°/J/-/No/N/Pl/Sr				
	35				4		1 1 2 1						
	36				5		2 1						
	37	9		100	4	43	2 3 4 3 5		1) 55°-65°/J/Vn/Fe-Ch/Sp/Pl/Sr 2) 5°-10°/J/Vn/Fe+Ch/Sp/Pl/Sr 3) 10°-15°/J/Vn/Ch/Sp/Pl/Sr			60	
1325	38				5		1 3		4) 45°/J/Vn/Ch+Py/Sp/Pl/Sr 5) 85°-90°/J/Vn/Fe/Sp/Pl/R 6) 15°/J/-/Ch/Sp/Pl/Sr				
	39				2		2 2 1 2						
	40		2		1		1						UCS = 5,200 psi
	41				2		2 3						
	42	10		100	2	68	4 3		1) 20°/J/Vn/Py/Sp/Pl/R 2) 10°/J/Vn/Py/Sp/Pl/Sr-R 3) 30°/J/Vn/Py+Ch/Sp/Pl/Sr			60	
1320	43				5		2 4 2 2		4) 55°/J/Vn/Fe+Ch/Sp/Pl/Sr 5) 25°/J/-/Py+Ch/Sp/Pl/R				
	44				1		5						
	45	11		100		58						46	

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Figure D-7

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-106

Sheet 4 of 7

Elevation, feet	Depth, feet	Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	45								GNEISS (KJm1), very dark gray to gray, phaneritic, fine to medium grained, slightly weathered, strong, moderately hard to hard, sub-vertical foliation and flow banding fabric continued...				
	46				7		1 1 2 3 4						
	47	11	2	100	2	58	5 6		1) 30°/J/Vn/Ch+Mn/Su/Pl/Sr 2) 60°/J/Vn/Ch+Mn/Su/Pl/R 3) 45°/J/Vn/Ch+Mn/Su/Pl/Sr 4) 40°/J/Vn/Ch+Mn/Su/Pl/Sr 5) 20°/J/Vn/Py/Sp/Pl/R 6) 5°/J/Vn/Py/Sp/Pl/Sr 7) 65°/Fo-J/T/-/-/Pl/- 8) 60°/J/Vn/Ch/Su/Pl/Sr 9) 30°/J/Vn/Ch+Py/Sp/Pl/Sr			46	
1315	48				2								
	49				3+		7 8						
	50	12		76	10+ 5+	0	1 1		1) 20°-30°/J/Vn/Ch+Mn/Su/Pl/Sr-R 2) 50°/J/Vn/Mn+Ch/Su/Pl/Sr 3) 70°/J/Vn-N/Mn+Ch/Su/Pl/R			43	
	51				N/A		3 NR 2						
	52	13		100	10+ 3+	0	1 2 3		very intensely fractured zone 1) 80°-90°/J-Fo/Vn/Ch+Fe/Sp/Pl-Wa/Sr 2) 65°/J/Vn/Ch+Sd/Fi/Pl/Sr 3) 20°/J/-/Ch/Sp/Pl/Sr			30	
1310	53												
	54				10+								
	55	14	3	92	2+ 6 4	20	1 2 2 3 2 2 2		1) 80°/J/-/Ch/Sp/Pl/Sr 2) 10°-20°/J/Vn/Ch/Sp/Pl/Sr 3) 30°/J/Vn/Ch+Fe/Sp/Pl/Sr 4) 80°-90°/J-Fo/Vn-T/Ch/Sp/Pl-Wa/Sr			47	
	56												
	57												
1305	58				N/A		3 4 3						
	59						NR						
	60	15		100	N/A 2	22	1 2 3 4		1) 80°-90°/J-Fo/Vn-T/Py/Sp/Pl-Wa/Sr 2) 5°/J/Vn/Py/Sp/Pl/Sr 3) 75°/J/Vn/Py/Sp/Pl/Sr 4) 5°-15°/J/Vn/Ch+Fe/Sp/Pl/Sr			49	
	61												

ROCK CORE

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Figure D-7

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-106

Sheet 5 of 7

Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	61								GNEISS (KJm1), very dark gray to gray, phaneritic, fine to medium grained, slightly weathered, strong, moderately hard to hard, sub-vertical foliation and flow banding fabric continued...				
	62	15	3	100	4	22							
1300	63				5				5) 30°/J/Vn/Fe+Ch/Sp/Pl/Sr 6) 75°/J/Vn/Ch+Py/Su/Pl/Sr 7) 25°/J/Vn/Ch/Su/Pl/R 8) 55°/J/-/Ch+Cl/Su/Pl/R				
	64				9								
	65	16		100	4+	37			1) 20°-25°/J/Vn/Ch/Sp-Su/Pl/Sr 2) 5°-10°/J/Vn-N/Ch/Su/Pl/Sr 3) 80°/J/Vn/Py+Ch/Sp/Pl-Wa/R 4) 30°/J/-/Py+Ch/Sp/Pl/R			50	
	66				4+								
	67				5								
1295	68				3								
	69				3								
	70	17	4	100	3	65			1) 30°-35°/J/Vn/Ch+Py/Sp/Pl/Sr 2) 50°/J/Vn/Py+Ch/Sp/Pl/Sr 3) 30°/J/Vn/Py/Sp/Pl/Sr 4) 50°/J/Vn/Fe+Ch/Sp/Pl/Sr 5) 55°-60°/J/Vn-N/Ch/Su-Fi/Pl/Sr 6) 30°/J/-/Ch+Py/Sp/Pl/Sr			50	
	71				2								
	72				3								
1290	73				2								
	74				6+				} very intensely fractured zone				
	75	18		100	10+	32						64	
	76				4				1) 10°/J/Vn/Ch/Sp/Pl/Sr 2) 40°/J/Vn/Ch/Su/Pl/Sr 3) 25°/J/Vn/Ch/Su/Pl/Sr 4) 45°/J/Vn/Ch/Su/Pl/R 5) 60°/J-Fo/Vn-T/Ch/Su/Pl/Sr 6) 35°/J/-/Py/Sp/Pl/Sr				
	77	19		100	5	42						52	

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Figure D-7

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-106

Sheet 6 of 7

Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	77								Gneiss (KJm1) continued...				
			4		1		3		7) 75°/Fo-J/T/-/-/Pl/-				
1285	78				1								
	79	19		100	6	42	1 2 3 4 5 6		1) 20°/J/Vn/Ch/Su/Pl/Sr 2) 35°/J/Vn/Ch/Su/Pl/Sr 3) 25°/J/Vn/Py/Sp/Pl/Sr 4) 50°/J/Vn/Ch/Su/Pl/Sr 5) 40°/J/Vn/No/N/Pl/Sr 6) 30°/J/Vn/Ch/Sp/Pl/Sr			52	
	80				10+								
	81												
					10+		1 2		} very intensely fractured zone				
	82	20		100	10+	0	3		1) 60°/J/-/Ch+Fe/Sp/Pl/Sr			39	
1280	83				5		4 5 6		2) 45°/J/Vn/No/N/Pl/Sr 3) 65°/J/Vn-N/Ch/Su/Pl/R 4) 65°/J/vn/Ch/Su/Pl/Sr 5) 10°/J/Vn/No/N/Pl/R				
	84				10+		7		6) 40°/J/Vn/Ch+Py/Sp/Pl/Sr 7) 55°/J/-/Ch/Su/Pl/Sr				
		21		100		0			} very intensely fractured zone			34	
	85				10+								
	86		5										
					10+		1						
	87						2 4						
		22		100	3	21	3		1) 45°/J/Vn/Ch/Su/Pl/Sr-R			48	
1275	88						6		2) 20°/J/Vn/Ch+Py/Sp/Pl/R 3) 50°/J/Vn/Ch+Fe/Su/Pl/Sr				
					5		5 6 7		4) 80°-90°/J/Vn/H/-/Pl-Wa/- 5) 70°-90°/J-Fo/Vn/Ch+Py/Sp/Wa/Sr 6) 25°-30°/J/Vn/Ch/Sp/Pl/Sr-R				
	89						8		7) 55°/J/Vn/Ch+Py/Sp/Pl/R				
							9		8) 20°/J/Vn/Ch+Py/Sp/Pl/Sr				
					5+		10		9) 30°/J/T/H/-/Pl/Sr				
	90						1		becomes slightly weathered to fresh, strong to very strong, hard				
					3		2 3						
	91	23		100		65	4					41	
					4		5		1) 45°/J/Vn/Py/Sp/Pl/R				
							6		2) 45°/J/Vn/Py/Sp/Pl/R				
	92								3) 40°-60°/J/Vn/Ch+Mn/Su/Pl/Sr				UCS = 13,500 psi
							7		4) 35°/J/Vn/Py/Sp/Pl/R				
					3				5) 35°/J/Vn/Ch+Py/Su/Pl/Vr				
							8		6) 5°/J/Vn/Ch+Py/Su/Pl/Vr				
1270	93												

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Figure D-7

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-106

Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
1270	93		5						Gneiss (KJm1) continued...				
		23		100	1	65	9		7) 60°/J/Vn/Ch+Py/Su/Pl/R 8) 35°/J/Vn/Py/Sp/Pl/R 9) 30°/J/Vn/Ch+Py+Mn/Su/Pl/R			41	
	94				0		M						
	95				1		1						
	96				0								
	97	24	6	100	1	97	2		1) 10°/J/Vn/Py/Sp/Pl/Sr 2) 20°/J/Vn/Py/Sp/Pl/Sr			52	
1265	98				2		3 2		3) 5°/J/Vn/Ch+Py/Sp/Pl/Sr 4) 10°/J/Vn/P/Sp/Pl/Sr				
	99				1		M						
	100	25		100	N/A	100	4					30	
	101								Bottom of boring at 100.7 feet below ground surface. Completed down-hole acoustic televiewer survey prior to backfilling hole.				
	102												
1260	103												
	104												
	105												
	106												
	107												
1255	108												
	109												

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Figure D-7

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-107

Sheet 1 of 7

Date(s) Drilled	**8/17/17 - 8/18/17**	Logged By	**A. Avakian**	Checked By	**C. Goetz**
Drilling Method	**Wireline Coring**	Drill Bit Size/Type	**HQ3**	Total Drilled Depth/Length	**100.3 feet**
Drill Rig Type	**Longyear LF70**	Drilling Contractor	**Ruen Drilling Inc**	Approximate Surface Elevation	**1374 feet**
Groundwater Level	**Not Measured**	Location	**N: 33.495870 W: -116.977439**	Inclination from Horizontal/Bearing	**90**
Borehole Completion	**Tremie Backfilled with Cement-Bentonite Grout**				

Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	0				N/A				**FILL** Moist, brown, silty SAND with gravel, mostly fine sand, some fines, little to some fine to coarse gravel, some cobbles, clasts are predominantly of gneissic source				
	1						NR						
					N/A								
	2	1		45	N/A	N/A						60	
					N/A								
	3				N/A								
1370	4				N/A								
					N/A								
	5						NR						
	6		1		N/A								
		2		40		N/A						60	
	7				N/A								
	8				N/A								
1365	9				N/A								
	10				N/A								
	11	3		20	N/A	N/A	NR					60	
	12				N/A								
	13				N/A								

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Figure D-8

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-107

Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	13	3		20	N/A	N/A			**FILL** Moist, brown, silty SAND with gravel, mostly fine sand, some fines, little to some fine to coarse gravel, some cobbles, clasts are predominantly of gneissic source continued...			N/A	
1360	14				N/A								
	15				N/A								
	16	4		20	N/A	N/A	NR					60	
	17				N/A								
	18				N/A								
1355	19				N/A								
	20		1		N/A		NR						
	21	5		36	N/A	N/A						60	
	22				N/A								
	23				N/A								
1350	24				N/A				**ALLUVIUM**				
	25				N/A								
	26	6		20	N/A	N/A	NR					60	
	27				N/A								
	28				N/A				fine to coarse gravel of mixed rock type/source, sub-rounded to sub-angular, some cobbles				
1345	29												

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Figure D-8

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-107

Sheet 3 of 7

Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
1345	29								Alluvium continued...				
	30				N/A								
	31				N/A								
	32	7		20	N/A	N/A	NR					75	
	33		1		N/A								
1340	34				N/A								
	35				3		1 2		**GNEISS (KJm1)**, very dark gray to gray, phaneritic, fine to medium grained, slightly weathered, weak to strong, hard, sub-vertical foliation and flow banding fabric				
	36	8		100	6	57	2 3 1 2 4		1) 30°/J/Vn/Fe/Sp/Pl/Sr 2) 60°/J/Vn/Fe/Sp/Pl/Sr 3) 5°/J/Vn/Fe/Sp/Pl/Sr 4) 50°/J/Vn/Fe/Su/Pl/Sr			60	
	37				3		5 4		5) 40°/J/Vn/Fe/Su/Pl/R 6) 15°/J/Vn/No/N/Pl/R				
	38				2		6 6 7 8		7) 85°/J/T/H/-/Pl/- 8) 65°/J/-/Fe/Su/Pl/R				
1335	39				5		1						
	40	9		91	2	33	2 3 4 5 6		1) 60°/J/Vn/Ch+Mn/Su/Pl/Sr 2) 65°/J/Vn/Ch+Mn/Su/Pl/Sr 3) 40°/J/Vn/Mn+Fe/Su/Pl/R 4) 5°/J/Vn/Py/Sp/Pl/R 5) 70°/J/Vn/Ch+Mn/Su/Pl/Sr 6) 50°/J/Vn/Ch+Mn/Su/Pl/Sr			60	
	41		2		3+								
	42				N/A		NR						
	43				1		1 2 2						
1330	44	10		100	7	40	2 3 4		1) 60°/J/Vn/Ch+Mn/Su/Pl/Sr 2) 35°/J/Vn/Ch+Mn/Su/Pl/Sr 3) 45°-55°/J/Vn/Ch+Mn/Su/Pl/Sr 4) 85°/J/T/H/-/Pl/Sr			19	UCS = 3,400 psi
	45												

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Figure D-8

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-107

Sheet 4 of 7

Elevation, feet	Depth, feet	Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	45								GNEISS (KJm1), very dark gray to gray, phaneritic, fine to medium grained, slightly weathered, strong, hard, sub-vertical foliation and flow banding fabric continued...				
	46	10		100	4 to 4+	40			5) 45°/J/Vn/Fe+Ch/Su/Pl/Sr 6) 50°/J/Vn-N/Ch/Su/Pl/Sr 7) 75°/J-Fo/Vn/Ch+Mn/Su/Wa/Sr 8) 70°/J/Vn/Ch+Mn/Su/Pl/R			19	
	47								very intensely fractured				
	48	11	2	100	10+ to 3	33			1) 45°-55°/J/Vn/No/N/Pl/Sr 2) 10°/J/Vn/No/N/Pl-Ir/Vr 3) 50°-90°/J/Vn/Fe+Ca/Sp/Ir/R 4) 30°/J/Vn/Ch/Su/Pl/Sr 5) 70°/J/Mw/Ca?/Fi/Pl/Sr 6) 5°/J/Vn/Ch+Ca/Sp/Pl/R 7) 25°/J/Vn/Ca/Sp/Pl/Sr 8) 80°-90°/J-Fo/T/-/-/Pl-Wa/-			63	
1325	49												
	50												
	51				3+ to 2								
	52												
	53	12	3	100	3+ to 4	18			1) 5°/J/Vn/Py/Sp/Pl/Sr 2) 80°-90°/J/Vn/Ch+Fe/Su/Pl-Wa/S 3) 5°/J/Vn/No/N/Pl/R 4) 50°-60°/J/Vn/Ch/Su/Pl/Sr 5) 15°/J/Vn/No/N/Pl/Sr 6) 60°/J/Vn/Ch+Fe/Sp/Pl/Sr 7) 35°/J/Vn/Ch/Sp/Pl/Sr 8) 30°/J/-/Ch+Fe/Sp/Pl/Sr			51	
1320	54												
	55				4 to 5+								
	56								very intensely fractured				
	57				9+ to 6+								
	58	13		100		0			1) 20°/J/Vn/Ch+Fe/Sp/Pl/Sr 2) 55°/J/V/Ch/Sp/Pl/Sr			24	
	59	14		100	4 to 3	70			becomes slightly weathered to fresh			50	
1315	60												
	61				3								

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Figure D-8

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

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Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	61								GNEISS (KJm1), very dark gray to gray, phaneritic, fine to medium grained, slightly weathered to fresh, strong, hard, sub-vertical foliation and flow banding fabric continued				
	62	14	3	100	4	70			1) 20°-30°/J/Vn/Ch/Sp/Pl/Sr 2) 50°/J/Vn/Ch/Sp/Pl/Sr 3) 5°-10°/J/Vn/No/N/Pl/Sr 4) 40°-50°/J/Vn/Ch+Fe/Sp/Pl/Sr 5) 65°/J/Vn/No/N/Pl/R 6) 80°/J/Vn/No/N/Pl/R 7) 20°-30°/J/Vn-N/Py/Sp/Pl-Ir/R 8) 30°/J/Vn/Ch+Mn/Su/Pl/Sr			50	
	63												
1310	64	15		96	5	70						54	
	65												
	66				2				1) 45°/J/Vn/Mn+Ch/Su/Pl/Sr 2) 30°/J/Vn/Mn+Ch/Su/Pl/Sr 3) 10°/J/Vn-N/Mn+Ch/Su/Pl/R 4) 20°/J/Vn/Py/Sp/Pl/Sr 5) 80°-90°/J/Vn/H/-/Pl-Wa/- 6) 35°/J/Vn/Py/Sp/St/Sr 7) 15°/J/Vn/Ch+Mn/Su/Pl/Sr 8) 70°/J/Vn/H/-/Pl/Sr 9) <5°/J/Vn/Ch-Mn/Su/Pl/Sr				
	67				2								
	68				3		NR						
1305	69	16	4	100	2	65						96	
	70				5								
	71				3				1) 20°/J/Vn/Ca/Sp/Pl/Sr 2) 25°/J/Vn/No/N/Pl/R 3) 55°/J/Vn/Py/Sp/Pl/Sr 4) 40°/J/Vn/No/N/Pl/Sr 5) 60°/J/Vn/No/N/Pl/Sr 6) 70°/J/Vn/No/N/Pl/R 7) 20°/J/Vn/Mn/Su/Pl/Sr 8) 10°/J/Vn/Ch+Mn/Su/Pl/Sr				
	72				1								
	73				1								
1300	74	17		100	0	73						30	
	75				2				1) 10°-55°/J/Vn/Py/Sp/Ir/R 2) 10°/J/Vn/Py+Ch/Sp/Pl/Sr 3) 65°/J/Vn/Ch/Sp/Pl/Sr 4) 20°/J/Vn/Ch+Mn/Su/Pl/Sr 5) 70°/J/Vn/Ch+Mn/Su/Pl/R 6) 30°/J/Vn/Ch/Sp/Pl/Sr 7) 75°/Fo-J/T/H/-/Pl/-				
	76				4								
	77				5								

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Figure D-8

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

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Sheet 6 of 7

Elevation, feet	Depth, feet	Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	77												
		17	4	100	3	73	7 1 M 1 2		GNEISS (KJm1), very dark gray to gray, phaneritic, fine to medium grained, slightly weathered to fresh, strong, hard, sub-vertical foliation and flow banding fabric continued			30	
	78				2								
1295	79				1		3						UCS = 4,500 psi
		18		100		89			1) 10°/J/Vn/Mn+Ch/Su/Pl/Sr 2) 25°/J/Vn/Py+Ch/Sp/Pl/Sr 3) 20°/J/Vn/Ch+Mn/Su/Pl-Ir/Sr 4) 60°/J/Vn/Py/Sp/Pl/Sr 5) 15°/J/Vn/Py/Sp/Pl/R 6) 25°/J/Vn/Py+Ch/Sp/Pl/Sr			58	
	80				2		4						
	81												
					3		5 6						
	82												
					2		M 1 2						
	83	19		100		0	2 3		1) 30°/J/-/Py/Sp/Pl/R 2) 15°/J/Vn/Mn+Ch/Su/Pl/Sr 3) 50°/J/Vn/Ch+Mn/Su/Pl/Sr			60	
					3								
1290	84						1						
					3								
	85												
		20		100	3	77	2					47	
	86		5				3		1) 30°/J/Vn/Mn/Su/Pl/Sr 2) 60°/J/Vn/Mn+Ch/Su/Pl/Sr 3) 20°-30°/J/Cn/Ch+Mn+Py/Su/Pl/Sr 4) 30°/J/Vn/Py/Sp/Pl/Sr 5) 40°/J/Vn/Ch+Cl/Su-Fi/Pl/Sr				
					2		3						
	87						4						
					3								
	88						3 5						
					3		1						
1285	89												
					1		2						
	90												
		21		100	5	82	3 4 5 6 7		1) 30°/J/Vn/Ch+Py/Sp/Pl/R 2) 5°/J/Vn/Py/Sp/Ir/R 3) 60°/J-Fo/Vn/Mn+Py/Su/Pl/Sr 4) 20°/J/T/-/-/Pl/- 5) 20°/J/Vn/Ch+Cl/Su-Fi/Pl/Sr 6) 10°/J/Vn/Ch+Mn/Su/Pl/Sr 7) 50°/J/Vn/Ch+Mn/Su/Pl/Sr 8) 20°-30°/J/Vn/Mn+Ch+Py/Su/Pl/R 9) 50°/J/Vn/Mn+Ch/Su/Pl/Sr			44	
	91						8						
					1								
	92												
					2		8						
	93												

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Figure D-8

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

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Sheet 7 of 7

Elevation, feet	Depth, feet	Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
									ROCK CORE				
	93	21		100	5	82	8 9 1 2 2		GNEISS (KJm1), very dark gray to gray, phaneritic, fine to medium grained, slightly weathered to fresh, strong, hard, sub-vertical foliation and flow banding fabric continued				
1280	94				3		3 4 3						
	95						6 5						
	96	22	6	100	4 2	58	6 5 5 7		1) 70°-80°/J/Vn/Ch+Py/Sp/Pl/Sr 2) 5°/J/Vn/Ch+Mn/Su/Pl/Sr 3) 30°/J/Cn/Ch+Mn/Su/Pl/Sr 4) 80°/J/Vn/Ca/Su/Pl/Sr 5) 15°/J/Vn/Cl/Su/Pl/Sr 6) 75°/J/Vn/Ca+Cl/Sp/Pl/R 7) 75°/J/Vn/Py/Sp/Pl-Wa/Sr 8) 45°/J/Vn/Py+Ch/Sp/Pl/R 9) 5°-10°/J/Vn/No/N/Pl/Sr			50	
	97				1		8						
	98						9 M						
1275	99	23		100	2 0	100			1) 60°-90°/Fo-J/T/-/-/Wa/-			61	
	100				N/A								
									Bottom of boring at 100.3 feet below ground surface.				
	101												
	102												
	103												
1270	104												
	105												
	106												
	107												
	108												
1265	109												

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Figure D-8

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

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Date(s) Drilled	**7/14/17**	Logged By	**D. Rector**	Checked By	**C. Goetz**
Drilling Method	**Wireline Coring**	Drill Bit Size/Type	**HQ3**	Total Drilled Depth/Length	**103.0 feet**
Drill Rig Type	**Longyear LF70 - Helo Access**	Drilling Contractor	**Ruen Drilling Inc**	Approximate Surface Elevation	**1430 feet**
Groundwater Level	**Not Measured**	Location	**N: 33.499213 W: -116.991867**	Inclination from Horizontal/Bearing	**75**
Borehole Completion	**Tremie Backfilled with Cement-Bentonite Grout**				

Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
1430	0								**MIGMATITIC GNEISS (KJm2)**, intermingled granitic and metamorphic rock, reddish brown, coarse grained, highly weathered, extremely weak				
	1	1		0	N/A	0	NR					90	
	2				N/A								
	3				N/A								
	4				N/A								
1425	5	2		0	N/A	0	NR					75	
	6		1		N/A								
	7				N/A								
	8				N/A								
	9				N/A								
1420	10	3		0	N/A	0	NR					75	
	11				N/A								
	12				N/A								
	13				N/A								

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Figure D-9

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

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Sheet 2 of 7

Elevation, feet	Depth, feet	Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
				ROCK CORE									
	13				N/A				MIGMATITIC GNEISS (KJm2), intermingled granitic and metamorphic rock, reddish brown, coarse grained, highly weathered, extremely weak continued...				
	14				N/A								
1415	15	4		6	N/A	0	NR					60	
	16				N/A								
	17				N/A		1		1) 90°/J/N/Fe/Sp/Pl/S				
	18				N/A				becomes highly to moderately weathered, weak to strong, moderately hard				
	19	5		36	N/A	0	NR		1) 90°/J/N/Fe/Sp/Pl/S			37	
1410	20		1		N/A		1						
	21	6		88	2	36	NR 1 2 2		1) 60°/Fo/N/Fe+Mn/Sp/Pl/Sr 2) 60°/Fo/N/Fe+Mn/Sp/Wa/Sr 3) 65°/Fo/N/Fe+Cl/Sp/Pl/Sr			50	
	22				1		3 M M						
	23				N/A		NR						
	24				N/A				becomes moderately weathered, light gray with white quartzo-feldspathic layers				
1405	25	7		70	2	0	1		1) 50°/J/N/Fe/Sp/Pl/Sr 2) 55°/J/N/Fe/Sp/Pl/Sr 3) 50°/Fo/N/Fe+Mn/Sp/Pl/Sr			60	
	26				1		2 M 3						
	27				0		M M M						
	28						NR		becomes slightly weathered, moderately strong to strong				
		8		96	N/A	46	M M					50	
	29												

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Figure D-9

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-201

Sheet 3 of 7

Elevation, feet	Depth, feet	Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	29				1		1 M		MIGMATITIC GNEISS (KJm2), intermingled granitic and metamorphic rock, reddish brown, coarse grained, slightly weathered, moderately strong to strong continued...				
1400	30		1		2		M 2						
	31	8		96	2	46	3 M 4		1) 30°/Fo/N/Mn+Fe/Sp/Wa/Sr 2) 30°/Fo/N/Fe+Mn/Sp/Pl/Sr 3) 75°/Fo/Mw/Fe+Mn/Fi/Pl/Sr 4) 60°/Fo/N/Fe+Mn/Sp/Wa/Sr 5) 45°/J/N/Fe+Bi/Su/Pl/Sr 6) 50°/J/N/Fe/Sp/Pl/Sr			50	
	32				2		M 5 6						
	33				3		1 2 2		1) 55°/J/N/Fe/Pa/Pl/Sr 2) 45°/J/N/Fe/Pa/Pl/Sr 3) 40°/Fo/N/No/N/Pl/Sr 4) 55°/Fo/Fe/Su/Pl/Sr 5) 70°/Fo/Fe/Su/Pl/Sr 6) 55°/J/Fe+Mn/Sp/Pl/Sr				
	34				2		3 4						
1395	35	9		80	2	52	M 5 6					50	
	36		2		0		M						
	37				N/A		NR		becomes moderately to slightly weathered				
	38				4		1 2 3		1) 90°/J/N/Fe/Sp/Wa/Sr 2) 60°/Fo/N/Fe+Bi/Sp/Pl/Sr 3) 55°/J/N/Fe/Sp/Wa/Sr 4) 70°/J/N/Fe/Su/Pl/Sr 5) 65°/J/N/Fe+Cl/Sp/Pl/Sr 6) 45°/Fo/Fe+Mn/Su/Wa/Sr				
	39				4		M M 4						
1390	40	10		100	10+	35	5		intensely fractured zone			48	
	41				2		6		becomes slightly weathered				
	42				2		1 2		1) 60°/J/N/Fe/Sp/Pl/Sr 2) 90°/J/Mw/Fe/Sp/Wa/Sr 3) 50°/J/N/Fe+Mn/Su/Pl/Sr			45	
	43	11	3	100	2	0	3						
	44	12		100	1	92	M 1		1) 25°/J/N/Fe/Sp/Pl/Sr			43	
1385	45												

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Figure D-9

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

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Elevation, feet	Depth, feet	Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
				ROCK CORE									
1385	45				2		2		MIGMATITIC GNEISS (KJm2), intermingled granitic and metamorphic rock, reddish brown, coarse grained, slightly weathered, moderately strong to strong continued...				
	46	12	3	100	1	92	3		2) 25°/J/N/Fe+Mn/Su/Pl/Sr 3) 70°-90°/J/N/Fe/Su/Wa/Sr 4) 45°/J/Mw/Fe+Mn/Su/Wa/Sr			43	
	47				2		M						
	48				0		4						
	49				2		M						
							1						
1380	50				3		1		becomes highly to moderately weathered				
		13		78		18	2					39	
	51				2		3		1) 30°/J/N/Fe/Su/Pl/Sr 2) 65°/J/N/Fe/Su/Pl/Sr 3) 45°/J/N/Fe/Su/Pl/Sr 4) 70°/J/N/Fe+Cl/Pa/Pl/Sr 5) 25°/J/Mw/Fe/Su/Wa/Sr 6) 10°/J/N/Fe/Su/Wa/Sr 7) 70°/J/Mw/Fe+Cl/Su/Wa/Sr				
	52				N/A		NR						
	53				N/A								
	54						NR						
					N/A								
1375	55	14	4	64	3	0	1		1) 70°-90°/J/W/Fe+Mn/Su/Wa/Sr 2) 20°/J/Mw/Fe/Su/Pl/Sr			N/A	
	56				2		2						
	57				3		2						
	58				N/A		2		**GNEISS (KJm1)**, interlayered light to medium gray, fine to medium grained gneissic layers, moderately weathered, moderately strong				
	59	15		79	1	58	NR		becomes slightly weathered to fresh, strong to very strong			60	
1370	60				1		1		1) 70°/J/W/Fe+Mn/Pa/Pl/Sr 2) 50°/J/N/Mn/Su/Pl/Sr				
	61						M						
							2						

Report: GEO_CORE_4E; File: 60539527.GPJ; 10/26/2017 B-201

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Figure D-9

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-201

Sheet 5 of 7

Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	61						3		GNEISS (KJm1), interlayered light to medium gray, fine to medium grained gneissic layers, slightly weathered to fresh, strong to very strong continued...				
			4		2		4						
	62	15		79		58			becomes very strong			60	
					0		M						
	63								3) 65°/J/N/Fe/Sp/Wa/Sr 4) 5°/J/N/Fe/Sp/Pl/Sr				
					0								
	64												
					0								
1365	65												
		16		100	1	100	1					43	
	66								1) 65°/J/N/Py/Sp/Pl/Sr				
					1								
	67		5										UCS = 10,200 psi PA
					0								
	68												
					0								
	69						1		1) 55°/J/N/Fe/Su/Wa/Sr 2) 45°/J/N/Fe/Su/Wa/Sr				
					2		2						
1360	70												
		17		100	0	94						N/A	
	71						M						
					0								
	72						M						
					0								
	73												
					0								
	74												
			6		0								
							M						
1355	75	18		100		98						33	
					1		1		1) 65°/J/Mw/Fe+Mn/Pa/Pl/Sr				
	76												
					1								
	77						M						

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Figure D-9

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-201

Sheet 6 of 7

Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	77						2		GNEISS (KJm1), interlayered light to medium gray, fine to medium grained gneissic layers, slightly weathered to fresh, strong to very strong continued...				
		18		100	1	98	M					33	
	78						1		2) 55°/J/N/Fe+Mn/Su/Pl/Sr				
			6		2		2		1) 55°/J/Mw/Fe+Mw/Pa/Pl/Sr				
	79								2) 15°/J/N/No/N/Pl/Sr				
					2		3		3) 65°/J/N/Fe-H/Su/Pl/Sr 4) 45°/J/W/Fe/Sp/Wa/Sr 5) 55°/J/N/Fe/Sp/Wa/Sr				
1350	80								6) 45°/J/N/Fe/Sp/Pl/Sr				
		19		100	1	84	4					300	
	81						M						
					1								
	82												
					1								
	83												
					1		1						
	84		7						1) 40°/J/Mw/Fe/Pa/Pl/Sr				
					0								
1345	85												
		20		100	0	100						38	
	86						M						
					0								
	87												
					0								
	88												
					1		1		1) 55°/J/N/Fe/Su/Pl/Sr 2) 25°/J/N/Fe/Sp/Pl/Sr				
	89												
					0								
1340	90												
		21		100	1	100	2					60	
	91		8				M						
					0		M						
	92						M		Quartzite layer, very strong				
					0								
	93						M						

Report: GEO_CORE_4E; File: 60539527.GPJ; 10/26/2017 B-201

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Figure D-9

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-201

Sheet 7 of 7

Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	93								GNEISS (KJm1), interlayered light to medium gray, fine to medium grained gneissic layers, slightly weathered to fresh, strong to very strong continued...				
	94				0								
					2		1 M		1) 40°/J/N/Mw/Sp/Pl/Sr 2) 30°/J/N/Fe/Su/Pl/Sr 3) 70°/J/Mw/Fe+Mn/Su/Pl/Sr 4) 25°/J/N/Mw/Su/Wa/Sr 5) 10°/J/N/Fe/Su/Pl/Sr				
1335	95	22	8	100		100	2						
					1		3					60	
	96						4						
					1								
	97						M 5 M						
					1								
	98												
					0		M						
	99						1						
					1				1) 30°/J/N/Fe+Bi/Sp/Pl/Sr 2) 45°/J/N/Fe+Mn/Su/Pl/Sr				
1330	100	23		100		100							
					0		M					60	
	101		9				M						
					1				Quartzite layer, very strong				
	102						2						
					0		M						
	103								Bottom of boring at 103.0 feet below ground surface				
	104												
1325	105												
	106												
	107												
	108												
	109												

Report: GEO_CORE_4E; File: 60539527.GPJ; 10/26/2017 B-201

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Figure D-9

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-202

Sheet 1 of 7

Date(s) Drilled	**7/12/17 - 7/13/17**	Logged By	**D. Rector**	Checked By	**C. Goetz**
Drilling Method	**Wireline Coring**	Drill Bit Size/Type	**HQ3**	Total Drilled Depth/Length	**99.0 feet**
Drill Rig Type	**Longyear LF70 - Helo Access**	Drilling Contractor	**Ruen Drilling Inc**	Approximate Surface Elevation	**1437 feet**
Groundwater Level	**Not Measured**	Location	**N: 33.499038 W: -116.991817**	Inclination from Horizontal/Bearing	**90**
Borehole Completion	**Tremie Backfilled with Cement-Bentonite Grout**				

Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	0				N/A				**TONALITE (Kt)**, yellowish brown, phaneritic, coarse grained, completely weathered, extremely weak Breaks down to: sandy CLAY to clayey SAND				
	1				N/A								
1435	2	1		0	N/A	0	NR					80	
	3				N/A								
	4				N/A							100	
	5				N/A								
	6	2	1	0	N/A	0	NR						
1430	7				N/A								
	8				N/A								
	9				N/A				becomes completely to highly weathered, light gray mottled with pink, extremely weak breaks down to: silty clayey SAND				
	10				N/A								
	11	3		0	N/A	0	NR					70	
1425	12				N/A								
	13	4		0		0	NR					11	

Report: GEO_CORE_4E; File: 60539527.GPJ; 10/26/2017 B-202

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Figure D-10

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-202

Elevation, feet	Depth, feet	Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	13	4		0	N/A	0	NR		TONALITE (Kt), light gray mottled with pink, phaneritic, coarse grained, completely to highly weathered, extremely weak Breaks down to: silty clayey SAND continued...			11	
	14				N/A								
	15	5		0	N/A	0	NR					115	
	16				N/A								
1420	17				N/A								
	18				N/A								
	19	6	1	0	N/A	0	NR					38	
	20				N/A								
	21				N/A								
1415	22				N/A								
	23	7		0		0	NR					61	
	24				N/A								
	25				N/A		NR						
	26	8		48	N/A	48*			becomes highly weathered, light gray to white mottled with pink, weak			75	" * " indicates rock strength may not meet requirements for RQD
1410	27				2		1 2		1) 35°/J/N/Fe/Sp/Pl/Sr 2) 35°/J/N/Fe/Sp/Pl/Sr				
	28				2		3 4		3) 40°/J/N/Fe/Sp/Pl/Sr 4) 40°/J/N/Fe/Sp/Pl/Sr				
	29												

ROCK CORE

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Figure D-10

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-202

Sheet 3 of 7

Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	29						NR 1		TONALITE (Kt), light gray to white mottled with pink, phaneritic, coarse grained, highly weathered, weak				
					3		2		continued...				
	30						3		1) 80°/J/Vn/Fe/Sp/Pl/Sr				
							4		2) 10°/J/N/Fe/Su/Pl/Sr				
					3		4		3) 20°/J/N/Fe/Su/St/Sr				
									4) 60°/J/N/Fe/Su/Pl/Sr				
	31		1						5) 35°/J/Mw/Fe+Cl/Su/Pl/Sr				
							5		6) 50°/J/N/Fe/Su/Pl/Sr				
		9		94	3	20*			7) 85°/J/Fe+Cl/Pa/Pl/Sr				
							6		8) 45°/J/N/Fe/Su/Pl/Sr				
									9) 20°/J/Mw/Fe/Sp/Pl/Sr			50	" * " indicates rock strength may not meet requirements for RQD
1405	32						7						
					1								
	33						8						
					4								
	34						9						
							NR 1		1) 75°/J/N/Fe/Pl/Sr				
					2				2) 50°/J/N/Fe/Sp/Pl/Sr				
	35						2		3) 45°/J/Mw/Fe/Sp/Pl/R				
									4) 40°/J/N/Fe/Sp/Pl/Sr				
					3		3		5) 35°/J/N/Fe/Sp/Pl/Sr				
	36								becomes moderately weathered, strong to very strong				
		10		86	2	38	4						
							5					100	
1400	37												
							6		6) 50°/J/N/Fe/Sp/Pl/Sr				
					2				7) 30°/J/Mw/Fe/Sp/Pl/R				
	38						M		8) 40°/J/N/Fe/Sp/Pl/Sr				
			2				7						
					2		8						
	39								becomes slightly weathered				
					2								
							1		1) 15°/J/N/Fe/Sp/Pl/Sr				
	40						2		2) 75°/J/N/Fe/Sp/Pl/Sr				
									3) 45°/J/N/Fe/Sp/Pl/Sr				
					3				4) 45°/J/N/Fe/Sp/Pl/Sr				
							3		5) 55°/J/N/Fe+Mn/Su/Pl/Sr				
							4		6) 45°/J/N/Fe+Mn/Su/Pl/Sr				
	41								7) 70°/J/N/Fe/Sp/Pl/Sr				
							5		8) 25°/J/N/Fe/Sp/Pl/Sr				
		11		100	2	76	6					50	
							7						
1395	42												
					2		8						
													UCS = 16,400 psi PA
	43						M						
					0								
							M						
	44						M						
		12	3	65	1	13	M		becomes moderately to slightly weathered			34	
	45												

Report: GEO_CORE_4E; File: 60539527.GPJ; 10/26/2017 B-202

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Figure D-10

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-202

Sheet 4 of 7

Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	45						2		1) 50°/J/N/Fe/Sp/Pl/Sr				
					10+		3		TONALITE (Kt), light gray to white mottled with pink, phaneritic, coarse grained, moderately to slightly weathered, strong continued...				
	46								very intensely fractured zone				
		12		65	N/A	13	4					34	
1390	47						NR		2) 65°/J/N/Fe/Sp/Pl/Sr 3) 35°/J/N/Fe/Sp/Pl/R 4) 70°/J/Mw/Fe+Cl/Pl/Sr				
					N/A								
	48						1		1) 40°/J/N/Fe/Sp/Pl/Sr 2) 45°/J/N/Fe/Su/Pl/Sr				
					3		2		3) 35°/J/N/Fe/Sp/Pl/Sr				
							3		4) 45°/J/Mw/Fe/Su/Pl/Sr				
	49		3				4		5) 55°/J/N/Fe/Su/Pl/Sr				
		13		100	4	10	5					70	
	50						6		6) 60°/J/N/Fe+Mn/Su/Pl/Sr				
							7		7) 70°/J/N/Fe/Su/Pl/Sr				
					4		8		8) 55°/J/N/Fe/Sp/Pl/Sr				
							9		9) 20°/J/N/Fe/Sp/Pl/Sr				
	51						10		10) 75°/J/N/Fe+Cl/Sp/Pl/Sr				
					3								
							1		**MIGMATITIC GNEISS (KJm2)**, light gray and dark gray, moderately weathered, strong, foliated				
1385	52												
		14		100	2	56	2					50	
	53								1) 25°/J/N/Fe/Sp/Wa/Sr				
							3		2) 15°/J/N/Fe/Sp/Wa/Sr				
							4		3) 10°/J/N/Fe/Sp/Wa/Sr				
					3		5		4) 45°/J/N/Fe-H/Pa/Pl/Sr				
							6		5) 40°/J/N/Fe/Sp/Pl/Sr				
	54								6) 50°/J/N/Fe/Sp/Pl/Sr				
							M						
					0								
	55						M		1) 40°/J/Mw/Fe+Cl/Fi/Wa/Sr				
							1		2) 20°/J/N/Fe+Mn/Su/Pl/Sr				
					2				3) 45°/J/Mw/Fe/Pa/Pl/Sr				
	56						2		4) 45°/J/Mw/Fe/Pa/Pl/Sr				
									5) 65°/J/N/No/N/Pl/Sr				
		15		100	3	62	3					43	
							4						
1380	57												
			4		2		5						
	58								6) 35°/J/Mw/Fe/Pa/Pl/Sr				
									7) 65°/J/Mw/Fe/Su/Pl/Sr				
					3		6		8) 10°/J/Mw/Mn/Sp/Pl/Sr				
							7						
	59						8						
					2								
							1		1) 40°/J/N/Mn/Su/Pl/Sr				
	60	16		100		72			2) 60°/J/N/Mn/Su/Pl/Sr				
							2					43	
					0								
	61												

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Figure D-10

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-202

Sheet 5 of 7

Elevation, feet	Depth, feet	Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
				ROCK CORE									
	61								MIGMATITIC GNEISS (KJm2), light gray and dark gray, moderately weathered, strong, foliated continued...				
					1		3						
1375	62	16	4	100	0	72	M		3) 45°/J/Mw/Fe/Fi/Pl/Sr 4) 40°/J/N/Mw/Su/Pl/Sr 5) 35°/J/N/Fe/Sp/Pl/Sr			43	
	63				2		4 5						
	64												
					1		1						
	65						2		1) 70°/J/N/Fe/Fi/Pl/Sr 2) 5°/J/N/Fe/Sp/Wa/Sr 3) 40°/J/N/Fe/Su/Pl/Sr				
					1				4) 70°/J/N/Fe/Su/Pl/Sr 5) 70°/J/N/Fe-H/Su/Pl/Sr				
	66								6) 60°/J/N/Cl/Fi/Pl/Sr				
		17		100	2	54	3		7) 50°/J/N/Fe/Su/Pl/Sr			38	
							4		becomes moderately to highly weathered, weak				
1370	67						5						
					2								
	68		5						highly fractured zone				
					3		6						
	69						7		becomes moderately weathered, strong				
					1		1		1) 10°/J/Mw/Fe/Su/St/Sr 2) 30°/J/W/Fe/Sp/Pl/Sr				
	70								3) 85°/J/Mn+Fe/Su/Pl/Sr 4) 25°/J/N/Fe+Mn/Pl/Sr				
					2		2						
	71	18		100		51						45	
					2		2						
1365	72						3						
					2								
	73						4 M						
					2		1						
							2		1) 10°/J/N/Fe/Sp/Pl/Sr 2) 25°/J/N/Fe/Sp/Pl/Sr				
	74						3		3) 15°/J/N/Fe/Sp/Pl/Sr 4) 80°-90°/J/Mw/Mn/Fi/Pl/Sr				
					4		4 5		5) 60°/J/Mw/Fe+Mn/Su/Pl/Sr				
	75						6						
		19	6	100		42	M M		becomes slightly weathered, strong			34	
					3		7		6) 50°/J/Mw/Cl+Fe/Fi/Pl/Sr				
							8		7) 65°/J/N/Fe/Su/Pl/Sr				
	76						M		8) 20°/J/N/Fe/Sp/Pl/Sr				
					1		9		9) 10°/J/N/Fe/Sp/Pl/Sr				
							M						
1360	77												

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Figure D-10

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-202

Sheet 6 of 7

Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
1360	77	19		100	0	42			MIGMATITIC GNEISS (KJm2), light gray and dark gray, slightly weathered, strong, foliated continued... 1) 30°/J/N/Fe/Sp/Pl/Sr 2) 10°/J/N/Fe/Pl/Sr			34	
	78				3		1 2 3		3) 20°/J/N/Fe/Su/Pl/Sr 4) 60°/Fo/N/No/N/Pl/Sr 5) 45°/Fo/N/No/N/Pl/Sr 6) 70°/Fo/N/Fe/Sp/Pl/Sr 7) 40°/Fo/N/Fe/Su/Pl/Sr				
	79	20	6	100	2	17	4		completely weathered to dark gray CLAY (CL)			20	
	80				10+		5 6 7 8		**GNEISS (KJm1)**, interlayered light gray and medium gray, fine to medium grained gneissic layers, highly to moderately weathered, fine to medium grained, weak, foliated				
	81				1		1		becomes slightly weathered, strong to very strong				
1355	82	21		100	2	90	2		1) 50°/J/N/Fe/Sp/Pl/Sr 2) 45°/Fo/N/N/No/Pl/Sr 3) 65°/J/Fo/N/No/N/Pl/Sr 4) 60°/J/Mw/Fe+Mn/Fi/Pl/Sr			36	
	83				1		3 4						
	84				0								
	85		7		1		M 1						
	86	22		100	1	96	2		1) 20°/Fo/N/Fe+Mn/Su/Pl/Sr 2) 40°/J/N/Fe+Mn/Su/Pl/Sr 3) 40°/J/N/Fe+Mn/Su/Wa/Sr 4) 50°/J/N/Fe+Mn/Su/Pl/Sr 5) 30°/J/N/Fe/Sp/Wa/Sr			50	
1350	87				2		3 4						
	88				1		5						
	89				0								
	90				0								
	91	23	8	100	0	98						38	
1345	92				0								
	93												

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Figure D-10

Project: RCWD - Vail Dam
Project Location: Temecula, CA
Project Number: 60539527

Log of Core Boring B-202

Elevation, feet	Depth, feet	ROCK CORE: Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Fracture Drawing Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Test Intervals	Drill Rate, feet/hour	FIELD NOTES AND LAB TESTS
	93	23	8	100	2	98	1 2		GNEISS (KJm1), interlayered light gray and medium gray, fine to medium grained gneissic layers, slightly weathered, fine to medium grained, strong to very strong, foliated continued...			38	
	94				1		1		1) 60°/J/W/Fe/Fi/Pl/Sr 2) 45°/J/N/Fe/Sp/Pl/Sr				
	95				1		2						
	96	24		100	1	68	3		1) 50°/J/N/Fe/Sp/Pl/Sr 2) 30°/J/N/Fe/Sp/Pl/Sr 3) 70°-80°/J/Mw/Fe/Fi/Wa/Sr 4) 80°-90°/J/N/Fe+Cl/Fi/Wa/Sr			38	
1340	97				1		4						
	98				1								
	99								Bottom of boring at 99.0 feet below ground surface				
	100												
	101												
1335	102												
	103												
	104												
	105												
	106												
1330	107												
	108												
	109												

Report: GEO_CORE_4E; File: 60539527.GPJ; 10/26/2017 B-202

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Figure D-10

Date(s) Excavated	August 10, 2021	Logged By:	M. Skakun
Excavation Contractor	Innovative Service Group	Checked By:	C. Goetz
Excavation Equipment	CASE CX145D SR Excavator	Excavation Trend	N40W
Approximate Surface Elevation	1482.7 ft NAVD88	Location	N 2,125,164 E 6,339,865

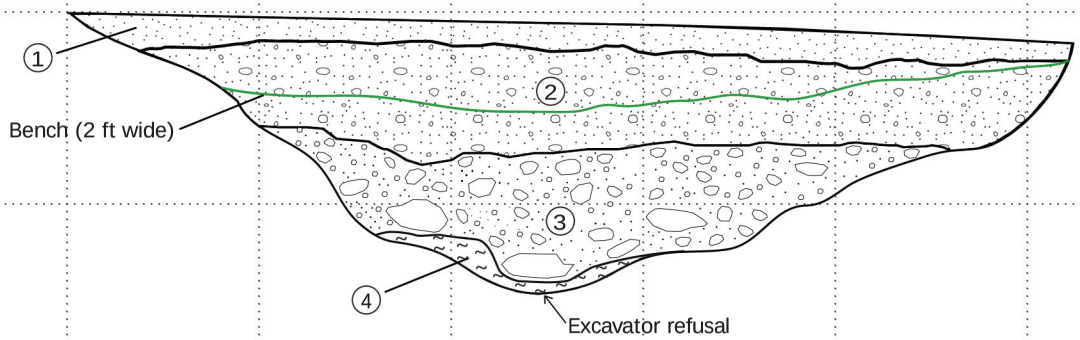
Log of Test Pit TP-1

Project: Vail Dam Seismic and Hydrologic Remediation Project
Project Location: Temecula, CA
Project Number: 60580537

MATERIAL DESCRIPTION	ORIENTATION DATA	SAMPLES	WC (%)	DUW (pcf)	LABORATORY TESTS
(1) Silty SAND (SM) with few subrounded gravels to 2", dark brown (10 YR 3/3), moist [FILL]					
(2) Poorly-graded SAND (SP) with some subangular, fine to coarse gravels and few cobbles to 10", light yellowish brown (10YR 6/3)					
(3) Poorly-graded GRAVEL (GP) with fine to coarse sand, cobbles, and boulders to 32", light yellowish brown (10YR 6/3)					
(4) METAMORPHIC ROCK (GNEISS), gray (5Y 5/1), moderately strong, moderately weathered [KJm1]					

Scale (horizontal and vertical): 1 inch = 5 feet

Graphic Representation: Looking East



Total Depth - 7.5 feet bgs

No Groundwater encountered

Backfilled with cuttings, tamped and rolled with excavator.

Reported elevation is from North side of test pit

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Figure D-11

Date(s) Excavated	August 9, 2021	Logged By:	M. Skakun
Excavation Contractor	Innovative Service Group	Checked By:	C. Goetz
Excavation Equipment	CASE CX145D SR Excavator	Excavation Trend	N40W
Approximate Surface Elevation	1480.9 ft NAVD88	Location	N 2,125,129 E 6,339,898

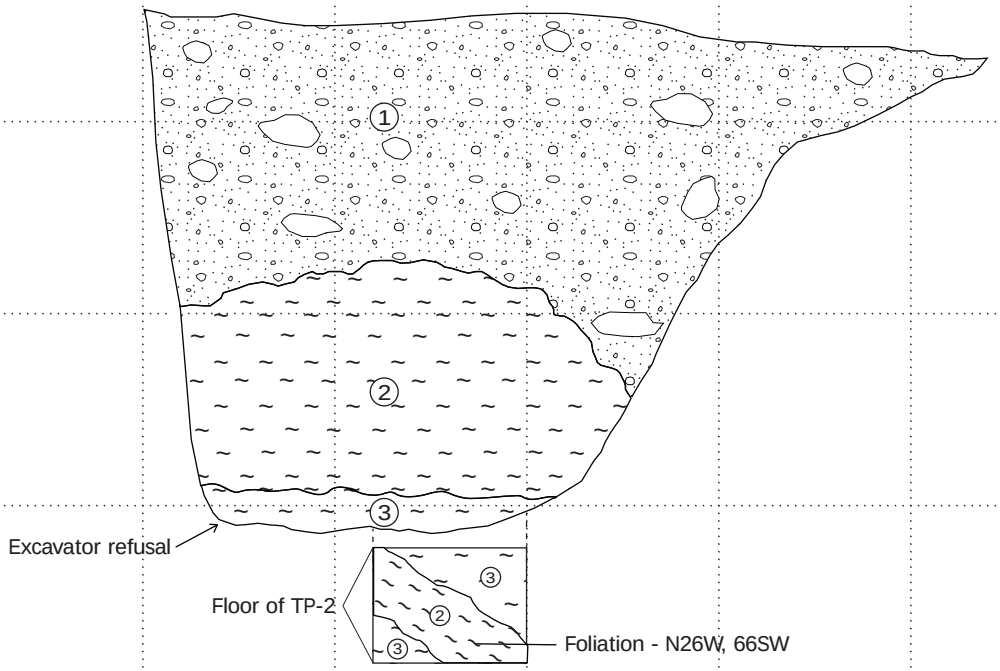
Log of Test Pit TP-2

Project: Vail Dam Seismic and Hydrologic Remediation Project
Project Location: Temecula, CA
Project Number: 60580537

MATERIAL DESCRIPTION	ORIENTATION DATA	SAMPLES	WC (%)	DUW (pcf)	LABORATORY TESTS
(1) Poorly-graded GRAVEL (GP) with sand, cobbles and boulders, brown (7.5YR 5/4), clast-supported, mostly coarse gravels to 3", Some silty fine-grain sand, little cobbles to 10", few boulders to 14" [FILL]					
(2) METAMORPHIC ROCK (GNEISS), light gray (2.5Y 7/2), weak, highly weathered [KJm1]	Foliation - N26W, 66SW				
(3) METAMORPHIC ROCK (GNEISS), gray (5Y 5/1), moderately strong, moderately weathered					

Scale (horizontal and vertical): 1 inch = 5 feet

Graphic Representation: Looking East



Total Depth - 13 feet bgs

No Groundwater encountered

Backfilled with cuttings, tamped and rolled with excavator.

Reported elevation is from North side of test pit

AECOM

Figure D-12

Date(s) Excavated	August 9, 2021	Logged By:	M. Skakun
Excavation Contractor	Innovative Service Group	Checked By:	C. Goetz
Excavation Equipment	CASE CX145D SR Excavator	Excavation Trend	N45W
Approximate Surface Elevation	1479.7 ft NAVD88	Location	N 2,125,091 E 6,339,932

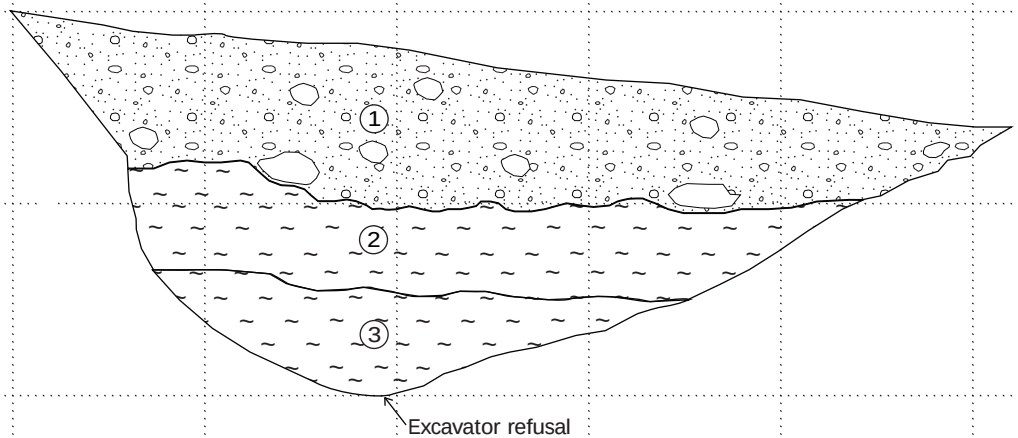
Log of Test Pit TP-3

Project: Vail Dam Seismic & Hydrologic Remediation Project
Project Location: Temecula, CA
Project Number: 60580537

MATERIAL DESCRIPTION	ORIENTATION DATA	SAMPLES	WC (%)	DUW (pcf)	LABORATORY TESTS
(1) Clayey SAND (SC) with gravel, cobbles and boulders, brown (7.5YR 5/4), mostly fine to coarse-grain sand, little low plasticity clay, little gravels to 3", few cobbles to 10", trace boulders to 14" [FILL]					
(2) METAMORPHIC ROCK (GNEISS), light gray (10YR 7/2), weak, highly weathered [KJm1]					
(3) METAMORPHIC ROCK (GNEISS), light olive gray (5Y 6/2), moderately strong, moderately weathered	Foliation - N30W, 70SW				

Scale (horizontal and vertical): 1 inch = 5 feet

Graphic Representation: Looking East



Total Depth - 9 feet bgs

No Groundwater encountered

Backfilled with cuttings, tamped and rolled with excavator.

Reported elevation is from North side of test pit

AECOM

Figure D-13

Appendix E

Core Box Photographs

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Box 1 of 10: Depths 0.0 feet to 24.3 feet



Box 2 of 10: Depths 24.3 feet to 44.0 feet

Rancho California Water District

AECOM

CORE PHOTOGRAPHS BORING B-101

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: A. Avakian	DATE: 8/21/2017	FIGURE NO: E-1
CHECKED BY: L. Handfelt	DATE: 8/21/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix E - Core Box Photographs\B-101 Core Box Photos.xlsx\Box 1 and 2



Box 3 of 10: Depths 44.0 feet to 58.7 feet



Box 4 of 10: Depths 58.7 feet to 73.9 feet

Rancho California Water District

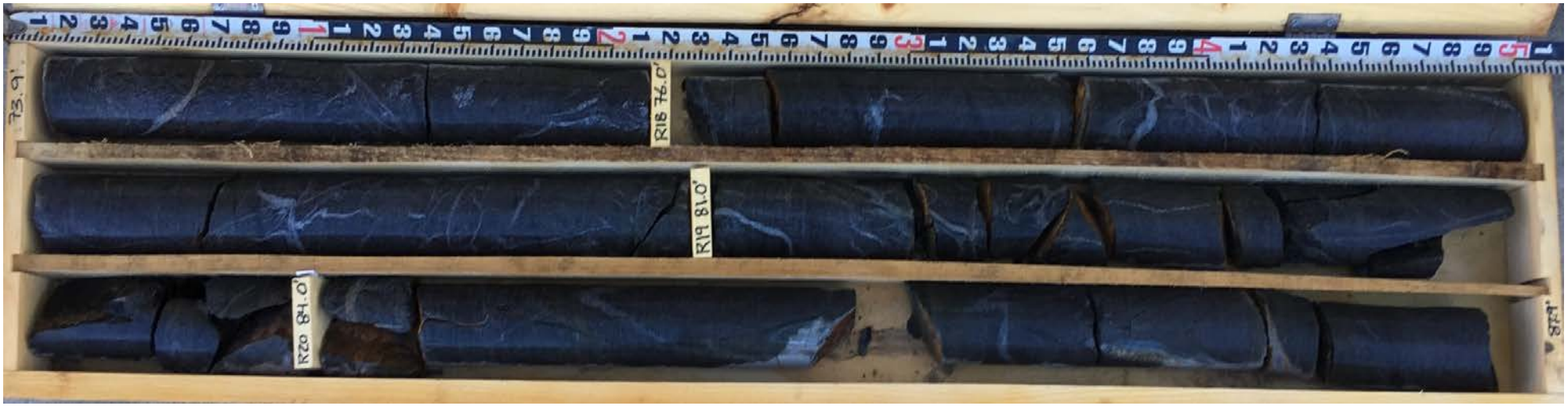
AECOM

CORE PHOTOGRAPHS BORING B-101

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: A. Avakian	DATE: 8/21/2017	FIGURE NO: E-2
CHECKED BY: L. Handfelt	DATE: 8/21/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix E - Core Box Photographs\B-101 Core Box Photos.xlsx\Box 3 and 4



Box 5 of 10: Depths 73.9 feet to 87.9 feet



Box 6 of 10: Depths 87.9 feet to 102.0 feet

Rancho California Water District

AECOM

CORE PHOTOGRAPHS BORING B-101

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: A. Avakian	DATE: 8/21/2017	FIGURE NO: E-3
CHECKED BY: L. Handfelt	DATE: 8/21/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix E - Core Box Photographs\B-101 Core Box Photos.xlsx\Box 5 and 6



Box 7 of 10: Depths 102.0 feet to 115.7 feet



Box 8 of 10: Depths 115.7 feet to 129.0 feet

Rancho California Water District

AECOM

CORE PHOTOGRAPHS BORING B-101

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: A. Avakian	DATE: 8/21/2017	FIGURE NO: E-4
CHECKED BY: L. Handfelt	DATE: 8/21/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix E - Core Box Photographs\B-101 Core Box Photos.xlsx\Box 7 and 8



Box 9 of 10: Depths 129.0 feet to 143.2 feet



Box 10 of 10: Depths 143.2 feet to 150.5 feet

Rancho California Water District

AECOM

CORE PHOTOGRAPHS BORING B-101

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: A. Avakian	DATE: 8/21/2017	FIGURE NO: E-5
CHECKED BY: L. Handfelt	DATE: 8/21/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix E - Core Box Photographs\B-101 Core Box Photos.xlsx\Box 9 and 10



Box 1 of 14: Depths 0.0 feet to 29.8 feet



Box 2 of 14: Depths 29.8 feet to 42.9 feet

Rancho California Water District

AECOM

CORE PHOTOGRAPHS BORING B-102

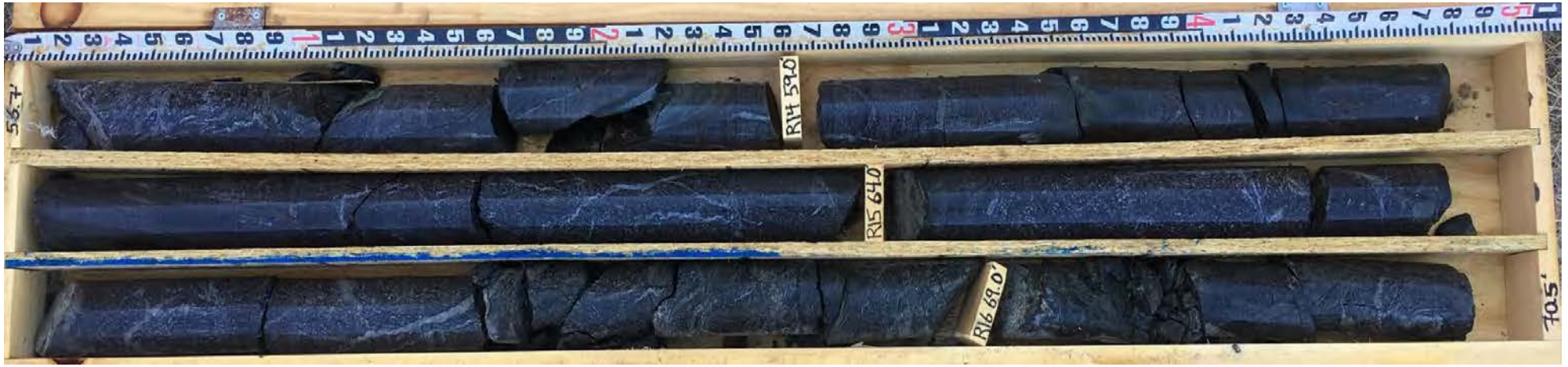
Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: A. Avakian	DATE: 8/21/2017	FIGURE NO: E-6
CHECKED BY: L. Handfelt	DATE: 8/21/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix E - Core Box Photographs\B-102 Core Photos.xlsx\Box 1 and 2



Box 3 of 14: Depths 42.9 feet to 56.7 feet



Box 4 of 14: Depths 56.7 feet to 70.5 feet

Rancho California Water District

AECOM

CORE PHOTOGRAPHS BORING B-102

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: A. Avakian	DATE: 8/21/2017	FIGURE NO: E-7
CHECKED BY: L. Handfelt	DATE: 8/21/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix E - Core Box Photographs\B-102 Core Photos.xlsx\Box 3 and 4



Box 5 of 14: Depths 70.5 feet to 84.8 feet



Box 6 of 14: Depths 84.8 feet to 98.5 feet

Rancho California Water District

AECOM

CORE PHOTOGRAPHS BORING B-102

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: A. Avakian	DATE: 8/21/2017	FIGURE NO: E-8
CHECKED BY: L. Handfelt	DATE: 8/21/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix E - Core Box Photographs\B-102 Core Photos.xlsx\Box 5 and 6



Box 7 of 14: Depths 98.5 feet to 112.6 feet



Box 8 of 14: Depths 112.6 feet to 126.8 feet

Rancho California Water District

AECOM

CORE PHOTOGRAPHS BORING B-102

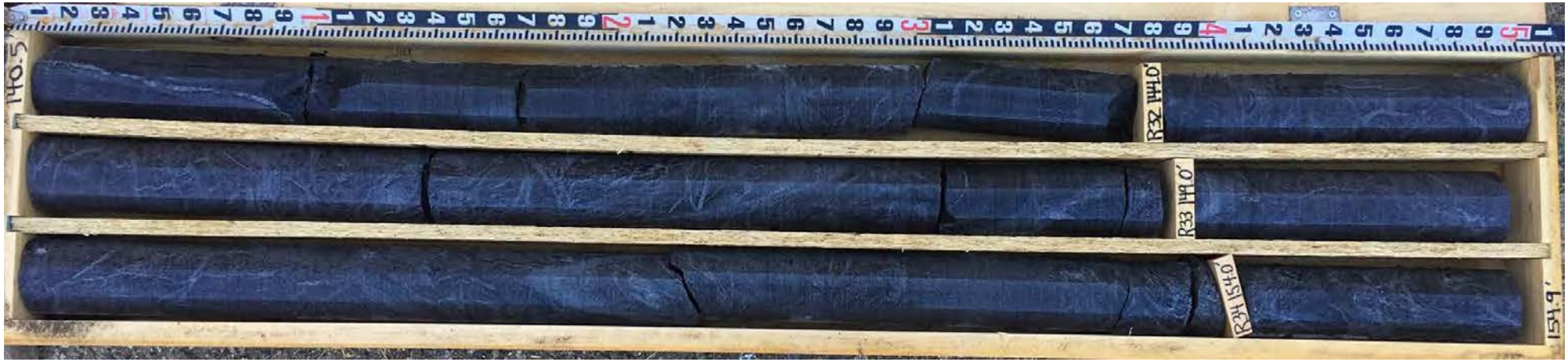
Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: A. Avakian	DATE: 8/21/2017	FIGURE NO: E-9
CHECKED BY: L. Handfelt	DATE: 8/21/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix E - Core Box Photographs\B-102 Core Photos.xlsx\Box 7 and 8



Box 9 of 14: Depths 126.8 feet to 140.5 feet



Box 10 of 14: Depths 140.5 feet to 154.9 feet

Rancho California Water District

AECOM

CORE PHOTOGRAPHS BORING B-102

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: A. Avakian	DATE: 8/21/2017	FIGURE NO: E-10
CHECKED BY: L. Handfelt	DATE: 8/21/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix E - Core Box Photographs\B-102 Core Photos.xlsx\Box 9 and 10



Box 11 of 14: Depths 154.9 feet to 169.0 feet



Box 12 of 14: Depths 169.0 feet to 183.5 feet

Rancho California Water District

AECOM

CORE PHOTOGRAPHS BORING B-102

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: A. Avakian	DATE: 8/21/2017	FIGURE NO: E-11
CHECKED BY: L. Handfelt	DATE: 8/21/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix E - Core Box Photographs\B-102 Core Photos.xlsx\Box 11 and 12



Box 13 of 14: Depths 183.5 feet to 197.1 feet



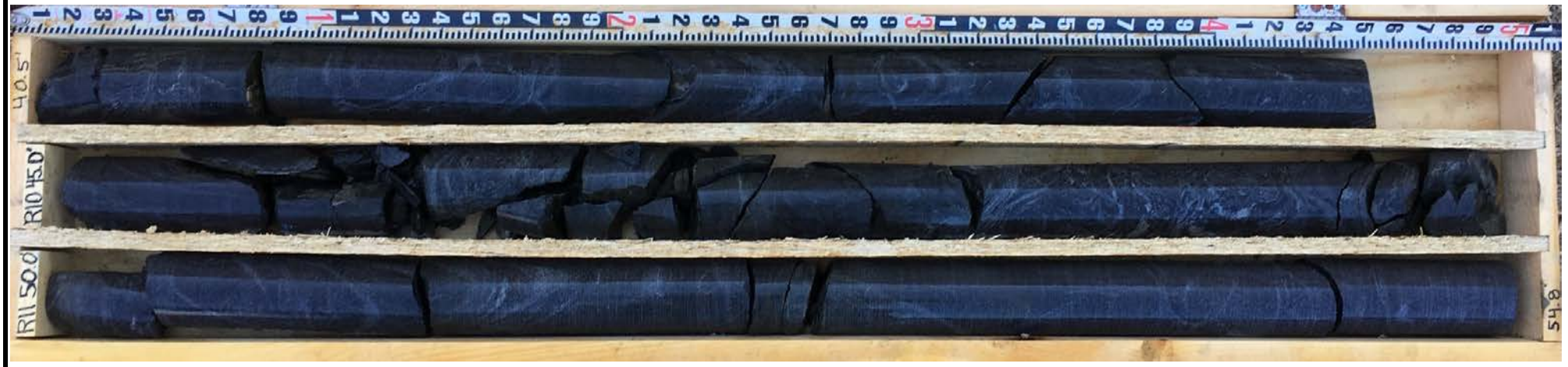
Box 14 of 14: Depths 197.1 feet to 200.0 feet

Rancho California Water District	AECOM	**CORE PHOTOGRAPHS BORING B-102** Vail Dam Geotechnical Investigation, Temecula, California		
		DRAWN BY: A. Avakian	DATE: 8/21/2017	FIGURE NO: E-12
		CHECKED BY: L. Handfelt	DATE: 8/21/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix E - Core Box Photographs\B-102 Core Photos.xlsx\Box 13 and 14



Box 1 of 13: Depths 0.0 feet to 40.5 feet



Box 2 of 13: Depths 40.5 feet to 54.8 feet

Rancho California Water District

AECOM

CORE PHOTOGRAPHS BORING B-103

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: A. Avakian	DATE: 8/21/2017	FIGURE NO: E-13
CHECKED BY: L. Handfelt	DATE: 8/21/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix E - Core Box Photographs\B-103 Core Photos.xlsx\Box 1 and 2



Box 3 of 13: Depths 54.8 feet to 68.5 feet



Box 4 of 13: Depths 68.5 feet to 81.6 feet

Rancho California Water District

AECOM

CORE PHOTOGRAPHS BORING B-103

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: A. Avakian	DATE: 8/21/2017	FIGURE NO: E-14
CHECKED BY: L. Handfelt	DATE: 8/21/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix E - Core Box Photographs\B-103 Core Photos.xlsx\Box 3 and 4



Box 5 of 13: Depths 81.6 feet to 95.0 feet



Box 6 of 13: Depths 95.0 feet to 108.5 feet

Rancho California Water District

AECOM

CORE PHOTOGRAPHS BORING B-103

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: A. Avakian	DATE: 8/21/2017	FIGURE NO: E-15
CHECKED BY: L. Handfelt	DATE: 8/21/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix E - Core Box Photographs\B-103 Core Photos.xlsx\Box 5 and 6



Box 7 of 13: Depths 108.5 feet to 122.6 feet



Box 8 of 13: Depths 122.6 feet to 136.4 feet

Rancho California Water District

AECOM

CORE PHOTOGRAPHS BORING B-103

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: A. Avakian	DATE: 8/21/2017	FIGURE NO: E-16
CHECKED BY: L. Handfelt	DATE: 8/21/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix E - Core Box Photographs\B-103 Core Photos.xlsx\Box 7 and 8



Box 9 of 13: Depths 136.4 feet to 150.5 feet



Box 10 of 13: Depths 150.5 feet to 164.1 feet

Rancho California Water District

AECOM

CORE PHOTOGRAPHS BORING B-103

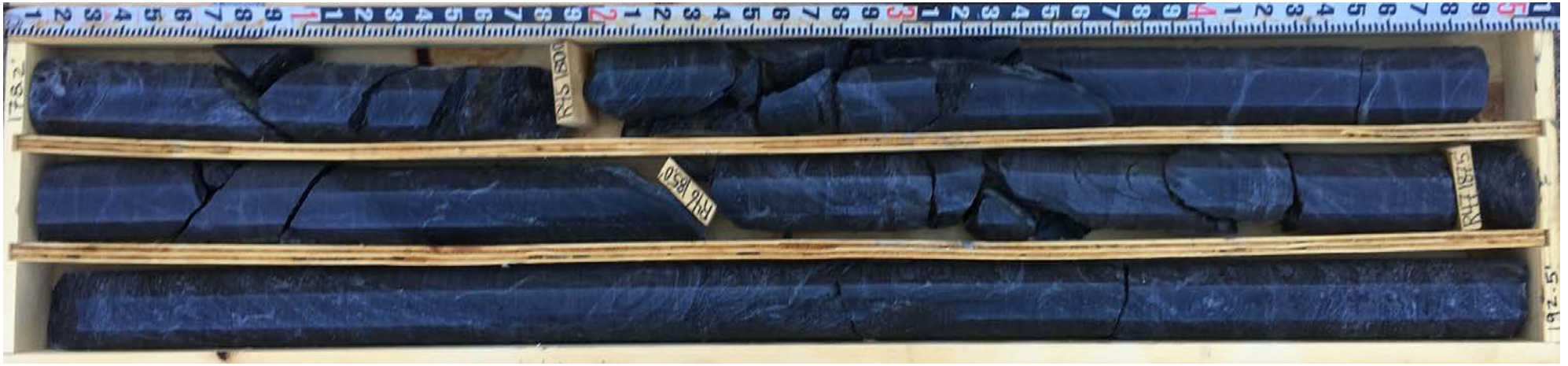
Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: A. Avakian	DATE: 8/21/2017	FIGURE NO: E-17
CHECKED BY: L. Handfelt	DATE: 8/21/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix E - Core Box Photographs\B-103 Core Photos.xlsx\Box 9 and 10



Box 11 of 13: Depths 164.1 feet to 178.2 feet



Box 12 of 13: Depths 178.2 feet to 192.5 feet

Rancho California Water District

AECOM

CORE PHOTOGRAPHS BORING B-103

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: A. Avakian	DATE: 8/21/2017	FIGURE NO: E-18
CHECKED BY: L. Handfelt	DATE: 8/21/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix E - Core Box Photographs\B-103 Core Photos.xlsx\Box 11 and 12



Box 13 of 13: Depths 192.5 feet to 200.0 feet

Rancho California Water District	AECOM	**CORE PHOTOGRAPHS BORING B-103** Vail Dam Geotechnical Investigation, Temecula, California		
		DRAWN BY: A. Avakian	DATE: 8/21/2017	FIGURE NO: E-19
		CHECKED BY: L. Handfelt	DATE: 8/21/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix E - Core Box Photographs\B-103 Core Photos.xlsx\Box 13



Box 1 of 11: Depths 0.0 feet to 15.4 feet



Box 2 of 11: Depths 15.4 feet to 29.5 feet

Rancho California Water District

AECOM

CORE PHOTOGRAPHS BORING B-104

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: A. Avakian	DATE: 8/21/2017	FIGURE NO: E-20
CHECKED BY: L. Handfelt	DATE: 8/21/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix E - Core Box Photographs\B-104 Core Photographs.xlsx\Box 1 and 2



Box 3 of 11: Depths 29.5 feet to 43.0 feet



Box 4 of 11: Depths 43.0 feet to 56.9 feet

Rancho California Water District

AECOM

CORE PHOTOGRAPHS BORING B-104

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: A. Avakian	DATE: 8/21/2017	FIGURE NO: E-21
CHECKED BY: L. Handfelt	DATE: 8/21/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix E - Core Box Photographs\B-104 Core Photographs.xlsx\Box 3 and 4



Box 5 of 11: Depths 56.9 feet to 70.0 feet



Box 6 of 11: Depths 70.0 feet to 83.9 feet

Rancho California Water District

AECOM

CORE PHOTOGRAPHS BORING B-104

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: A. Avakian	DATE: 8/21/2017	FIGURE NO: E-22
CHECKED BY: L. Handfelt	DATE: 8/21/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix E - Core Box Photographs\B-104 Core Photographs.xlsx\Box 5 and 6



Box 7 of 11: Depths 83.9 feet to 97.5 feet



Box 8 of 11: Depths 97.5 feet to 111.5 feet

Rancho California Water District

AECOM

CORE PHOTOGRAPHS BORING B-104

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: A. Avakian	DATE: 8/21/2017	FIGURE NO: E-23
CHECKED BY: L. Handfelt	DATE: 8/21/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix E - Core Box Photographs\B-104 Core Photographs.xlsx\Box 7 and 8



Box 9 of 11: Depths 111.5 feet to 125.0 feet



Box 10 of 11: Depths 125.0 feet to 139.1 feet

Rancho California Water District

AECOM

CORE PHOTOGRAPHS BORING B-104

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: A. Avakian	DATE: 8/21/2017	FIGURE NO: E-24
CHECKED BY: L. Handfelt	DATE: 8/21/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix E - Core Box Photographs\B-104 Core Photographs.xlsx\Box 9 and 10



Box 11 of 11: Depths 139.1 feet to 150.0 feet

Rancho California Water District

AECOM

CORE PHOTOGRAPHS BORING B-104

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: A. Avakian	DATE: 8/21/2017	FIGURE NO: E-25
CHECKED BY: L. Handfelt	DATE: 8/21/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix E - Core Box Photographs\B-104 Core Photographs.xlsx\Box 11



Box 1 of 7: Depths 0.0 feet to 15.2 feet



Box 2 of 7: Depths 15.2 feet to 29.3 feet

Rancho California Water District

AECOM

CORE PHOTOGRAPHS BORING B-105

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: A. Avakian	DATE: 8/21/2017	FIGURE NO: E-26
CHECKED BY: L. Handfelt	DATE: 8/21/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix E - Core Box Photographs\B-105 Core Photos.xlsx\Box 1 and 2



Box 3 of 7: Depths 29.3 feet to 43.1 feet



Box 4 of 7: Depths 43.1 feet to 57.2 feet

Rancho California Water District

AECOM

CORE PHOTOGRAPHS BORING B-105

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: A. Avakian	DATE: 8/21/2017	FIGURE NO: E-27
CHECKED BY: L. Handfelt	DATE: 8/21/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix E - Core Box Photographs\B-105 Core Photos.xlsx\Box 3 and 4



Box 5 of 7: Depths 57.2 feet to 71.6 feet



Box 6 of 7: Depths 71.6 feet to 86.3 feet

Rancho California Water District

AECOM

CORE PHOTOGRAPHS BORING B-105

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: A. Avakian	DATE: 8/21/2017	FIGURE NO: E-28
CHECKED BY: L. Handfelt	DATE: 8/21/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix E - Core Box Photographs\B-105 Core Photos.xlsx\Box 5 and 6



Box 7 of 7: Depths 86.3 feet to 100.2 feet

Rancho California Water District	AECOM	**CORE PHOTOGRAPHS BORING B-105** Vail Dam Geotechnical Investigation, Temecula, California		
		DRAWN BY: A. Avakian	DATE: 8/21/2017	FIGURE NO: E-29
		CHECKED BY: L. Handfelt	DATE: 8/21/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix E - Core Box Photographs\B-105 Core Photos.xlsx\Box 7



Box 1 of 6: Depths 0.0 feet to 35.4 feet



Box 2 of 6: Depths 35.4 feet to 49.1 feet

Rancho California Water District

AECOM

CORE PHOTOGRAPHS BORING B-106

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: A. Avakian	DATE: 8/21/2017	FIGURE NO: E-30
CHECKED BY: L. Handfelt	DATE: 8/21/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix E - Core Box Photographs\B-106 Core Photos.xlsx\Box 1 and 2



Box 3 of 6: Depths 49.1 feet to 64.1 feet



Box 4 of 6: Depths 64.1 feet to 78.8 feet

Rancho California Water District

AECOM

CORE PHOTOGRAPHS BORING B-106

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: A. Avakian	DATE: 8/21/2017	FIGURE NO: E-31
CHECKED BY: L. Handfelt	DATE: 8/21/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix E - Core Box Photographs\B-106 Core Photos.xlsx\Box 3 and 4



Box 5 of 6: Depths 78.8 feet to 93.2 feet



Box 6 of 6: Depths 93.2 feet to 100.7 feet

Rancho California Water District

AECOM

CORE PHOTOGRAPHS BORING B-106

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: A. Avakian	DATE: 8/21/2017	FIGURE NO: E-32
CHECKED BY: L. Handfelt	DATE: 8/21/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix E - Core Box Photographs\B-106 Core Photos.xlsx\Box 5 and 6



Box 1 of 6: Depths 0.0 feet to 37.4 feet



Box 2 of 6: Depths 37.4 feet to 51.9 feet

Rancho California Water District

AECOM

CORE PHOTOGRAPHS BORING B-107

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: A. Avakian	DATE: 8/21/2017	FIGURE NO: E-33
CHECKED BY: L. Handfelt	DATE: 8/21/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix E - Core Box Photographs\B-107 Core Photos.xlsx\Box 1 and 2



Box 3 of 6: Depths 51.9 feet to 65.8 feet



Box 4 of 6: Depths 65.8 feet to 79.7 feet

Rancho California Water District

AECOM

CORE PHOTOGRAPHS BORING B-107

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: A. Avakian	DATE: 8/21/2017	FIGURE NO: E-34
CHECKED BY: L. Handfelt	DATE: 8/21/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix E - Core Box Photographs\B-107 Core Photos.xlsx\Box 3 and 4



Box 5 of 6: Depths 79.7 feet to 93.1 feet



Box 6 of 6: Depths 93.1 feet to 100.3 feet

Rancho California Water District

AECOM

CORE PHOTOGRAPHS BORING B-107

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: A. Avakian	DATE: 8/21/2017	FIGURE NO: E-35
CHECKED BY: L. Handfelt	DATE: 8/21/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix E - Core Box Photographs\B-107 Core Photos.xlsx\Box 5 and 6



Box 1 of 9: Depths 13.0 feet to 30.9 feet



Box 2 of 9: Depths 30.9 feet to 40.9 feet

Rancho California Water District	AECOM	**CORE PHOTOGRAPHS** **BORING B-201** Vail Dam Geotechnical Investigation, Temecula, California		
		DRAWN BY: A. Avakian	DATE: 8/21/2017	FIGURE NO: E-36
		CHECKED BY: L. Handfelt	DATE: 8/21/2017	



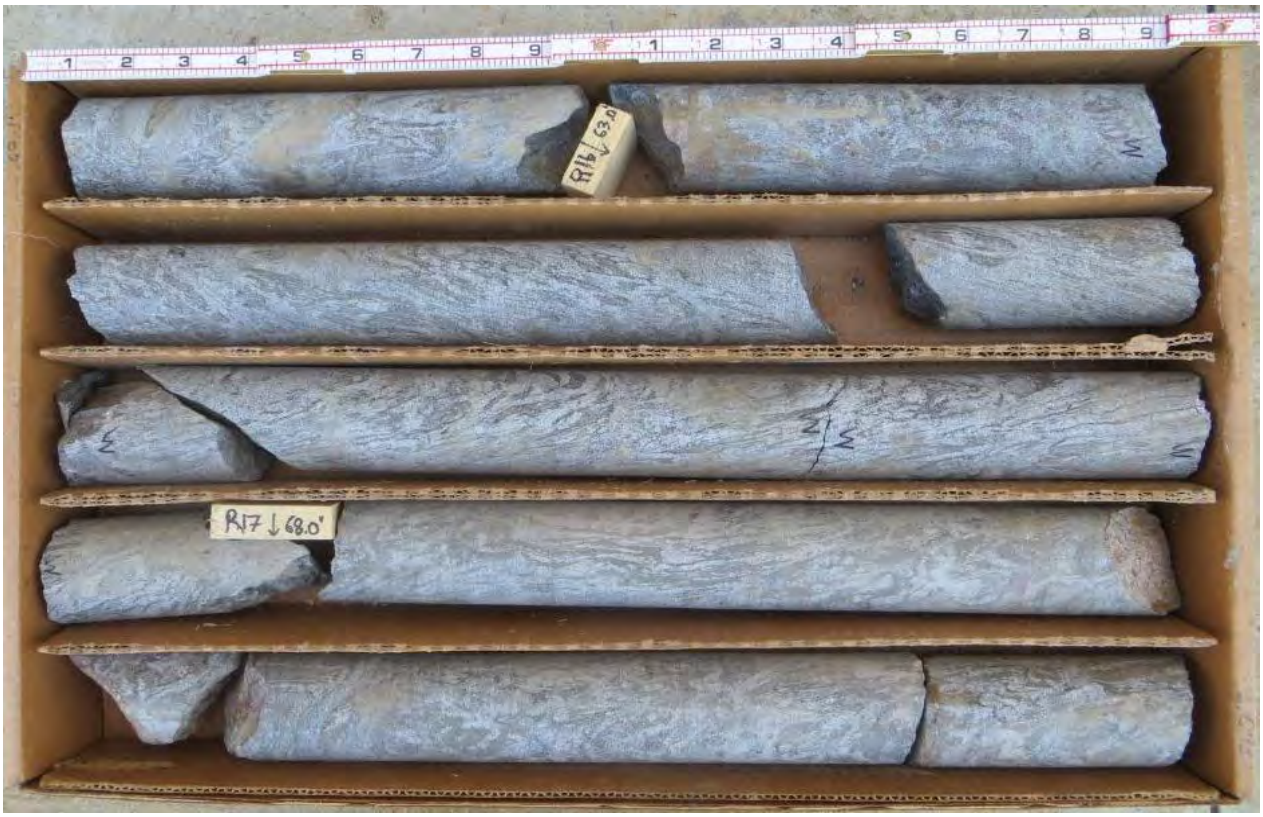
Box 3 of 9: Depths 40.9 feet to 49.9 feet



Box 4 of 9: Depths 49.9 feet to 62.2 feet

Rancho California Water District	AECOM	**CORE PHOTOGRAPHS** **BORING B-201** Vail Dam Geotechnical Investigation, Temecula, California		
		DRAWN BY: A. Avakian	DATE: 8/21/2017	FIGURE NO: E-37
		CHECKED BY: L. Handfelt	DATE: 8/21/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix E - Core Box Photographs\Boring B-201 Core Photos.xlsx\B-201-2



Box 5 of 9: Depths 62.2 feet to 71.7 feet



Box 6 of 9: Depths 71.7 feet to 80.3 feet

Rancho California Water District

AECOM

CORE PHOTOGRAPHS
BORING B-201

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: A. Avakian	DATE: 8/21/2017	FIGURE NO: E-38
CHECKED BY: L. Handfelt	DATE: 8/21/2017	

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Box 7 of 9: Depths 80.3 feet to 89.0 feet



Box 8 of 9: Depths 89.0 feet to 98.8 feet

Rancho California Water District

AECOM

CORE PHOTOGRAPHS
BORING B-201

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: A. Avakian	DATE: 8/21/2017	FIGURE NO: E-39
CHECKED BY: L. Handfelt	DATE: 8/21/2017	

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Box 9 of 9: Depths 98.8 feet to 103.0 feet

Rancho California Water District	AECOM	**CORE PHOTOGRAPHS** **BORING B-201** Vail Dam Geotechnical Investigation, Temecula, California		
		DRAWN BY: A. Avakian	DATE: 8/21/2017	FIGURE NO: E-40
		CHECKED BY: L. Handfelt	DATE: 8/21/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix E - Core Box Photographs\Boring B-201 Core Photos.xlsx\B-201-5



Box 1 of 8: Depths 26.6 feet to 34.0 feet



Box 2 of 8: Depths 34.0 feet to 44.0 feet

Rancho California Water District	AECOM	**CORE PHOTOGRAPHS** **BORING B-202** Vail Dam Geotechnical Investigation, Temecula, California	
		DRAWN BY: A. Avakian / DATE: 8/21/2017	FIGURE NO: E-41
		CHECKED BY: L. Handfelt / DATE: 8/21/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix E - Core Box Photographs\Boring B-202 Core Photos.xlsx\B-202-1



Box 3 of 8: Depths 44.0 feet to 54.0 feet



Box 4 of 8: Depths 54.0 feet to 63.6 feet

Rancho California Water District	AECOM	**CORE PHOTOGRAPHS** **BORING B-202** Vail Dam Geotechnical Investigation, Temecula, California	
		DRAWN BY: A. Avakian / DATE: 8/21/2017	FIGURE NO: E-42
		CHECKED BY: L. Handfelt / DATE: 8/21/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix E - Core Box Photographs\Boring B-202 Core Photos.xlsx\B-202-2



Box 5 of 8: Depths 63.6 feet to 72.8 feet



Box 6 of 8: Depths 72.8 feet to 81.8 feet

Rancho California Water District	AECOM	**CORE PHOTOGRAPHS** **BORING B-202** Vail Dam Geotechnical Investigation, Temecula, California	
		DRAWN BY: A. Avakian / DATE: 8/21/2017	FIGURE NO: E-43
		CHECKED BY: L. Handfelt / DATE: 8/21/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix E - Core Box Photographs\Boring B-202 Core Photos.xlsx\B-202-3



Box 7 of 8: Depths 81.8 feet to 89.3 feet



Box 8 of 8: Depths 89.3 feet to 99.0 feet

Rancho California Water District	AECOM	**CORE PHOTOGRAPHS** **BORING B-202** Vail Dam Geotechnical Investigation, Temecula, California		
		DRAWN BY: A. Avakian	DATE: 8/21/2017	FIGURE NO: E-44
		CHECKED BY: L. Handfelt	DATE: 8/21/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix E - Core Box Photographs\Boring B-202 Core Photos.xlsx\B-202-4

Appendix F

Packer Permeability Tests

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Appendix F
Packer Permeability Tests

This appendix presents the results of the packer tests (Lugeon tests) that were performed in Borings B-101 through B-104. The data are presented on a Summary of Lugeon Data Table (presented as Figure F-1) and individual data sheets for each test (Presented as Figures F-2 to F-33. The following text presents the methodology that was utilized to assign representative Lugeon values for each packer tests.

F.1 Packer Test Methodology

The Packer test is used to estimate average hydraulic conductivity of rock masses. Seepage through rock masses typically occurs along discontinuities (e.g., joints, foliations, shears, etc.). Thus hydraulic conductivity in rock masses depends on the aperture, spacing and infilling characteristics of its discontinuities. The packer test is a constant head type test that takes place in an isolated portion of a borehole. Water at constant pressure is injected into the rock mass through a slotted pipe bounded by pneumatic packers. The test is typically conducted in five stages, with a particular water pressure magnitude associated with each stage. A single stage consists of keeping a constant water pressure at the test interval for approximately 5 minutes. The first stage is held at a low water pressure, increasing the pressure in each subsequent stage until reaching Pmax. Pmax is defined so that it does not exceed the in-situ minimum stress, thus avoiding hydraulic fracturing. Once Pmax is reached, pressures are decreased following the same pressure stages used on the way up, thus describing a “pressure loop”. The pressure magnitudes customarily used during the five test stages are as follows:

1st Stage - Low Pressure (0.50*Pmax)

2nd Stage Medium Pressure (0.75*Pmax)

3rd Stage Maximum Pressure (Pmax)

4th Stage Medium Pressure (0.75*Pmax)

5th Stage Low Pressure (0.50*Pmax)

During the execution of each stage, water pressure and flow rate values are recorded every minute and these data are then used to compute the hydraulic conductivity for each stage. The hydraulic conductivity is expressed in terms of the Lugeon Value which is empirically defined as the hydraulic conductivity required to achieve a flow rate of 1 liter/minute per meter of test interval under a reference water pressure equal to 1 MPa.

F.2 Interpretation of Data

The Lugeon values for the staged pressure test performed for the project were interpreted in accordance with the methodology presented by Houlsby (1976). Houlsby proposed that representative hydraulic conductivity values should be selected based on the behavior observed in the Lugeon values computed for the different pressure stages. Houlsby (1976) classified five typical behaviors, as follows:

Laminar Flow: The hydraulic conductivity of the rock mass is independent of the water pressure employed. This behavior is characteristic of rock masses observing low hydraulic conductivities, where seepage velocities are relatively small (i.e., less than four Lugeons).

Turbulent Flow: The hydraulic conductivity of the rock mass decreases as the water pressure increases. This behavior is characteristic of rock masses exhibiting partly open to moderately wide cracks.

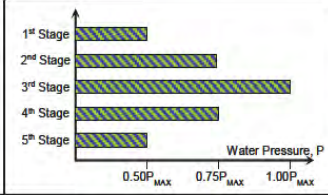
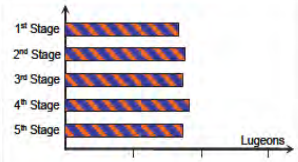
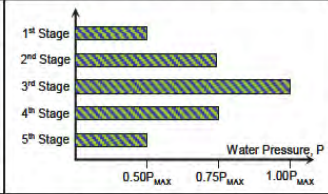
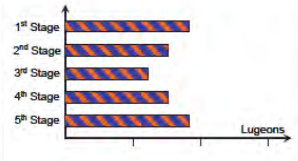
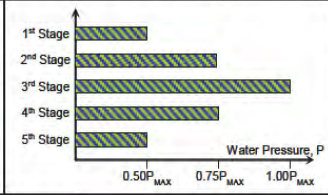
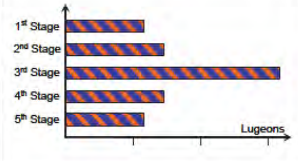
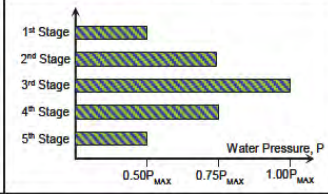
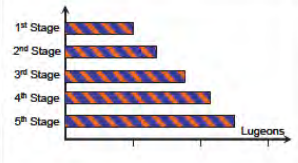
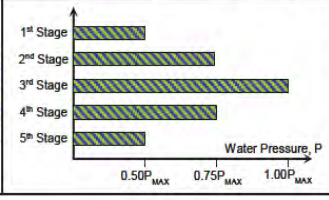
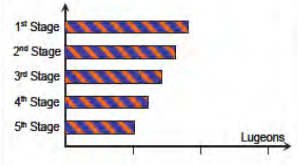
Dilation: Similar hydraulic conductivities are observed at low and medium pressures; however, a much greater value is recorded at the maximum pressure. This behavior – which is sometimes also observed at medium pressures – occurs when the water pressure applied is greater than the minimum principal stress of the rock mass, thus causing a temporary dilatancy (hydro-jacking) of the fissures within the rock mass. Dilatancy causes an increase in the cross sectional area available for water to flow, and thereby increases the hydraulic conductivity.

Wash-Out: Hydraulic conductivities increase as the test proceeds, regardless of the changes observed in water pressure. This behavior indicates that seepage induces permanent and irrecoverable damage on the rock mass, usually due to infillings wash out and/or permanent rock movements.

Void Filling: Hydraulic conductivities decrease as the test proceeds, regardless of the changes observed in water pressure. This behavior indicates that either: (1) water progressively fills isolated/non-persistent discontinuities, (2) swelling occurs in the discontinuities, or (3) fines flow slowly into the discontinuities building up a cake layer that clogs them.

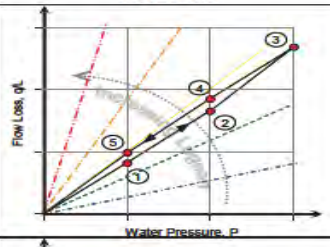
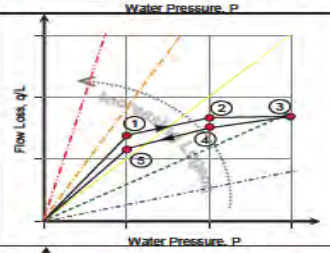
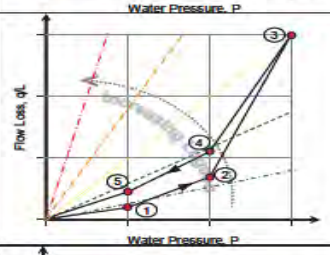
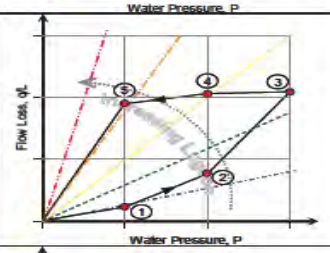
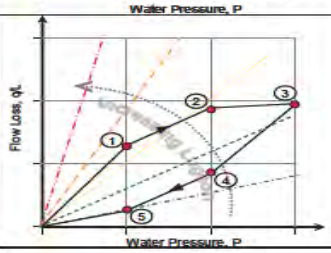
Table C-1, which is from Quinones-Rizo (2010) and based on Houlsby (1976), presents a bar chart graphic summary of these five behavior groups as well as representative Lugeon value that should be reported for each group. Lugeon test results can also be interpreted using a flow loss vs. pressure space graph (Quinones-Rizo, 2010). For each pressure step, the average flow rate is calculated from the defined readings. The gauge pressure and average flow rate for each step are then plotted on a "Flow vs Pressure" diagram forming a “pressure loop”. The following figure from Quinones-Rizo (2010) presents a graphic summary of the same five behavior groups defined by Houlsby (1976) as depicted on a flow/pressure loop diagram. Under this procedure the data corresponding to different stages of the test are plotted and interpreted based on the shape of the resulting “pressure loop”.

Table F-1. Lugeon Pattern Diagram

BEHAVIOR	PRESSURE STAGES	LUGEON PATTERN	DESCRIPTION	REPRESENTATIVE LUGEON VALUE
LAMINAR			All Lugeon values about equal regardless of the water pressure	Average of Lugeon values for all stages
TURBULENT			Lugeon values decrease as the water pressures increase. The minimum Lugeon value is observed at the stage with the maximum water pressure	Lugeon value corresponding to the highest water pressure (3rd stage)
DILATION			Lugeon values vary proportionally to the water pressures. The maximum Lugeon value is observed at the stage with the maximum water pressure	Lowest Lugeon value recorded, corresponding either to low or medium water pressures (1st, 2nd, 4th, 5th stage)
WASH-OUT			Lugeon values increase as the test proceeds. Discontinuities' infillings are progressively washed-out by the water	Highest Lugeon value recorded (5th stage)
VOID FILLING			Lugeon values decrease as the test proceeds. Either non-persistent discontinuities are progressively being filled or swelling is taking place	Final Lugeon value (5th stage)

Lugeon test results can also be interpreted using a flow loss vs. pressure graph (Quinones-Rizo, 2010). For each pressure step, the average flow rate is calculated from the defined readings. The gauge pressure and average flow rate for each step are then plotted on a "Flow vs Pressure" diagram forming a “pressure loop”. Table D-2 from Quinones-Rizo (2010) presents a graphic summary of the same five behavior groups defined by Houlsby (1976) as depicted on a flow/pressure loop diagram. Under this procedure the data corresponding to different stages of the test are plotted and interpreted based on the shape of the resulting “pressure loop”.

Table F-2. Flow versus Pressure Diagrams

BEHAVIOR	WATER LOSS VS PRESSURE PATTERN	DESCRIPTION	REPRESENTATIVE LUGEON VALUE
LAMINAR		All Lugeon values about equal regardless of the water pressure	Average of Lugeon values for all stages
TURBULENT		Lugeon values decrease as the water pressures increase. The minimum Lugeon value is observed at the stage with the maximum water pressure	Range of Lugeon values observed at water pressures expected during operation. If water pressure expected during operation is unknown use the value corresponding to the medium water pressure (2nd or 4th stage)
DILATION		Lugeon values vary proportionally to the water pressures. The maximum Lugeon value is observed at the stage with the maximum water pressure	Range of Lugeon values observed at water pressures expected during operation. If water pressure expected during operation is unknown use the value corresponding to either low or medium water pressures (1st, 2nd, 4th, or 5th stage)
WASH-OUT		Lugeon values increase as the test proceeds. Discontinuities' infillings are progressively washed-out by the water	Highest Lugeon value recorded (5th stage)
VOID FILLING		Lugeon values decrease as the test proceeds. Either non-persistent discontinuities are progressively being filled or swelling is taking place	Use final Lugeon value (5th stage), provided that presence of non-persistent discontinuities and/or occurrence of swelling is confirmed by observation of rock core.

The following data sheets in this appendix present the testing information and data for each of the 31 packer test that were performed. The data sheets provide the basic background information for the test (i.e. boring number, depth interval, Pmax, pressure and flow data, etc.) and provide the flow versus pressure diagram and a Lugeon Pattern bar chart. From inspection of the flow/pressure diagram and the Lugeon pattern bar chart an interpretation of the packer test data with regard to the five behavior types is presented and based on this interpretation a Lugeon value is assigned for the test (see the lower right area of the data sheet). These assigned values are also presented on the Summary Table that is presented as Figure F-1.

Boring	Test Interval	Lugeon
B-101	21.5 to 39.0	8.9
B-101	36.5 to 56.0	1.2
B-101	56.5 to 76.0	1.1
B-101	76.5 to 96.0	0.2
B-101	96.5 to 116.0	1.0
B-101	116.5 to 136.0	0.3
B-101	136.0 to 150.5	0.4
B-102	30.0 to 49.0	14.4
B-102	49.0 to 69.0	11.4
B-102	69.0 to 89.0	25.0
B-102	89.0 to 109.0	1.6
B-102	109.0 to 129.0	5.6
B-102	129.0 to 149.0	4.0
B-102	149.0 to 169.0	1.2
B-102	169.0 to 189.0	1.7
B-102	184.0 to 200.0	1.4
B-103	47.5 to 67.5	59.0
B-103	67.5 to 87.5	16.0
B-103	87.5 to 107.5	1.4
B-103	107.5 to 127.5	0.2
B-103	127.5 to 147.5	1.2
B-103	147.5 to 167.5	3.5
B-103	167.5 to 187.5	10.0
B-103	187.5 to 200.0	5.6
B-104	12.5 to 30.0	23.6
B-104	30.0 to 50.0	39.9
B-104	50.0 to 70.0	12.3
B-104	70.0 to 90.0	1.5
B-104	90.0 to 110.0	1.6
B-104	110.0 to 130.0	1.0
B-104	130.0 to 150.0	1.6

Rancho California Water District

AECOM

SUMMARY OF LUGEON DATA

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: E. Marquez	DATE: 10/18/2017	FIGURE NO: F-1
CHECKED BY: L. Handfelt	DATE: 10/18/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix F - Packer Tests\Appendix F - Packer Tests101.xlsx\F-1.summ

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Packer Testing from 21.5 to 39 feet in Borehole B-101
Vail Dam (Single Packer)

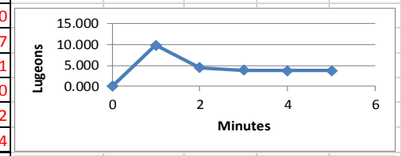
Test Information	
Boring:	B-101
Top of Test Interval (ft):	21.5
Bottom of Test Interval (ft):	39
Test Interval Length (m):	5.33
Transducer Depth bgs (ft):	66
Cable Length (ft):	150
Test by:	A. Avakian

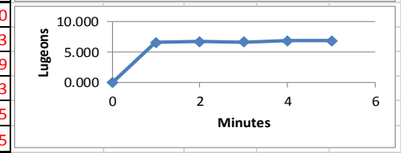
Make:	Geokon Type S
Model:	4500S -1 MPa
Serial #	1213704*
Date of Calibration	8/1/2012
Factory Zero Reading Temperature T_0 (°C)	24.4
Factory Reading Zero Barometric Pressure S_0 (psi)	14.306
Linear Gage Factor, G psi per digit)	-0.03024
Regression Zero	8471
Polynomial Gage Factor A (psi)	-5.506E-08
Polynomial Gage Factor B (psi)	-0.02957
Polynomial Gage Factor C (psi)	254.4384567
Thermal Factor, K (psi/deg C)	0.03998

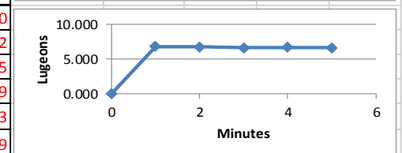
* Purchased June 2013 and put into service on June 26, 2013.

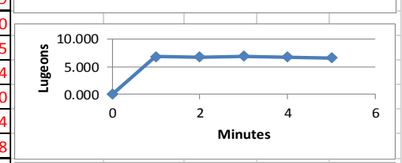
Test	At Testing	
Date	7/18/2017	
Temperature at Testing T_1 °C	35.6	deg C
Barometric Pressure at Testing S_1 psi	14.74	psi
Length of Test Interval	17.5	feet
Pmax	30	psi

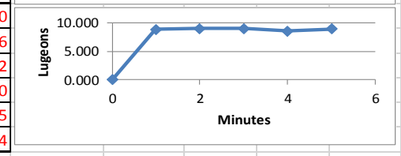
Elapsed Time minutes	Transducer Reading (R_1)	Flow Rate (q) gallons/ min	Pressure (psi)	Flow Loss (gpm/ft)	Lugeons
0	7974	0.00	15.16	0.000	0.000
1	7974	1.44	15.16	0.082	9.777
2	7974	0.66	15.16	0.038	4.481
3	7974	0.57	15.16	0.033	3.870
4	7974	0.56	15.16	0.032	3.802
5	7974	0.55	15.16	0.031	3.734
0	7726	0.00	22.71	0.000	0.000
1	7726	1.45	22.71	0.083	6.573
2	7726	1.48	22.71	0.085	6.709
3	7726	1.47	22.71	0.084	6.663
4	7726	1.51	22.71	0.086	6.845
5	7726	1.51	22.71	0.086	6.845
0	7472	0.00	30.43	0.000	0.000
1	7472	2.02	30.43	0.115	6.832
2	7472	2.00	30.43	0.114	6.765
3	7472	1.96	30.43	0.112	6.629
4	7472	1.97	30.43	0.113	6.663
5	7472	1.96	30.43	0.112	6.629
0	7726	0.00	22.71	0.000	0.000
1	7726	1.51	22.71	0.086	6.845
2	7726	1.49	22.71	0.085	6.754
3	7726	1.52	22.71	0.087	6.890
4	7726	1.49	22.71	0.085	6.754
5	7726	1.46	22.71	0.083	6.618
0	7974	0.00	15.16	0.000	0.000
1	7974	1.30	15.16	0.074	8.826
2	7974	1.32	15.16	0.075	8.962
3	7974	1.33	15.16	0.076	9.030
4	7974	1.26	15.16	0.072	8.555
5	7974	1.31	15.16	0.075	8.894

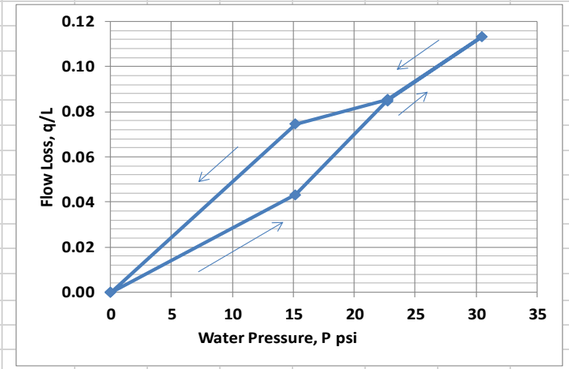


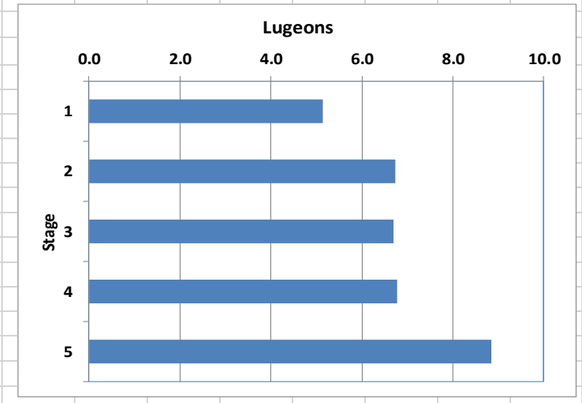












Review the data and select values for pressure, flow loss and Lugeons

Stage	Pressure psi	Flow Loss q/L (gpm/ft)	Lugeons
-	0.00	0.000	0.000
1	15.16	0.043	5.133
2	22.71	0.085	6.727
3	30.43	0.113	6.704
4	22.71	0.085	6.772
5	15.16	0.075	8.854
-	0.00	0.000	0.000

Interpreted Lugeon Value: 8.9

Interpreted Behavior: Wash Out (?)

Rancho California Water District

AECOM

B-101 PACKER TEST - 21.5-39.0 FEET

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: C. Goetz	DATE: 10/18/2017	FIGURE NO: F-2
CHECKED BY: L. Handfelt	DATE: 10/18/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix F - Packer Tests\Appendix F - Packer Tests101.xlsx\101-21.5ft

Packer Testing from 36.5 to 56 feet in Borehole URS-15-RC1
Trampas (Straddle Packer)

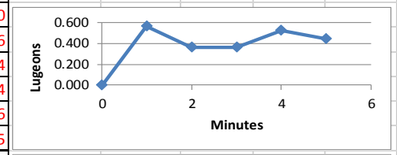
Test Information	
Boring:	URS-15-RC1
Top of Test Interval (ft):	36.5
Bottom of Test Interval (ft):	56
Test Interval Length (m):	5.94
Transducer Depth bgs (ft):	45.7
Cable Length (ft):	150
Test by:	A. Avakian

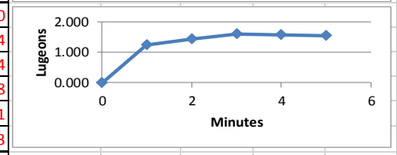
Make:	Geokon Type S
Model:	4500S -1 MPa
Serial #	1213704*
Date of Calibration	8/1/2012
Factory Zero Reading Temperature T_0 (°C)	24.4
Factory Reading Zero Barometric Pressure S_0 (psi)	14.306
Linear Gage Factor, G psi per digit)	-0.03024
Regression Zero	8471
Polynomial Gage Factor A (psi)	-5.506E-08
Polynomial Gage Factor B (psi)	-0.02957
Polynomial Gage Factor C (psi)	254.4384567
Thermal Factor, K (psi/deg C)	0.03998

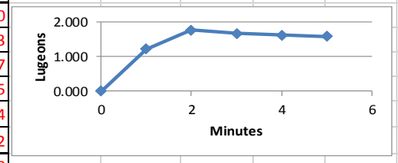
* Purchased June 2013 and put into service on June 26, 2013.

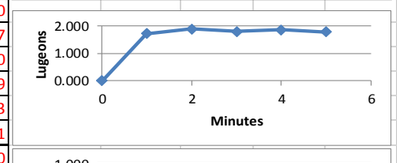
Test	At Testing	
Date	7/18/2017	
Temperature at Testing T_1 ºC	26.5	deg C
Barometric Pressure at Testing S_1 psi	14.74	psi
Length of Test Interval	19.5	feet
Pmax	45	psi

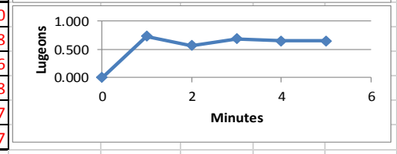
Elapsed Time minutes	Transducer Reading (R_1)	Flow Rate (q) gallons/ min	Pressure (psi)	Flow Loss (gpm/ft)	Lugeons
0	7710	0.00	22.83	0.000	0.000
1	7710	0.14	22.83	0.007	0.566
2	7710	0.09	22.83	0.005	0.364
3	7710	0.09	22.83	0.005	0.364
4	7710	0.13	22.83	0.007	0.526
5	7710	0.11	22.83	0.006	0.445
0	7346	0.00	33.90	0.000	0.000
1	7346	0.46	33.90	0.024	1.254
2	7346	0.53	33.90	0.027	1.444
3	7346	0.59	33.90	0.030	1.608
4	7346	0.58	33.90	0.030	1.581
5	7346	0.57	33.90	0.029	1.553
0	6982	0.00	44.95	0.000	0.000
1	6982	0.59	44.95	0.030	1.213
2	6982	0.86	44.95	0.044	1.767
3	6982	0.81	44.95	0.042	1.665
4	6982	0.79	44.95	0.041	1.624
5	6982	0.77	44.95	0.039	1.582
0	7346	0.00	33.90	0.000	0.000
1	7346	0.63	33.90	0.032	1.717
2	7346	0.69	33.90	0.035	1.880
3	7346	0.66	33.90	0.034	1.799
4	7346	0.68	33.90	0.035	1.853
5	7346	0.65	33.90	0.033	1.771
0	7710	0.00	22.83	0.000	0.000
1	7710	0.18	22.83	0.009	0.728
2	7710	0.14	22.83	0.007	0.566
3	7710	0.17	22.83	0.009	0.688
4	7710	0.16	22.83	0.008	0.647
5	7710	0.16	22.83	0.008	0.647

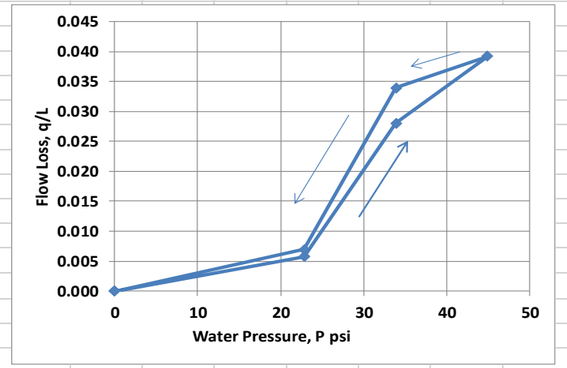


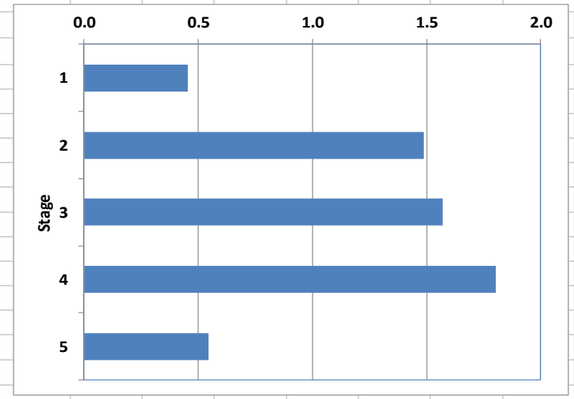












Review the data and select values for pressure, flow loss and Lugeons

Stage	Pressure psi	Flow Loss q/L (gpm/ft)	Lugeons
--	0.00	0.000	0.000
1	22.83	0.006	0.453
2	33.90	0.028	1.488
3	44.95	0.039	1.570
4	33.90	0.034	1.804
5	22.83	0.007	0.546
-	0.00	0.000	0.000

Interpreted Lugeon Value: 1.2

Interpreted Behavior: Laminar (?)

Rancho California Water District

AECOM

B-101 PACKER TEST - 36.5-56.0 FEET

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: C. Goetz	DATE: 10/18/2017	FIGURE NO: F-3
CHECKED BY: L. Handfelt	DATE: 10/18/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix F - Packer Tests\Appendix F - Packer Tests101.xlsx\101-36.5ft

Packer Testing from 56.5 to 76 feet in Borehole B-101
Vail Dam (Single Packer)

Test Information	
Boring:	B-101
Top of Test Interval (ft):	56.5
Bottom of Test Interval (ft):	76
Test Interval Length (m):	5.94
Transducer Depth bgs (ft):	65.7
Cable Length (ft):	150
Test by:	A. Avakian

Make:	Geokon Type S
Model:	4500S -1 MPa
Serial #	1213704*
Date of Calibration	8/1/2012
Factory Zero Reading Temperature T_0 (°C)	24.4
Factory Reading Zero Barometric Pressure S_0 (psi)	14.306
Linear Gage Factor, G psi per digit)	-0.03024
Regression Zero	8471
Polynomial Gage Factor A (psi)	-5.506E-08
Polynomial Gage Factor B (psi)	-0.02957
Polynomial Gage Factor C (psi)	254.4384567
Thermal Factor, K (psi/deg C)	0.03998

* Purchased June 2013 and put into service on June 26, 2013.

Test	At Testing	
Date	7/19/2017	
Temperature at Testing T_1 °C	19.3	deg C
Barometric Pressure at Testing S_1 psi	14.31	psi
Length of Test Interval	19.5	feet
Pmax	60	psi

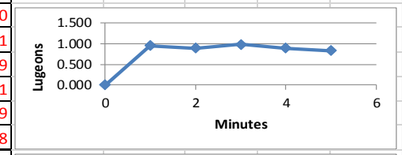
Elapsed Time minutes	Transducer Reading (R_1)	Flow Rate (q) gallons/ min	Pressure (psi)	Flow Loss (gpm/ft)	Lugeons
0	7475	0.00	30.12	0.000	0.000
1	7475	0.31	30.12	0.016	0.951
2	7475	0.29	30.12	0.015	0.889
3	7475	0.32	30.12	0.016	0.981
4	7475	0.29	30.12	0.015	0.889
5	7475	0.27	30.12	0.014	0.828
0	6985	0.00	45.00	0.000	0.000
1	6985	0.63	45.00	0.032	1.293
2	6985	0.71	45.00	0.036	1.457
3	6985	0.67	45.00	0.034	1.375
4	6985	0.68	45.00	0.035	1.396
5	6985	0.68	45.00	0.035	1.396
0	6487	0.00	60.10	0.000	0.000
1	6487	0.86	60.10	0.044	1.322
2	6487	0.88	60.10	0.045	1.353
3	6487	0.87	60.10	0.045	1.337
4	6487	0.91	60.10	0.047	1.399
5	6487	0.92	60.10	0.047	1.414
0	6985	0.00	45.00	0.000	0.000
1	6985	0.73	45.00	0.037	1.498
2	6985	0.70	45.00	0.036	1.437
3	6985	0.70	45.00	0.036	1.437
4	6985	0.74	45.00	0.038	1.519
5	6985	0.71	45.00	0.036	1.457
0	7475	0.00	30.12	0.000	0.000
1	7475	0.15	30.12	0.008	0.460
2	7475	0.19	30.12	0.010	0.583
3	7475	0.19	30.12	0.010	0.583
4	7475	0.19	30.12	0.010	0.583
5	7475	0.19	30.12	0.010	0.583

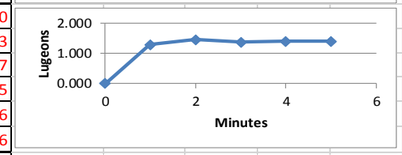
Review the data and select values for pressure, flow loss and Lugeons

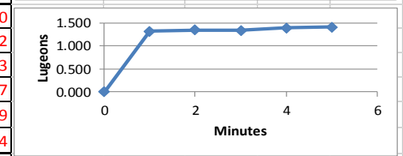
Stage	Pressure psi	Flow Loss q/L (gpm/ft)	Lugeons
-	0.00	0.000	0.000
1	30.12	0.015	0.908
2	45.00	0.035	1.383
3	60.10	0.046	1.365
4	45.00	0.037	1.470
5	30.12	0.009	0.558
-	0.00	0.000	0.000

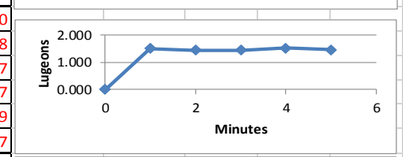
Interpreted Lugeon Value: 1.1

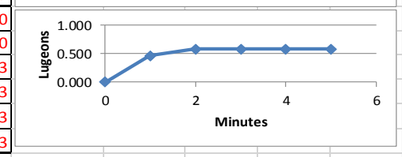
Interpreted Behavior: Laminar (?)

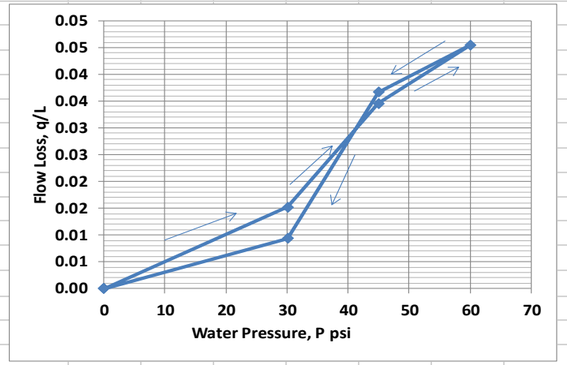


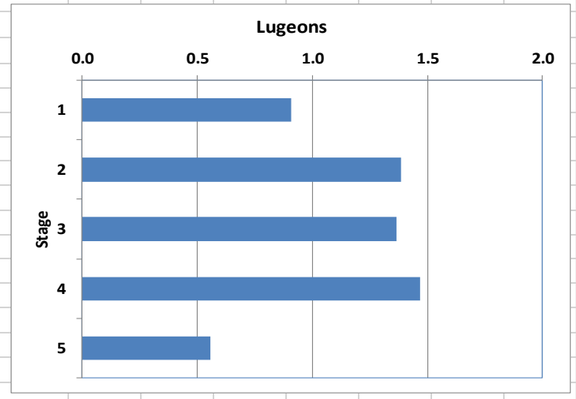












Rancho California Water District | AECOM

B-101 PACKER TEST - 56.5-76.0 FEET

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: C. Goetz	DATE: 10/18/2017	FIGURE NO: F-4
CHECKED BY: L. Handfelt	DATE: 10/18/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix F - Packer Tests\Appendix F - Packer Tests101.xlsx\101-56.5ft

Packer Testing from 76.5 to 96 feet in Borehole B-101
Vail Dam (Single Packer)

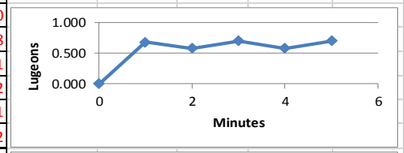
Test Information	
Boring:	B-101
Top of Test Interval (ft):	76.5
Bottom of Test Interval (ft):	96
Test Interval Length (m):	5.94
Transducer Depth bgs (ft):	85.7
Cable Length (ft):	150
Test by:	A. Avakian

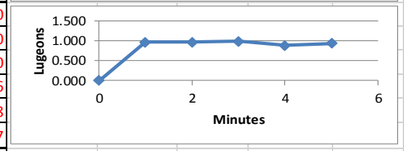
Make:	Geokon Type S
Model:	4500S -1 MPa
Serial #	1213704*
Date of Calibration	8/1/2012
Factory Zero Reading Temperature T_0 (°C)	24.4
Factory Reading Zero Barometric Pressure S_0 (psi)	14.306
Linear Gage Factor, G psi per digit)	-0.03024
Regression Zero	8471
Polynomial Gage Factor A (psi)	-5.506E-08
Polynomial Gage Factor B (psi)	-0.02957
Polynomial Gage Factor C (psi)	254.4384567
Thermal Factor, K (psi/deg C)	0.03998

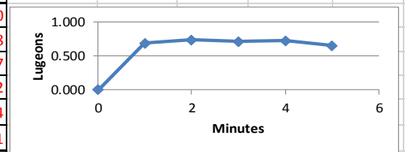
* Purchased June 2013 and put into service on June 26, 2013.

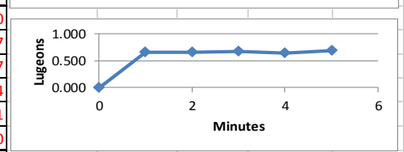
Test	At Testing	
Date	7/19/2017	
Temperature at Testing T_1 ºC	21.9	deg C
Barometric Pressure at Testing S_1 psi	14.31	psi
Length of Test Interval	19.5	feet
Pmax	75	psi

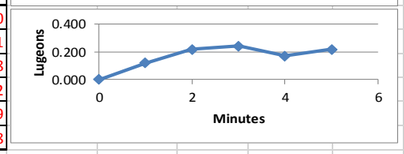
Elapsed Time minutes	Transducer Reading (R_1)	Flow Rate (q) gallons/ min	Pressure (psi)	Flow Loss (gpm/ft)	Lugeons
0	7214	0.00	38.16	0.000	0.000
1	7214	0.28	38.16	0.014	0.678
2	7214	0.24	38.16	0.012	0.581
3	7214	0.29	38.16	0.015	0.702
4	7214	0.24	38.16	0.012	0.581
5	7214	0.29	38.16	0.015	0.702
0	6619	0.00	56.20	0.000	0.000
1	6619	0.59	56.20	0.030	0.970
2	6619	0.59	56.20	0.030	0.970
3	6619	0.60	56.20	0.031	0.986
4	6619	0.54	56.20	0.028	0.888
5	6619	0.57	56.20	0.029	0.937
0	5990	0.00	75.24	0.000	0.000
1	5990	0.56	75.24	0.029	0.688
2	5990	0.60	75.24	0.031	0.737
3	5990	0.58	75.24	0.030	0.712
4	5990	0.59	75.24	0.030	0.724
5	5990	0.53	75.24	0.027	0.651
0	6619	0.00	56.20	0.000	0.000
1	6619	0.40	56.20	0.021	0.657
2	6619	0.40	56.20	0.021	0.657
3	6619	0.41	56.20	0.021	0.674
4	6619	0.39	56.20	0.020	0.641
5	6619	0.42	56.20	0.022	0.690
0	7214	0.00	38.16	0.000	0.000
1	7214	0.05	38.16	0.003	0.121
2	7214	0.09	38.16	0.005	0.218
3	7214	0.10	38.16	0.005	0.242
4	7214	0.07	38.16	0.004	0.169
5	7214	0.09	38.16	0.005	0.218

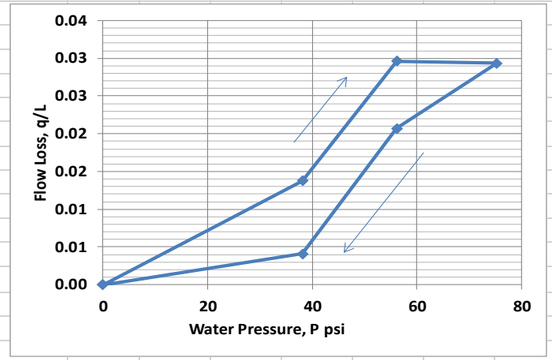


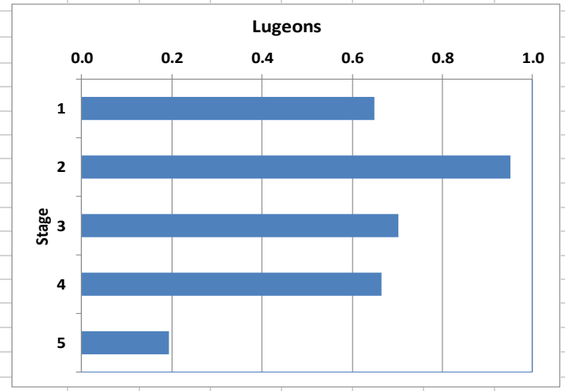












Review the data and select values for pressure, flow loss and Lugeons

Stage	Pressure psi	Flow Loss q/L (gpm/ft)	Lugeons
-	0.00	0.000	0.000
1	38.16	0.014	0.649
2	56.20	0.030	0.950
3	75.24	0.029	0.702
4	56.20	0.021	0.664
5	38.16	0.004	0.194
-	0.00	0.000	0.000

Interpreted Lugeon Value: 0.2

Interpreted Behavior: Void Filling (?)

Rancho California Water District

AECOM

B-101 PACKER TEST - 76.5-96.0 FEET

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: C. Goetz	DATE: 10/18/2017	FIGURE NO: F-5
CHECKED BY: L. Handfelt	DATE: 10/18/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix F - Packer Tests\Appendix F - Packer Tests101.xlsx\101-76.5ft

Packer Testing from 96.5 to 116 feet in Borehole B-101
Vail Dam (Single Packer)

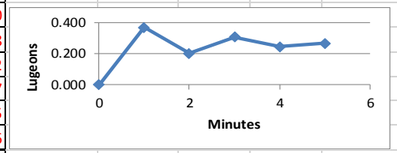
Test Information	
Boring:	B-101
Top of Test Interval (ft):	96.5
Bottom of Test Interval (ft):	116
Test Interval Length (m):	5.94
Transducer Depth bgs (ft):	105.7
Cable Length (ft):	150
Test by:	A. Avakian

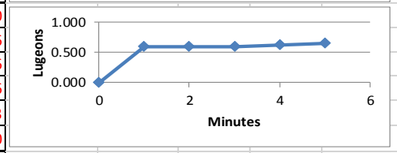
Make:	Geokon Type S
Model:	4500S -1 MPa
Serial #	1213704*
Date of Calibration	8/1/2012
Factory Zero Reading Temperature T_0 (°C)	24.4
Factory Reading Zero Barometric Pressure S_0 (psi)	14.306
Linear Gage Factor, G psi per digit)	-0.03024
Regression Zero	8471
Polynomial Gage Factor A (psi)	-5.506E-08
Polynomial Gage Factor B (psi)	-0.02957
Polynomial Gage Factor C (psi)	254.4384567
Thermal Factor, K (psi/deg C)	0.03998

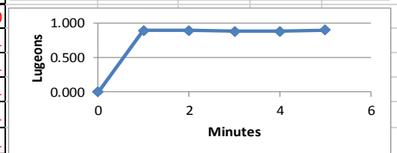
* Purchased June 2013 and put into service on June 26, 2013.

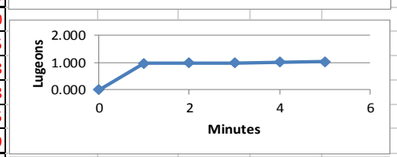
Test	At Testing	
Date	7/19/2017	
Temperature at Testing T_1 ºC	21.9	deg C
Barometric Pressure at Testing S_1 psi	14.31	psi
Length of Test Interval	19.5	feet
Pmax	90	psi

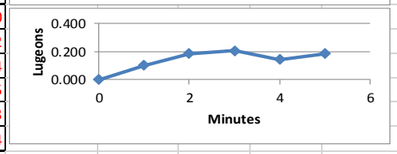
Elapsed Time minutes	Transducer Reading (R_1)	Flow Rate (q) gallons/ min	Pressure (psi)	Flow Loss (gpm/ft)	Lugeons
0	6983	0.00	45.17	0.000	0.000
1	6983	0.18	45.17	0.009	0.368
2	6983	0.10	45.17	0.005	0.202
3	6983	0.15	45.17	0.008	0.307
4	6983	0.12	45.17	0.006	0.245
5	6983	0.13	45.17	0.007	0.266
0	6222	0.00	68.22	0.000	0.000
1	6222	0.44	68.22	0.023	0.596
2	6222	0.44	68.22	0.023	0.596
3	6222	0.44	68.22	0.023	0.596
4	6222	0.46	68.22	0.024	0.623
5	6222	0.48	68.22	0.025	0.650
0	5495	0.00	90.19	0.000	0.000
1	5495	0.87	90.19	0.045	0.891
2	5495	0.87	90.19	0.045	0.891
3	5495	0.86	90.19	0.044	0.881
4	5495	0.86	90.19	0.044	0.881
5	5495	0.88	90.19	0.045	0.901
0	6222	0.00	68.22	0.000	0.000
1	6222	0.72	68.22	0.037	0.975
2	6222	0.73	68.22	0.037	0.988
3	6222	0.73	68.22	0.037	0.988
4	6222	0.75	68.22	0.038	1.015
5	6222	0.76	68.22	0.039	1.029
0	6983	0.00	45.17	0.000	0.000
1	6983	0.05	45.17	0.003	0.102
2	6983	0.09	45.17	0.005	0.184
3	6983	0.10	45.17	0.005	0.205
4	6983	0.07	45.17	0.004	0.143
5	6983	0.09	45.17	0.005	0.184

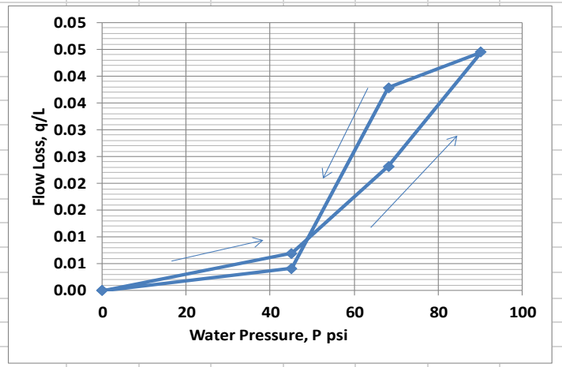


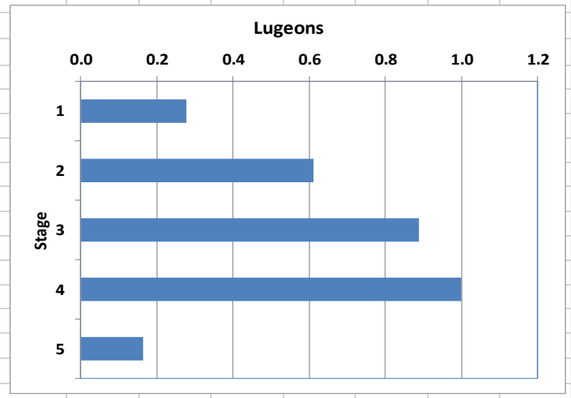












Review the data and select values for pressure, flow loss and Lugeons

Stage	Pressure psi	Flow Loss q/L (gpm/ft)	Lugeons
-	0.00	0.000	0.000
1	45.17	0.007	0.278
2	68.22	0.023	0.612
3	90.19	0.045	0.889
4	68.22	0.038	0.999
5	45.17	0.004	0.164
-	0.00	0.000	0.000

Interpreted Lugeon Value: 1

Interpreted Behavior: Wash Out (?)

Rancho California Water District

AECOM

B-101 PACKER TEST - 96.5-116.0 FEET

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: C. Goetz	DATE: 10/18/2017	FIGURE NO: F-6
CHECKED BY: L. Handfelt	DATE: 10/18/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix F - Packer Tests\Appendix F - Packer Tests101.xlsx\101-96.5ft

Packer Testing from 116.5 to 136 feet in Borehole B-101
Vail Dam (Single Packer)

Test Information	
Boring:	B-101
Top of Test Interval (ft):	116.5
Bottom of Test Interval (ft):	136
Test Interval Length (m):	5.94
Transducer Depth bgs (ft):	125.7
Cable Length (ft):	150
Test by:	A. Avakian

Make:	Geokon Type S
Model:	4500S -1 MPa
Serial #	1213704*
Date of Calibration	8/1/2012
Factory Zero Reading Temperature T_0 (°C)	24.4
Factory Reading Zero Barometric Pressure S_0 (psi)	14.306
Linear Gage Factor, G psi per digit)	-0.03024
Regression Zero	8471
Polynomial Gage Factor A (psi)	-5.506E-08
Polynomial Gage Factor B (psi)	-0.02957
Polynomial Gage Factor C (psi)	254.4384567
Thermal Factor, K (psi/deg C)	0.03998

* Purchased June 2013 and put into service on June 26, 2013.

Test	At Testing	
Date	7/20/2017	
Temperature at Testing T_1 °C	21.9	deg C
Barometric Pressure at Testing S_1 psi	14.31	psi
Length of Test Interval	19.5	feet
Pmax	100	psi

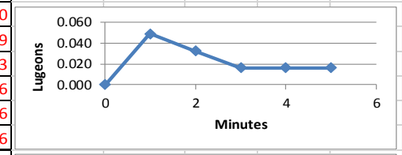
Elapsed Time minutes	Transducer Reading (R_1)	Flow Rate (q) gallons/ min	Pressure (psi)	Flow Loss (gpm/ft)	Lugeons
0	6600	0.00	56.78	0.000	0.000
1	6600	0.03	56.78	0.002	0.049
2	6600	0.02	56.78	0.001	0.033
3	6600	0.01	56.78	0.001	0.016
4	6600	0.01	56.78	0.001	0.016
5	6600	0.01	56.78	0.001	0.016
0	5991	0.00	75.21	0.000	0.000
1	5991	0.66	75.21	0.034	0.811
2	5991	0.66	75.21	0.034	0.811
3	5991	0.68	75.21	0.035	0.835
4	5991	0.70	75.21	0.036	0.860
5	5991	0.67	75.21	0.034	0.823
0	5164	0.00	100.17	0.000	0.000
1	5164	1.18	100.17	0.061	1.088
2	5164	1.18	100.17	0.061	1.088
3	5164	1.18	100.17	0.061	1.088
4	5164	1.16	100.17	0.059	1.070
5	5164	1.17	100.17	0.060	1.079
0	5991	0.00	75.21	0.000	0.000
1	5991	0.72	75.21	0.037	0.884
2	5991	0.70	75.21	0.036	0.860
3	5991	0.69	75.21	0.035	0.847
4	5991	0.71	75.21	0.036	0.872
5	5991	0.69	75.21	0.035	0.847
0	6600	0.00	56.78	0.000	0.000
1	6600	0.22	56.78	0.011	0.358
2	6600	0.19	56.78	0.010	0.309
3	6600	0.20	56.78	0.010	0.325
4	6600	0.19	56.78	0.010	0.309
5	6600	0.16	56.78	0.008	0.260

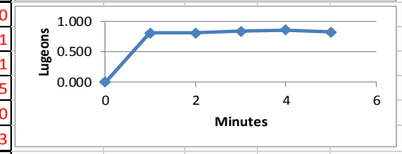
Review the data and select values for pressure, flow loss and Lugeons

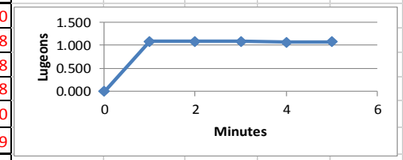
Stage	Pressure psi	Flow Loss q/L (gpm/ft)	Lugeons
-	0.00	0.000	0.000
1	56.78	0.001	0.026
2	75.21	0.035	0.828
3	100.17	0.060	1.083
4	75.21	0.036	0.862
5	56.78	0.010	0.312
-	0.00	0.000	0.000

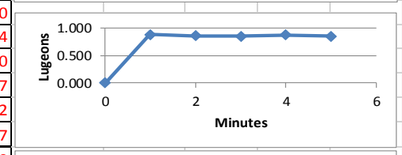
Interpreted Lugeon Value: 0.3

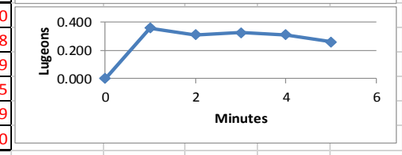
Interpreted Behavior: Dilation

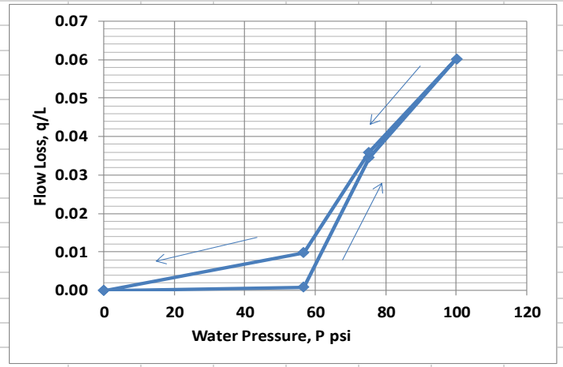


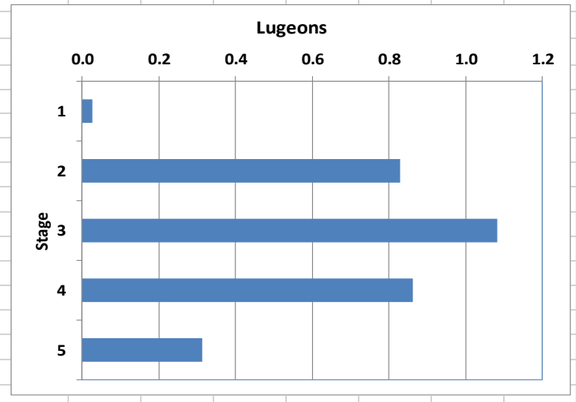












Rancho California Water District | AECOM

B-101 PACKER TEST - 116.5-136.0 FEET

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: C. Goetz	DATE: 10/18/2017	FIGURE NO: F-7
CHECKED BY: L. Handfelt	DATE: 10/18/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix F - Packer Tests\Appendix F - Packer Tests101.xlsx\101-116.5ft

Packer Testing from 30 to 49 feet in Borehole B-102
Vail Dam (Single Packer)

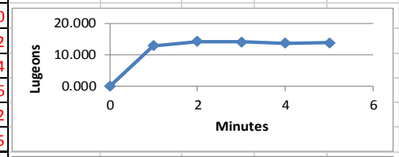
Test Information	
Boring:	B-102
Top of Test Interval (ft):	30
Bottom of Test Interval (ft):	49.0
Test Interval Length (m):	5.79
Transducer Depth bgs (ft):	39.2
Cable Length (ft):	200
Test by:	A. Avakian

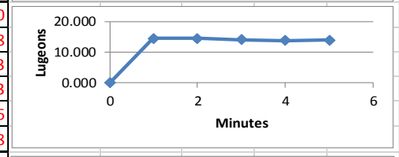
Make:	Geokon Type S
Model:	4500S -1 MPa
Serial #	1213704*
Date of Calibration	8/1/2012
Factory Zero Reading Temperature T_0 (°C)	24.4
Factory Reading Zero Barometric Pressure S_0 (psi)	14.306
Linear Gage Factor, G psi per digit)	-0.03024
Regression Zero	8471
Polynomial Gage Factor A (psi)	-5.506E-08
Polynomial Gage Factor B (psi)	-0.02957
Polynomial Gage Factor C (psi)	254.4384567
Thermal Factor, K (psi/deg C)	0.03998

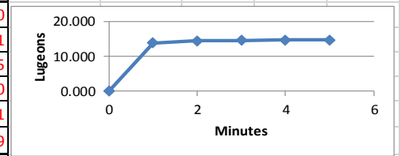
* Purchased June 2013 and put into service on June 26, 2013.

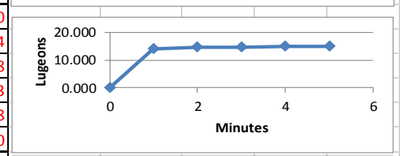
Test	At Testing	
Date	7/27/2017	
Temperature at Testing T_1 ºC	26.5	deg C
Barometric Pressure at Testing S_1 psi	14.74	psi
Length of Test Interval	19	feet
Pmax	40	psi

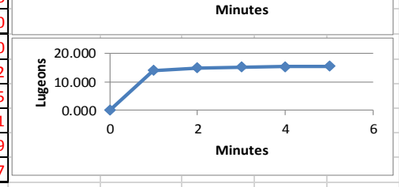
Elapsed Time minutes	Transducer Reading (R_1)	Flow Rate (q) gallons/ min	Pressure (psi)	Flow Loss (gpm/ft)	Lugeons
0	7818	0.00	19.54	0.000	0.000
1	7806	2.72	19.91	0.143	12.952
2	7803	3.02	20.00	0.159	14.314
3	7798	3.02	20.15	0.159	14.206
4	7796	2.93	20.21	0.154	13.742
5	7800	2.93	20.09	0.154	13.825
0	7450	0.00	30.74	0.000	0.000
1	7445	4.74	30.89	0.249	14.548
2	7436	4.79	31.16	0.252	14.573
3	7455	4.54	30.58	0.239	14.073
4	7446	4.51	30.86	0.237	13.856
5	7460	4.49	30.43	0.236	13.988
0	7129	0.00	40.49	0.000	0.000
1	7123	5.95	40.67	0.313	13.871
2	7129	6.19	40.49	0.326	14.495
3	7127	6.27	40.55	0.330	14.660
4	7124	6.31	40.64	0.332	14.721
5	7135	6.27	40.30	0.330	14.749
0	7538	0.00	28.06	0.000	0.000
1	7524	4.22	28.49	0.222	14.044
2	7522	4.42	28.55	0.233	14.678
3	7517	4.46	28.70	0.235	14.733
4	7526	4.50	28.43	0.237	15.008
5	7523	4.50	28.52	0.237	14.960
0	7819	0.00	19.51	0.000	0.000
1	7823	2.86	19.39	0.151	13.982
2	7824	3.04	19.36	0.160	14.885
3	7827	3.10	19.27	0.163	15.251
4	7827	3.12	19.27	0.164	15.349
5	7827	3.14	19.27	0.165	15.447

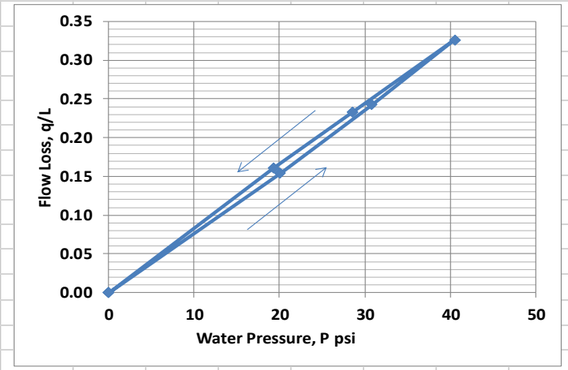


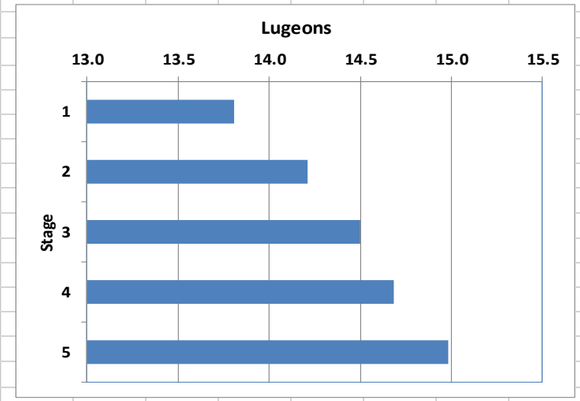












Review the data and select values for pressure, flow loss and Lugeons

Stage	Pressure psi	Flow Loss q/L (gpm/ft)	Lugeons
-	0.00	0.000	0.000
1	20.07	0.154	13.809
2	30.78	0.243	14.209
3	40.53	0.326	14.498
4	28.54	0.233	14.685
5	19.31	0.161	14.981
-	0.00	0.000	0.000

Interpreted Lugeon Value: 14.4

Interpreted Behavior: Laminar

Rancho California Water District

AECOM

B-102 PACKER TEST - 30.0-49.0 FEET

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: C. Goetz	DATE: 10/18/2017	FIGURE NO: F-8
CHECKED BY: L. Handfelt	DATE: 10/18/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix F - Packer Tests\Appendix F - Packer Tests102.xlsx\102-30ft

Packer Testing from 49 to 69 feet in Borehole B-102
Vail Dam (Single Packer)

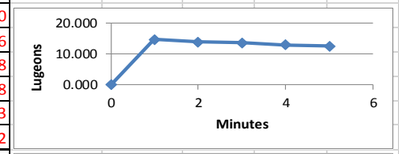
Test Information	
Boring:	B-102
Top of Test Interval (ft):	49
Bottom of Test Interval (ft):	69.0
Test Interval Length (m):	6.10
Transducer Depth bgs (ft):	58.2
Cable Length (ft):	200
Test by:	A. Avakian

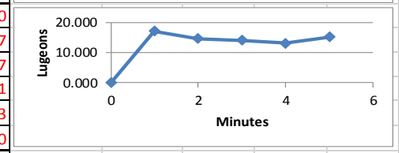
Make:	Geokon Type S
Model:	4500S -1 MPa
Serial #	1213704*
Date of Calibration	8/1/2012
Factory Zero Reading Temperature T_0 (°C)	24.4
Factory Reading Zero Barometric Pressure S_0 (psi)	14.306
Linear Gage Factor, G psi per digit)	-0.03024
Regression Zero	8471
Polynomial Gage Factor A (psi)	-5.506E-08
Polynomial Gage Factor B (psi)	-0.02957
Polynomial Gage Factor C (psi)	254.4384567
Thermal Factor, K (psi/deg C)	0.03998

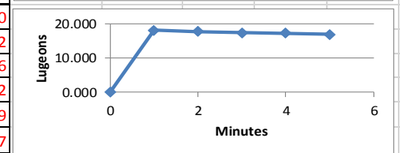
* Purchased June 2013 and put into service on June 26, 2013.

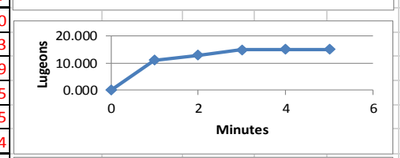
Test	At Testing	
Date	7/27/2017	
Temperature at Testing T_1 °C	29	deg C
Barometric Pressure at Testing S_1 psi	14.74	psi
Length of Test Interval	20	feet
Pmax	60	psi

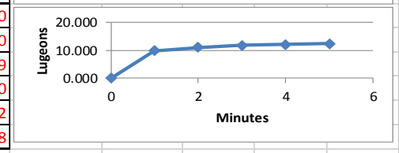
Elapsed Time minutes	Transducer Reading (R_1)	Flow Rate (q) gallons/ min	Pressure (psi)	Flow Loss (gpm/ft)	Lugeons
0	7408	0.00	32.11	0.000	0.000
1	7390	5.34	32.66	0.267	14.726
2	7400	5.00	32.36	0.250	13.918
3	7403	4.90	32.26	0.245	13.678
4	7396	4.66	32.48	0.233	12.923
5	7403	4.50	32.26	0.225	12.562
0	6912	0.00	47.17	0.000	0.000
1	6959	8.75	45.74	0.438	17.227
2	6949	7.54	46.05	0.377	14.747
3	6947	7.25	46.11	0.363	14.161
4	6939	6.79	46.35	0.340	13.193
5	6932	7.91	46.56	0.396	15.300
0	6498	0.00	59.72	0.000	0.000
1	6487	12.07	60.05	0.604	18.102
2	6464	11.99	60.75	0.600	17.776
3	6454	11.83	61.05	0.592	17.452
4	6443	11.77	61.38	0.589	17.269
5	6446	11.54	61.29	0.577	16.957
0	7103	0.00	41.37	0.000	0.000
1	6968	5.55	45.47	0.278	10.993
2	6995	6.39	44.65	0.320	12.889
3	6986	7.39	44.93	0.370	14.815
4	6977	7.53	45.20	0.377	15.005
5	6977	7.57	45.20	0.379	15.084
0	7477	0.00	30.02	0.000	0.000
1	7495	3.20	29.47	0.160	9.780
2	7507	3.58	29.10	0.179	11.079
3	7502	3.82	29.26	0.191	11.760
4	7504	3.91	29.19	0.196	12.062
5	7507	4.00	29.10	0.200	12.378

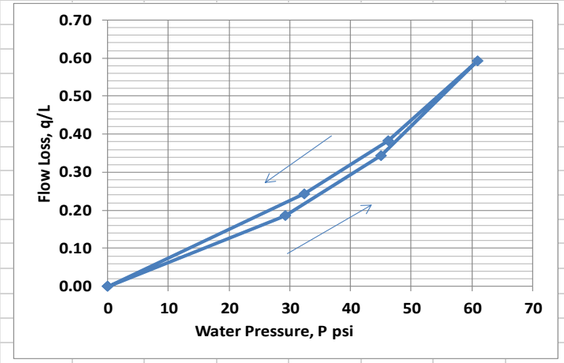


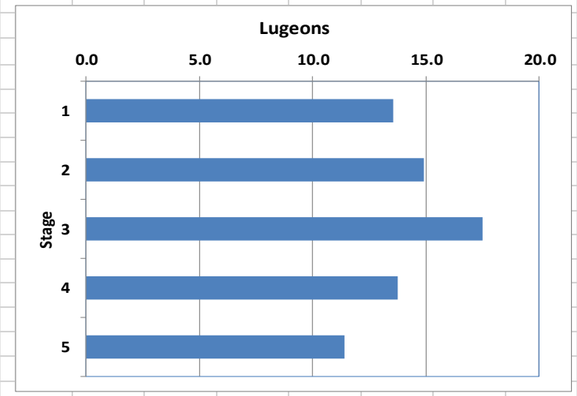












Review the data and select values for pressure, flow loss and Lugeons

Stage	Pressure psi	Flow Loss q/L (gpm/ft)	Lugeons
-	0.00	0.000	0.000
1	32.40	0.244	13.563
2	46.16	0.382	14.921
3	60.90	0.592	17.509
4	45.09	0.344	13.755
5	29.23	0.185	11.409
-	0.00	0.000	0.000

Interpreted Lugeon Value: 11.4

Interpreted Behavior: Dilation

Rancho California Water District | AECOM

B-102 PACKER TEST - 49.0-69.0 FEET

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: C. Goetz	DATE: 10/18/2017	FIGURE NO: F-9
CHECKED BY: L. Handfelt	DATE: 10/18/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix F - Packer Tests\Appendix F - Packer Tests102.xlsx\102-49ft

Packer Testing from 59 to 69 feet in Borehole B-102
Vail Dam (Single Packer)

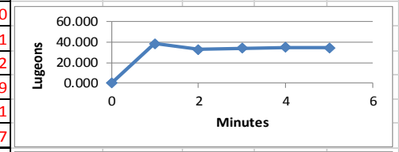
Test Information	
Boring:	B-102
Top of Test Interval (ft):	59
Bottom of Test Interval (ft):	69.0
Test Interval Length (m):	3.05
Transducer Depth bgs (ft):	64.5
Cable Length (ft):	150
Test by:	A. Avakian

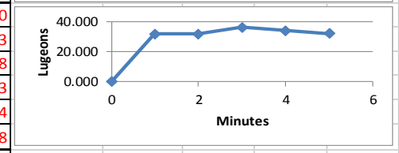
Make:	Geokon Type S
Model:	4500S -1 MPa
Serial #	1213704*
Date of Calibration	8/1/2012
Factory Zero Reading Temperature T_0 (°C)	24.4
Factory Reading Zero Barometric Pressure S_0 (psi)	14.306
Linear Gage Factor, G psi per digit)	-0.03024
Regression Zero	8471
Polynomial Gage Factor A (psi)	-5.506E-08
Polynomial Gage Factor B (psi)	-0.02957
Polynomial Gage Factor C (psi)	254.4384567
Thermal Factor, K (psi/deg C)	0.03998

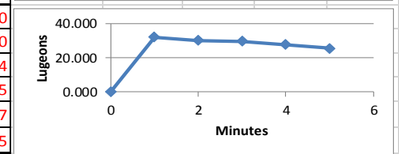
* Purchased June 2013 and put into service on June 26, 2013.

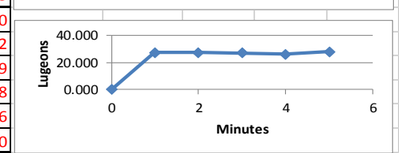
Test	At Testing	
Date	7/28/2017	
Temperature at Testing T_1 ºC	29	deg C
Barometric Pressure at Testing S_1 psi	14.74	psi
Length of Test Interval	10	feet
Pmax	65	psi

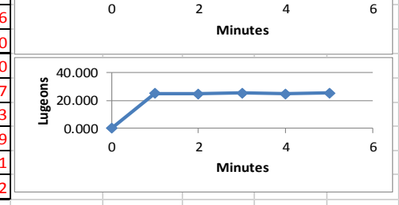
Elapsed Time minutes	Transducer Reading (R_1)	Flow Rate (q) gallons/ min	Pressure (psi)	Flow Loss (gpm/ft)	Lugeons
0	7350	0.00	33.87	0.000	0.000
1	7369	7.08	33.30	0.708	38.301
2	7248	6.70	36.97	0.670	32.642
3	7308	6.66	35.15	0.666	34.129
4	7347	6.60	33.97	0.660	35.001
5	7339	6.54	34.21	0.654	34.437
0	6629	0.00	55.75	0.000	0.000
1	6580	10.14	57.23	1.014	31.913
2	6664	9.63	54.69	0.963	31.718
3	6876	9.70	48.26	0.970	36.203
4	6783	9.66	51.08	0.966	34.064
5	6678	9.70	54.26	0.970	32.198
0	6126	0.00	70.98	0.000	0.000
1	5925	13.74	77.05	1.374	32.120
2	6067	12.14	72.76	1.214	30.054
3	6037	12.12	73.67	1.212	29.635
4	5874	12.12	78.59	1.212	27.777
5	5662	12.04	85.00	1.204	25.515
0	6986	0.00	44.93	0.000	0.000
1	7001	6.76	44.47	0.676	27.382
2	6983	6.82	45.02	0.682	27.289
3	6956	6.88	45.84	0.688	27.038
4	6904	6.89	47.41	0.689	26.176
5	6991	6.93	44.77	0.693	27.880
0	7313	0.00	35.00	0.000	0.000
1	7321	4.80	34.76	0.480	24.877
2	7288	4.88	35.76	0.488	24.583
3	7310	4.94	35.09	0.494	25.359
4	7273	4.98	36.21	0.498	24.771
5	7313	4.92	35.00	0.492	25.322

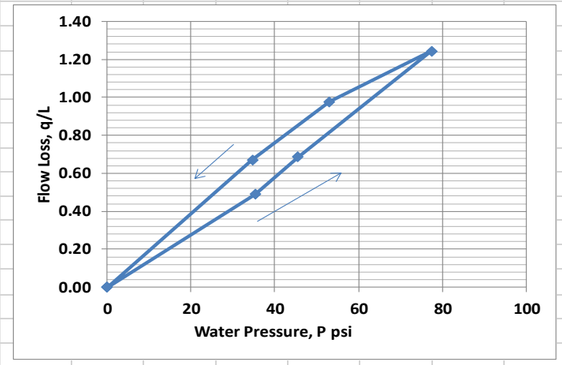


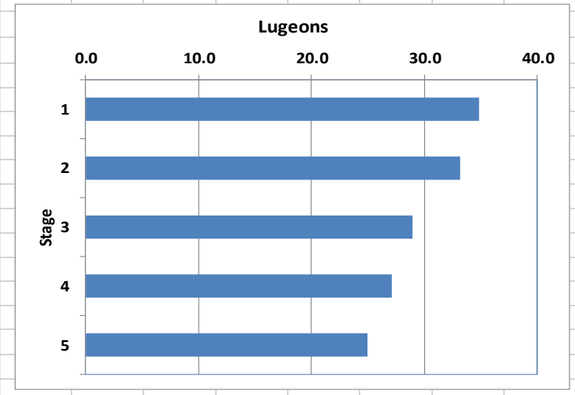












Review the data and select values for pressure, flow loss and Lugeons

Stage	Pressure psi	Flow Loss q/L (gpm/ft)	Lugeons
-	0.00	0.000	0.000
1	34.72	0.672	34.844
2	53.11	0.977	33.125
3	77.41	1.243	28.927
4	45.50	0.686	27.141
5	35.36	0.490	24.979
-	0.00	0.000	0.000

Interpreted Lugeon Value: 25

Interpreted Behavior: Void Filling (?)

Rancho California Water District | AECOM

B-102 PACKER TEST - 59.0-69.0 FEET

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: C. Goetz	DATE: 10/18/2017	FIGURE NO: F-10
CHECKED BY: L. Handfelt	DATE: 10/18/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix F - Packer Tests\Appendix F - Packer Tests102.xlsx\102-59ft

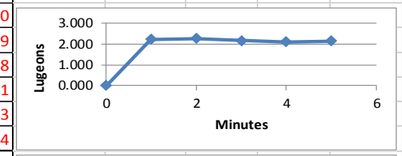
Packer Testing from 69 to 89 feet in Borehole B-102
Vail Dam (Single Packer)

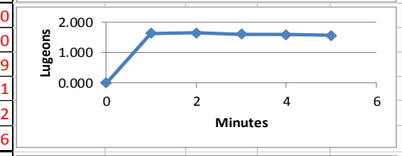
Test Information	
Boring:	B-102
Top of Test Interval (ft):	69
Bottom of Test Interval (ft):	89.0
Test Interval Length (m):	6.10
Transducer Depth bgs (ft):	78.2
Cable Length (ft):	200
Test by:	A. Avakian
Make:	Geokon Type S
Model:	4500S -1 MPa
Serial #	1213704*
Date of Calibration	8/1/2012
Factory Zero Reading Temperature T_0 (°C)	24.4
Factory Reading Zero Barometric Pressure S_0 (psi)	14.306
Linear Gage Factor, G psi per digit)	-0.03024
Regression Zero	8471
Polynomial Gage Factor A (psi)	-5.506E-08
Polynomial Gage Factor B (psi)	-0.02957
Polynomial Gage Factor C (psi)	254.4384567
Thermal Factor, K (psi/deg C)	0.03998

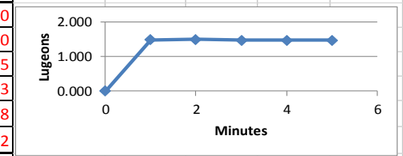
* Purchased June 2013 and put into service on June 26, 2013.

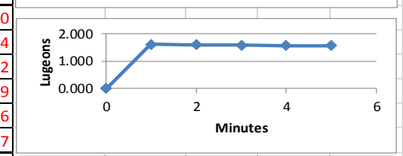
Test	At Testing	
Date	7/28/2017	
Temperature at Testing T_1 ºC	22.5	deg C
Barometric Pressure at Testing S_1 psi	14.74	psi
Length of Test Interval	20	feet
Pmax	80	psi

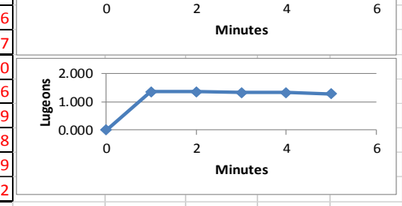
Elapsed Time minutes	Transducer Reading (R_1)	Flow Rate (q) gallons/ min	Pressure (psi)	Flow Loss (gpm/ft)	Lugeons
0	7140	0.00	39.99	0.000	0.000
1	7134	0.99	40.17	0.050	2.219
2	7136	1.01	40.11	0.051	2.268
3	7132	0.97	40.23	0.049	2.171
4	7131	0.94	40.26	0.047	2.103
5	7129	0.96	40.33	0.048	2.144
0	6464	0.00	60.49	0.000	0.000
1	6466	1.10	60.43	0.055	1.640
2	6478	1.10	60.06	0.055	1.649
3	6449	1.09	60.94	0.055	1.611
4	6462	1.07	60.55	0.054	1.592
5	6448	1.06	60.97	0.053	1.566
0	5840	0.00	79.36	0.000	0.000
1	5828	1.31	79.72	0.066	1.480
2	5815	1.33	80.12	0.067	1.495
3	5816	1.31	80.09	0.066	1.473
4	5807	1.31	80.36	0.066	1.468
5	5813	1.31	80.18	0.066	1.472
0	6474	0.00	60.18	0.000	0.000
1	6496	1.06	59.52	0.053	1.604
2	6457	1.08	60.70	0.054	1.602
3	6446	1.07	61.03	0.054	1.579
4	6467	1.05	60.40	0.053	1.566
5	6456	1.05	60.73	0.053	1.557
0	7135	0.00	40.14	0.000	0.000
1	7145	0.60	39.84	0.030	1.356
2	7138	0.60	40.05	0.030	1.349
3	7139	0.59	40.02	0.030	1.328
4	7140	0.59	39.99	0.030	1.329
5	7138	0.57	40.05	0.029	1.282

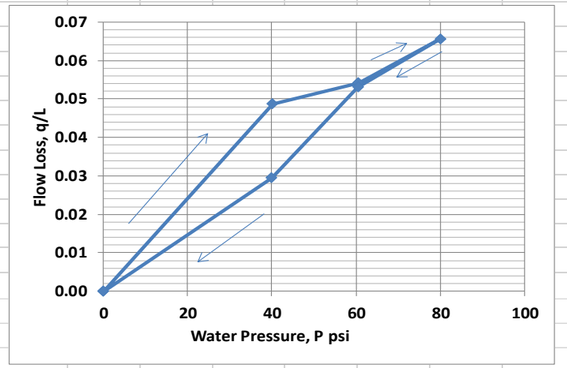


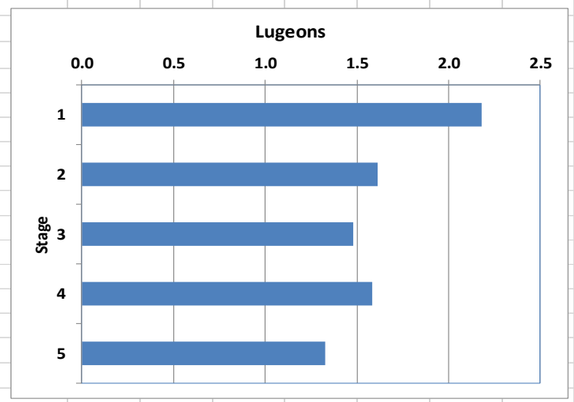












Review the data and select values for pressure, flow loss and Lugeons

Stage	Pressure psi	Flow Loss q/L (gpm/ft)	Lugeons
-	0.00	0.000	0.000
1	40.22	0.049	2.181
2	60.59	0.054	1.611
3	80.09	0.066	1.478
4	60.48	0.053	1.582
5	39.99	0.030	1.329
-	0.00	0.000	0.000

Interpreted Lugeon Value: 1.6

Interpreted Behavior: Laminar

Rancho California Water District

AECOM

B-102 PACKER TEST - 69.0-89.0 FEET

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: C. Goetz	DATE: 10/18/2017	FIGURE NO: F-11
CHECKED BY: L. Handfelt	DATE: 10/18/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix F - Packer Tests\Appendix F - Packer Tests102.xlsx\102-69ft

Packer Testing from 89 to 109 feet in Borehole B-102
Vail Dam (Single Packer)

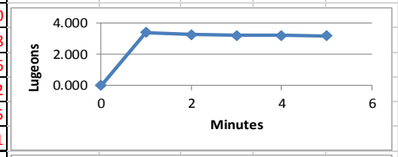
Test Information	
Boring:	B-102
Top of Test Interval (ft):	89
Bottom of Test Interval (ft):	109.0
Test Interval Length (m):	6.10
Transducer Depth bgs (ft):	98.2
Cable Length (ft):	150
Test by:	A. Avakian

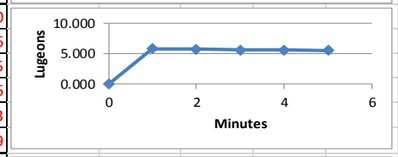
Make:	Geokon Type S
Model:	4500S -1 MPa
Serial #	1213704*
Date of Calibration	8/1/2012
Factory Zero Reading Temperature T_0 (°C)	24.4
Factory Reading Zero Barometric Pressure S_0 (psi)	14.306
Linear Gage Factor, G psi per digit)	-0.03024
Regression Zero	8471
Polynomial Gage Factor A (psi)	-5.506E-08
Polynomial Gage Factor B (psi)	-0.02957
Polynomial Gage Factor C (psi)	254.4384567
Thermal Factor, K (psi/deg C)	0.03998

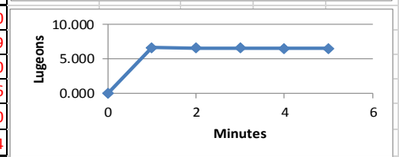
* Purchased June 2013 and put into service on June 26, 2013.

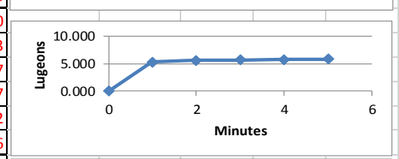
Test	At Testing	
Date	7/28/2017	
Temperature at Testing T_1 °C	24.2	deg C
Barometric Pressure at Testing S_1 psi	14.74	psi
Length of Test Interval	20	feet
Pmax	90	psi

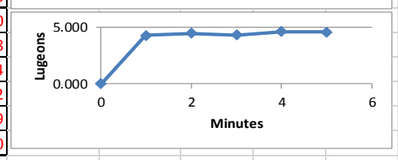
Elapsed Time minutes	Transducer Reading (R_1)	Flow Rate (q) gallons/ min	Pressure (psi)	Flow Loss (gpm/ft)	Lugeons
0	6975	0.00	45.07	0.000	0.000
1	6971	1.70	45.19	0.085	3.388
2	6970	1.64	45.22	0.082	3.266
3	6968	1.61	45.28	0.081	3.202
4	6969	1.61	45.25	0.081	3.205
5	6972	1.60	45.16	0.080	3.191
0	6192	0.00	68.79	0.000	0.000
1	6178	4.50	69.21	0.225	5.856
2	6157	4.44	69.85	0.222	5.725
3	6148	4.38	70.12	0.219	5.626
4	6147	4.38	70.15	0.219	5.623
5	6131	4.36	70.63	0.218	5.559
0	5444	0.00	91.39	0.000	0.000
1	5420	6.78	92.11	0.339	6.629
2	5415	6.74	92.26	0.337	6.580
3	5404	6.74	92.59	0.337	6.556
4	5401	6.73	92.68	0.337	6.540
5	5389	6.73	93.04	0.337	6.514
0	6263	0.00	66.64	0.000	0.000
1	6322	3.84	64.85	0.192	5.333
2	6336	3.99	64.43	0.200	5.577
3	6342	4.05	64.25	0.203	5.677
4	6349	4.09	64.04	0.205	5.752
5	6357	4.12	63.79	0.206	5.816
0	6945	0.00	45.98	0.000	0.000
1	6951	2.17	45.80	0.109	4.268
2	6951	2.27	45.80	0.114	4.464
3	6953	2.20	45.73	0.110	4.332
4	6950	2.34	45.83	0.117	4.599
5	6950	2.32	45.83	0.116	4.560

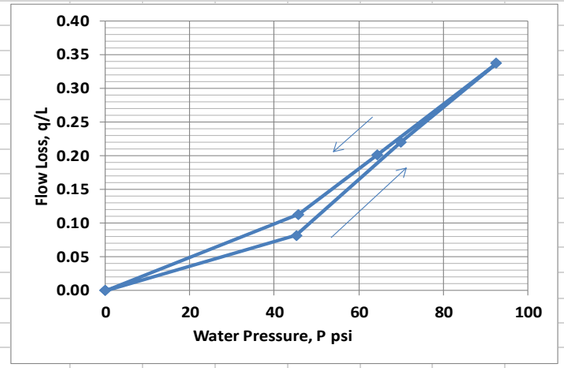


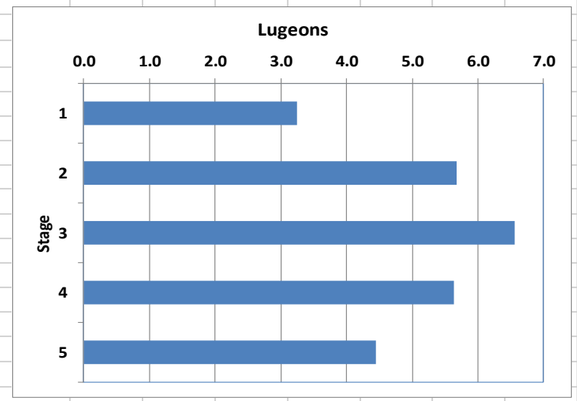












Review the data and select values for pressure, flow loss and Lugeons

Stage	Pressure psi	Flow Loss q/L (gpm/ft)	Lugeons
-	0.00	0.000	0.000
1	45.22	0.082	3.251
2	69.99	0.221	5.677
3	92.54	0.337	6.564
4	64.27	0.201	5.630
5	45.80	0.113	4.445
-	0.00	0.000	0.000

Interpreted Lugeon Value: 5.6

Interpreted Behavior: Dilation

Rancho California Water District | AECOM

B-102 PACKER TEST - 89.0-109.0 FEET

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: C. Goetz	DATE: 10/18/2017	FIGURE NO: F-12
CHECKED BY: L. Handfelt	DATE: 10/18/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix F - Packer Tests\Appendix F - Packer Tests102.xlsx\102-89ft

Packer Testing from 109 to 129 feet in Borehole B-102
Vail Dam (Single Packer)

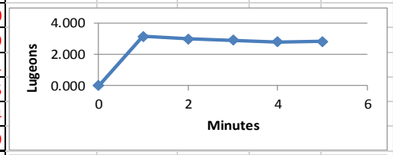
Test Information	
Boring:	B-102
Top of Test Interval (ft):	109
Bottom of Test Interval (ft):	129.0
Test Interval Length (m):	6.10
Transducer Depth bgs (ft):	118.2
Cable Length (ft):	150
Test by:	A. Avakian

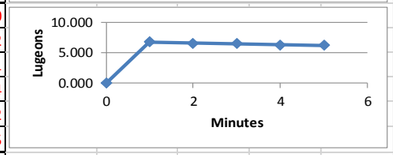
Make:	Geokon Type S
Model:	4500S -1 MPa
Serial #	1213704*
Date of Calibration	8/1/2012
Factory Zero Reading Temperature T_0 (°C)	24.4
Factory Reading Zero Barometric Pressure S_0 (psi)	14.306
Linear Gage Factor, G psi per digit)	-0.03024
Regression Zero	8471
Polynomial Gage Factor A (psi)	-5.506E-08
Polynomial Gage Factor B (psi)	-0.02957
Polynomial Gage Factor C (psi)	254.4384567
Thermal Factor, K (psi/deg C)	0.03998

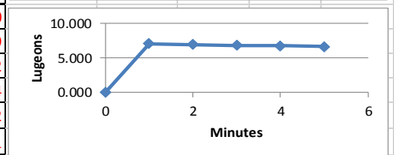
* Purchased June 2013 and put into service on June 26, 2013.

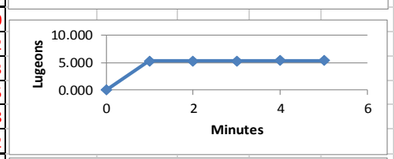
Test	At Testing	
Date	7/28/2017	
Temperature at Testing T_1 °C	23.8	deg C
Barometric Pressure at Testing S_1 psi	14.74	psi
Length of Test Interval	20	feet
Pmax	120	psi

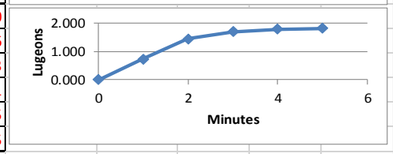
Elapsed Time minutes	Transducer Reading (R_1)	Flow Rate (q) gallons/ min	Pressure (psi)	Flow Loss (gpm/ft)	Lugeons
0	6460	0.00	60.66	0.000	0.000
1	6442	2.14	61.21	0.107	3.149
2	6435	2.04	61.42	0.102	2.991
3	6436	1.98	61.39	0.099	2.905
4	6434	1.92	61.45	0.096	2.814
5	6431	1.94	61.54	0.097	2.839
0	5443	0.00	91.40	0.000	0.000
1	5431	6.90	91.76	0.345	6.772
2	5392	6.76	92.94	0.338	6.551
3	5388	6.72	93.06	0.336	6.504
4	5323	6.68	95.02	0.334	6.332
5	5298	6.62	95.77	0.331	6.225
0	4451	0.00	121.27	0.000	0.000
1	4459	9.50	121.03	0.475	7.069
2	4400	9.48	122.81	0.474	6.952
3	4345	9.43	124.46	0.472	6.824
4	4300	9.46	125.81	0.473	6.772
5	4253	9.41	127.22	0.471	6.661
0	5570	0.00	87.57	0.000	0.000
1	5562	5.14	87.81	0.257	5.272
2	5579	5.14	87.30	0.257	5.303
3	5563	5.19	87.78	0.260	5.325
4	5603	5.15	86.57	0.258	5.358
5	5583	5.20	87.17	0.260	5.372
0	6501	0.00	59.42	0.000	0.000
1	6523	0.48	58.75	0.024	0.736
2	6526	0.94	58.66	0.047	1.443
3	6529	1.10	58.57	0.055	1.691
4	6530	1.16	58.54	0.058	1.785
5	6530	1.18	58.54	0.059	1.815

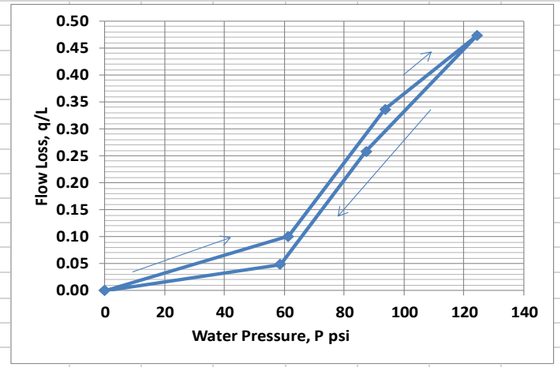


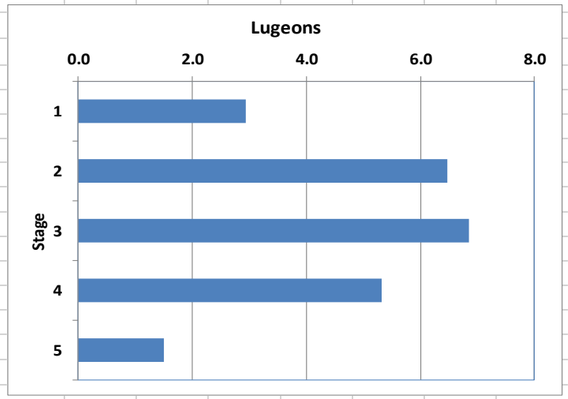












Review the data and select values for pressure, flow loss and Lugeons

Stage	Pressure psi	Flow Loss q/L (gpm/ft)	Lugeons
-	0.00	0.000	0.000
1	61.40	0.100	2.940
2	93.71	0.337	6.474
3	124.27	0.473	6.853
4	87.33	0.258	5.326
5	58.61	0.049	1.494
-	0.00	0.000	0.000

Interpreted Lugeon Value: 6.5

Interpreted Behavior: Dilation

Rancho California Water District | AECOM

B-102 PACKER TEST - 109.0-129.0 FEET

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: C. Goetz	DATE: 10/18/2017	FIGURE NO: F-13
CHECKED BY: L. Handfelt	DATE: 10/18/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix F - Packer Tests\Appendix F - Packer Tests102.xlsx\102-109ft

Packer Testing from 129 to 149 feet in Borehole B-102
Vail Dam (Single Packer)

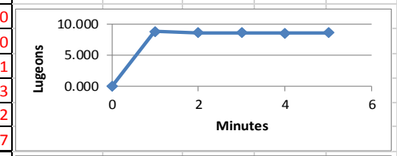
Test Information	
Boring:	B-102
Top of Test Interval (ft):	129
Bottom of Test Interval (ft):	149.0
Test Interval Length (m):	6.10
Transducer Depth bgs (ft):	138.2
Cable Length (ft):	150
Test by:	A. Avakian

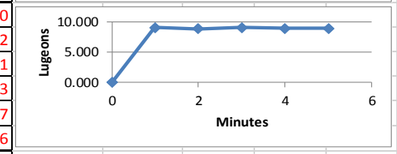
Make:	Geokon Type S
Model:	4500S -1 MPa
Serial #	1213704*
Date of Calibration	8/1/2012
Factory Zero Reading Temperature T_0 (°C)	24.4
Factory Reading Zero Barometric Pressure S_0 (psi)	14.306
Linear Gage Factor, G psi per digit)	-0.03024
Regression Zero	8471
Polynomial Gage Factor A (psi)	-5.506E-08
Polynomial Gage Factor B (psi)	-0.02957
Polynomial Gage Factor C (psi)	254.4384567
Thermal Factor, K (psi/deg C)	0.03998

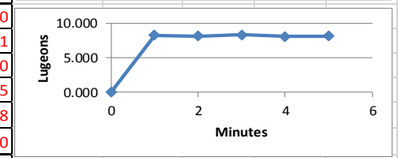
* Purchased June 2013 and put into service on June 26, 2013.

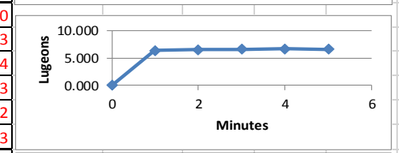
Test	At Testing	
Date	7/28/2017	
Temperature at Testing T_1 ºC	20.2	deg C
Barometric Pressure at Testing S_1 psi	14.74	psi
Length of Test Interval	20	feet
Pmax	140	psi

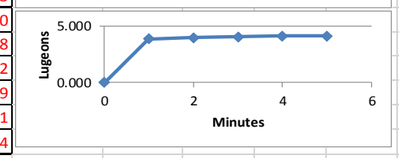
Elapsed Time minutes	Transducer Reading (R_1)	Flow Rate (q) gallons/ min	Pressure (psi)	Flow Loss (gpm/ft)	Lugeons
0	6128	0.00	70.56	0.000	0.000
1	6106	6.96	71.23	0.348	8.800
2	6093	6.88	71.62	0.344	8.651
3	6081	6.90	71.99	0.345	8.633
4	6071	6.88	72.29	0.344	8.572
5	6065	6.95	72.47	0.348	8.637
0	5240	0.00	97.38	0.000	0.000
1	5242	9.77	97.32	0.489	9.042
2	5233	9.58	97.59	0.479	8.841
3	5211	9.92	98.25	0.496	9.093
4	5204	9.76	98.46	0.488	8.927
5	5200	9.77	98.58	0.489	8.926
0	3826	0.00	139.90	0.000	0.000
1	3762	13.04	141.81	0.652	8.281
2	3727	12.88	142.86	0.644	8.120
3	3688	13.33	144.03	0.667	8.335
4	3652	13.08	145.11	0.654	8.118
5	3652	13.10	145.11	0.655	8.130
0	5210	0.00	98.28	0.000	0.000
1	5301	6.76	95.54	0.338	6.373
2	5311	6.93	95.24	0.347	6.554
3	5322	6.99	94.91	0.350	6.633
4	5340	6.99	94.36	0.350	6.672
5	5344	6.93	94.24	0.347	6.623
0	6159	0.00	69.63	0.000	0.000
1	6167	2.98	69.38	0.149	3.868
2	6171	3.07	69.26	0.154	3.992
3	6168	3.11	69.35	0.156	4.039
4	6172	3.16	69.23	0.158	4.111
5	6176	3.18	69.11	0.159	4.144

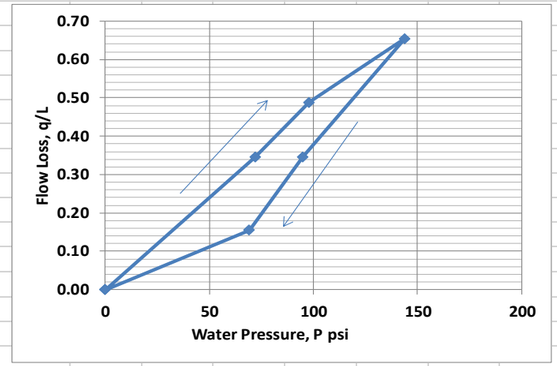


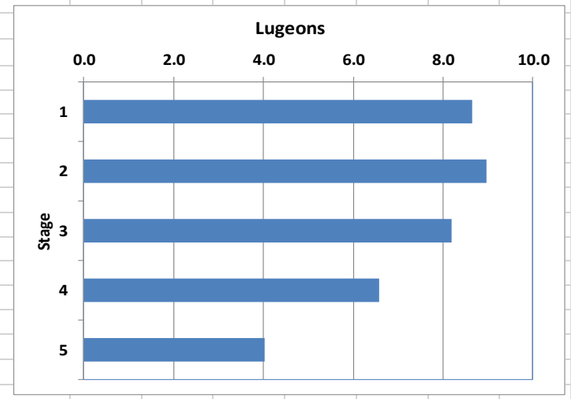












Review the data and select values for pressure, flow loss and Lugeons

Stage	Pressure psi	Flow Loss q/L (gpm/ft)	Lugeons
-	0.00	0.000	0.000
1	71.92	0.346	8.658
2	98.04	0.488	8.966
3	143.79	0.654	8.197
4	94.86	0.346	6.570
5	69.27	0.155	4.031
-	0.00	0.000	0.000

Interpreted Lugeon Value: 4

Interpreted Behavior: Void Filling

Rancho California Water District

AECOM

B-102 PACKER TEST - 129.0-149.0 FEET

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: C. Goetz	DATE: 10/18/2017	FIGURE NO: F-14
CHECKED BY: L. Handfelt	DATE: 10/18/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix F - Packer Tests\Appendix F - Packer Tests102.xlsx\102-129ft

Packer Testing from 149 to 169 feet in Borehole 102
Vail Dam (Single Packer)

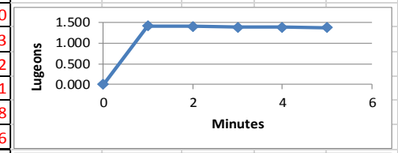
Test Information	
Boring:	102
Top of Test Interval (ft):	149
Bottom of Test Interval (ft):	169.0
Test Interval Length (m):	6.10
Transducer Depth bgs (ft):	158.2
Cable Length (ft):	150
Test by:	A. Avakian

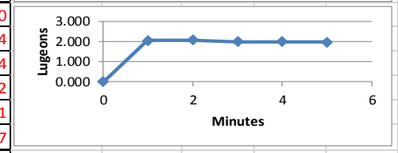
Make:	Geokon Type S
Model:	4500S -1 MPa
Serial #	1213704*
Date of Calibration	8/1/2012
Factory Zero Reading Temperature T_0 (°C)	24.4
Factory Reading Zero Barometric Pressure S_0 (psi)	14.306
Linear Gage Factor, G psi per digit)	-0.03024
Regression Zero	8471
Polynomial Gage Factor A (psi)	-5.506E-08
Polynomial Gage Factor B (psi)	-0.02957
Polynomial Gage Factor C (psi)	254.4384567
Thermal Factor, K (psi/deg C)	0.03998

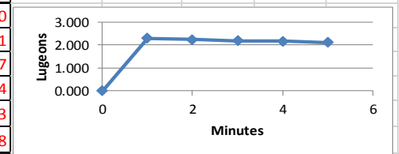
* Purchased June 2013 and put into service on June 26, 2013.

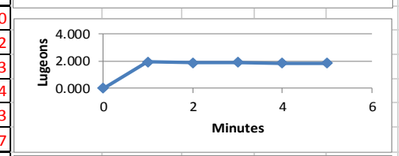
Test	At Testing	
Date	7/28/2017	
Temperature at Testing T_1 °C	20.5	deg C
Barometric Pressure at Testing S_1 psi	14.74	psi
Length of Test Interval	20	feet
Pmax	160	psi

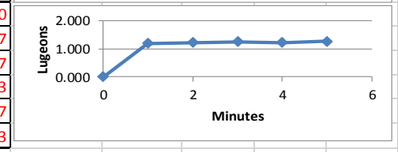
Elapsed Time minutes	Transducer Reading (R_1)	Flow Rate (q) gallons/ min	Pressure (psi)	Flow Loss (gpm/ft)	Lugeons
0	5830	0.00	79.58	0.000	0.000
1	5827	1.25	79.67	0.063	1.413
2	5828	1.24	79.64	0.062	1.402
3	5831	1.22	79.55	0.061	1.381
4	5823	1.23	79.80	0.062	1.388
5	5822	1.22	79.83	0.061	1.376
0	4584	0.00	117.14	0.000	0.000
1	4571	2.68	117.53	0.134	2.054
2	4556	2.73	117.98	0.137	2.084
3	4555	2.61	118.01	0.131	1.992
4	4553	2.61	118.07	0.131	1.991
5	4541	2.60	118.44	0.130	1.977
0	3201	0.00	158.63	0.000	0.000
1	3061	4.16	162.82	0.208	2.301
2	3051	4.07	163.12	0.204	2.247
3	3004	3.99	164.52	0.200	2.184
4	2965	3.98	165.69	0.199	2.163
5	2932	3.92	166.68	0.196	2.118
0	4554	0.00	118.04	0.000	0.000
1	4541	2.54	118.44	0.127	1.932
2	4518	2.49	119.13	0.125	1.883
3	4546	2.50	118.29	0.125	1.904
4	4584	2.41	117.14	0.121	1.853
5	4551	2.41	118.14	0.121	1.837
0	5805	0.00	80.34	0.000	0.000
1	5828	1.05	79.64	0.053	1.187
2	5818	1.08	79.95	0.054	1.217
3	5823	1.11	79.80	0.056	1.253
4	5840	1.08	79.28	0.054	1.227
5	5844	1.11	79.16	0.056	1.263

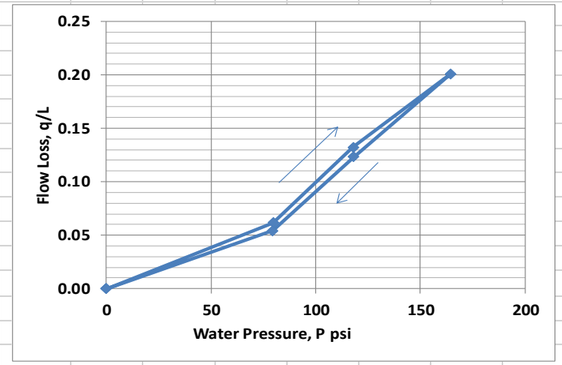


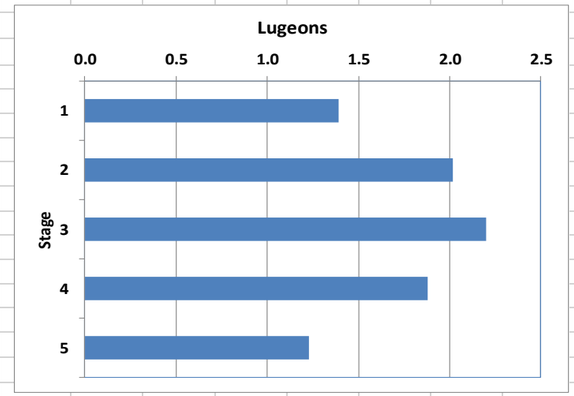












Review the data and select values for pressure, flow loss and Lugeons

Stage	Pressure psi	Flow Loss q/L (gpm/ft)	Lugeons
-	0.00	0.000	0.000
1	79.70	0.062	1.392
2	118.01	0.132	2.019
3	164.57	0.201	2.202
4	118.23	0.124	1.882
5	79.57	0.054	1.229
-	0.00	0.000	0.000

Interpreted Lugeon Value: 1.2

Interpreted Behavior: Dilation

Rancho California Water District | AECOM

B-102 PACKER TEST - 149.0-169.0 FEET

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: C. Goetz	DATE: 10/18/2017	FIGURE NO: F-15
CHECKED BY: L. Handfelt	DATE: 10/18/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix F - Packer Tests\Appendix F - Packer Tests102.xlsx\102-149ft

Packer Testing from 169 to 189 feet in Borehole 102
Vail Dam (Single Packer)

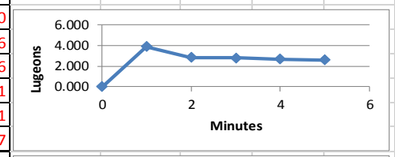
Test Information	
Boring:	102
Top of Test Interval (ft):	169
Bottom of Test Interval (ft):	189.0
Test Interval Length (m):	6.10
Transducer Depth bgs (ft):	178.2
Cable Length (ft):	150
Test by:	B. Donnelly

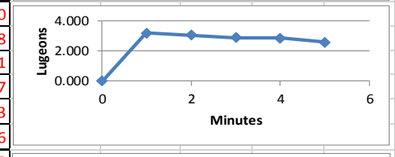
Make:	Geokon Type S
Model:	4500S -1 MPa
Serial #	1213704*
Date of Calibration	8/1/2012
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Factory Reading Zero Barometric Pressure S_0 (psi)	14.306
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Regression Zero	8471
Polynomial Gage Factor A (psi)	-5.506E-08
Polynomial Gage Factor B (psi)	-0.02957
Polynomial Gage Factor C (psi)	254.4384567
Thermal Factor, K (psi/deg C)	0.03998

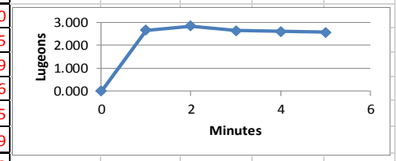
* Purchased June 2013 and put into service on June 26, 2013.

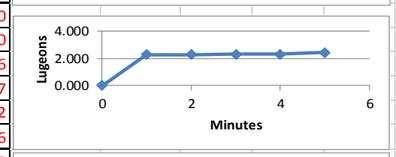
Test	At Testing	
Date	7/28/2017	
Temperature at Testing T_1 °C	20.5	deg C
Barometric Pressure at Testing S_1 psi	14.74	psi
Length of Test Interval	20	feet
Pmax	180	psi

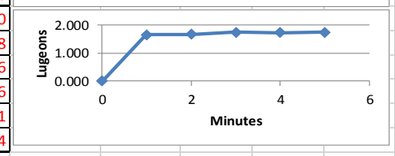
Elapsed Time minutes	Transducer Reading (R_1)	Flow Rate (q) gallons/ min	Pressure (psi)	Flow Loss (gpm/ft)	Lugeons
0	5475	0.00	90.29	0.000	0.000
1	5442	3.93	91.31	0.197	3.876
2	5469	2.86	90.49	0.143	2.846
3	5462	2.80	90.69	0.140	2.781
4	5517	2.64	89.03	0.132	2.671
5	5479	2.60	90.18	0.130	2.597
0	4024	0.00	133.96	0.000	0.000
1	4012	4.74	134.32	0.237	3.178
2	3983	4.58	135.19	0.229	3.051
3	3919	4.38	137.11	0.219	2.877
4	4001	4.25	134.65	0.213	2.843
5	3985	3.85	135.13	0.193	2.566
0	2628	0.00	175.76	0.000	0.000
1	2538	5.26	178.46	0.263	2.655
2	2479	5.68	180.22	0.284	2.839
3	2427	5.32	181.75	0.266	2.636
4	2423	5.26	181.87	0.263	2.605
5	2514	5.13	179.16	0.257	2.579
0	4030	0.00	133.78	0.000	0.000
1	4033	3.37	133.69	0.169	2.270
2	4025	3.37	133.94	0.169	2.266
3	4033	3.41	133.69	0.171	2.297
4	4029	3.42	133.83	0.171	2.302
5	4028	3.59	133.85	0.180	2.416
0	5450	0.00	91.05	0.000	0.000
1	5462	1.66	90.71	0.083	1.648
2	5457	1.68	90.84	0.084	1.666
3	5460	1.76	90.76	0.088	1.746
4	5468	1.74	90.52	0.087	1.731
5	5472	1.74	90.40	0.087	1.734

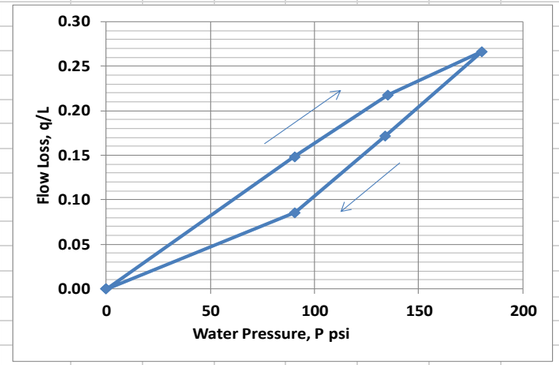


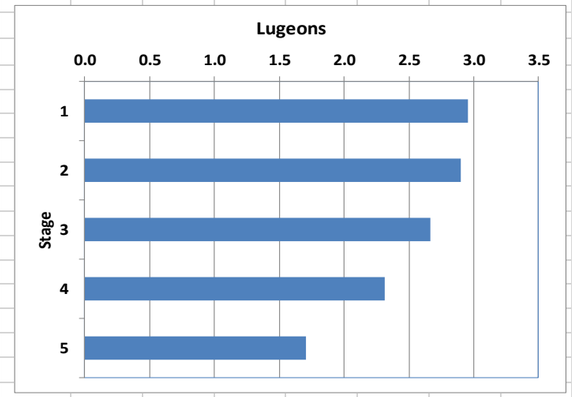












Review the data and select values for pressure, flow loss and Lugeons

Stage	Pressure psi	Flow Loss q/L (gpm/ft)	Lugeons
-	0.00	0.000	0.000
1	90.34	0.148	2.957
2	135.28	0.218	2.903
3	180.29	0.267	2.663
4	133.80	0.172	2.310
5	90.65	0.086	1.705
-	0.00	0.000	0.000

Interpreted Lugeon Value: 1.7

Interpreted Behavior: Void Filling

Rancho California Water District

AECOM

B-102 PACKER TEST - 169.0-189.0 FEET

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: C. Goetz	DATE: 10/18/2017	FIGURE NO: F-16
CHECKED BY: L. Handfelt	DATE: 10/18/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix F - Packer Tests\Appendix F - Packer Tests102.xlsx\102-169ft

Packer Testing from 184 to 200 feet in Borehole 102
Vail Dam (Single Packer)

Test Information	
Boring:	102
Top of Test Interval (ft):	184
Bottom of Test Interval (ft):	200.0
Test Interval Length (m):	4.88
Transducer Depth bgs (ft):	193.2
Cable Length (ft):	150
Test by:	B. Donnelly

Make:	Geokon Type S
Model:	4500S -1 MPa
Serial #	1213704*
Date of Calibration	8/1/2012
Factory Zero Reading Temperature T_0 (°C)	24.4
Factory Reading Zero Barometric Pressure S_0 (psi)	14.306
Linear Gage Factor, G psi per digit)	-0.03024
Regression Zero	8471
Polynomial Gage Factor A (psi)	-5.506E-08
Polynomial Gage Factor B (psi)	-0.02957
Polynomial Gage Factor C (psi)	254.4384567
Thermal Factor, K (psi/deg C)	0.03998

* Purchased June 2013 and put into service on June 26, 2013.

Test	At Testing	
Date	7/29/2017	
Temperature at Testing T_1 ºC	20.5	deg C
Barometric Pressure at Testing S_1 psi	14.74	psi
Length of Test Interval	16	feet
Pmax	195	psi

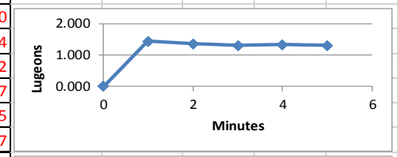
Elapsed Time minutes	Transducer Reading (R_1)	Flow Rate (q) gallons/ min	Pressure (psi)	Flow Loss (gpm/ft)	Lugeons
0	5415	0.00	92.11	0.000	0.000
1	5418	1.18	92.02	0.074	1.444
2	5400	1.12	92.56	0.070	1.362
3	5414	1.07	92.16	0.067	1.307
4	5394	1.10	92.75	0.069	1.335
5	5414	1.07	92.14	0.067	1.307
0	3652	0.00	145.13	0.000	0.000
1	3633	2.62	145.71	0.164	2.024
2	3743	2.52	142.39	0.158	1.992
3	3669	2.48	144.62	0.155	1.931
4	3625	2.37	145.92	0.148	1.828
5	3690	2.43	143.98	0.152	1.900
0	2079	0.00	192.15	0.000	0.000
1	2049	5.08	193.04	0.318	2.963
2	2044	5.15	193.18	0.322	3.001
3	2092	5.11	191.75	0.319	3.000
4	2025	5.19	193.74	0.324	3.016
5	2027	4.99	193.69	0.312	2.900
0	3646	0.00	145.30	0.000	0.000
1	3633	3.32	145.69	0.208	2.565
2	3650	3.15	145.20	0.197	2.442
3	3604	3.24	146.58	0.203	2.488
4	3617	3.24	146.19	0.203	2.495
5	3707	3.10	143.48	0.194	2.432
0	5407	0.00	92.34	0.000	0.000
1	5424	1.40	91.85	0.088	1.716
2	5401	1.40	92.54	0.088	1.703
3	5391	1.38	92.83	0.086	1.674
4	5408	1.36	92.33	0.085	1.658
5	5399	1.36	92.59	0.085	1.654

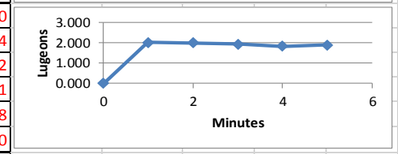
Review the data and select values for pressure, flow loss and Lugeons

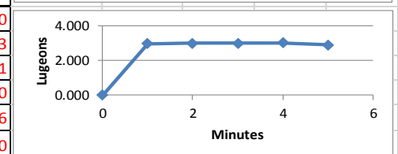
Stage	Pressure psi	Flow Loss q/L (gpm/ft)	Lugeons
-	0.00	0.000	0.000
1	92.33	0.069	1.351
2	144.52	0.155	1.935
3	193.08	0.319	2.976
4	145.43	0.201	2.485
5	92.43	0.086	1.681
-	0.00	0.000	0.000

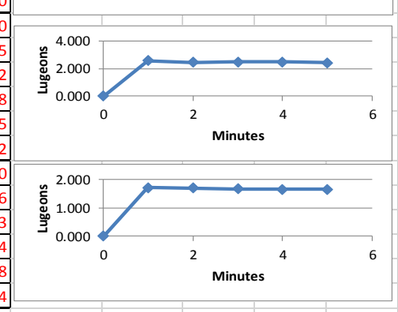
Interpreted Lugeon Value: 1.4

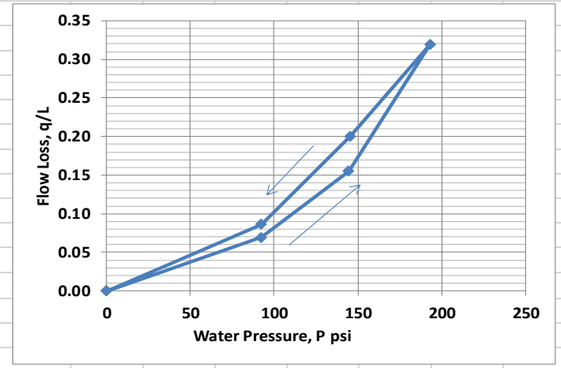
Interpreted Behavior: Dilation

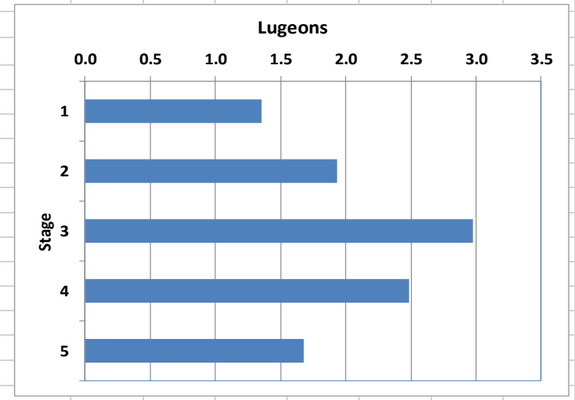












Rancho California Water District | AECOM

B-102 PACKER TEST - 184.0-200.0 FEET

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: C. Goetz	DATE: 10/18/2017	FIGURE NO: F-17
CHECKED BY: L. Handfelt	DATE: 10/18/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix F - Packer Tests\Appendix F - Packer Tests102.xlsx\102-184ft

Packer Testing from 47.5 to 67.5 feet in Borehole B-103
Vail Dam (Single Packer)

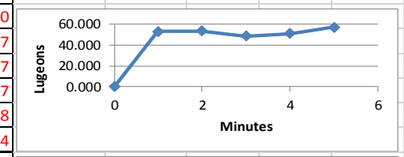
Test Information	
Boring:	B-103
Top of Test Interval (ft):	47.5
Bottom of Test Interval (ft):	67.5
Test Interval Length (m):	6.10
Transducer Depth bgs (ft):	56.7
Cable Length (ft):	200
Test by:	A. Avakian

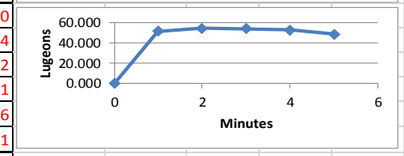
Make:	Geokon Type S
Model:	4500S -1 MPa
Serial #	1213704*
Factory Zero Reading Temperature T_0 (°C)	24.4
Factory Reading Zero Barometric Pressure S_0 (psi)	14.306
Linear Gage Factor, G psi per digit)	-0.03024
Regression Zero	8471
Polynomial Gage Factor A (psi)	-5.506E-08
Polynomial Gage Factor B (psi)	-0.02957
Polynomial Gage Factor C (psi)	254.4384567
Thermal Factor, K (psi/deg C)	0.03998

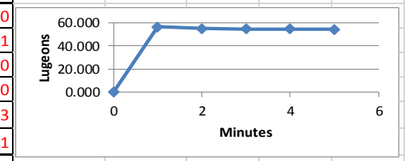
* Purchased June 2013 and put into service on June 26, 2013.

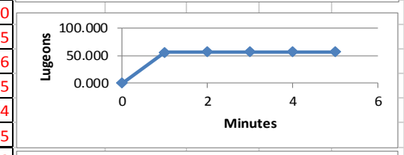
Test	At Testing	
Date	8/2/2017	
Temperature at Testing T_1 °C	28.2	deg C
Barometric Pressure at Testing S_1 psi	14.74	psi
Length of Test Interval	20	feet
Pmax	58	psi

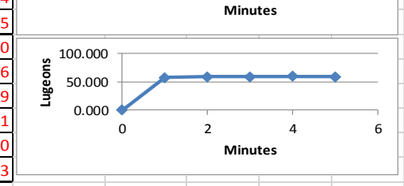
Elapsed Time minutes	Transducer Reading (R_1)	Flow Rate (q) gallons/ min	Pressure (psi)	Flow Loss (gpm/ft)	Lugeons
0	7548	0.00	27.83	0.000	0.000
1	7519	16.94	28.71	0.847	53.147
2	7536	16.66	28.19	0.833	53.227
3	7521	15.46	28.65	0.773	48.607
4	7503	16.54	29.19	0.827	51.028
5	7586	16.88	26.67	0.844	57.004
0	6971	0.00	45.35	0.000	0.000
1	6846	28.15	49.14	1.408	51.594
2	6787	30.74	50.93	1.537	54.362
3	6871	28.95	48.38	1.448	53.891
4	7005	25.91	44.32	1.296	52.656
5	6944	24.98	46.17	1.249	48.731
0	6507	0.00	59.41	0.000	0.000
1	6445	38.60	61.29	1.930	56.721
2	6418	37.99	62.11	1.900	55.090
3	6403	37.99	62.56	1.900	54.690
4	6404	37.96	62.53	1.898	54.673
5	6399	37.96	62.68	1.898	54.541
0	7043	0.00	43.16	0.000	0.000
1	7055	26.79	42.80	1.340	56.375
2	7059	26.80	42.68	1.340	56.556
3	7059	26.88	42.68	1.344	56.725
4	7057	26.88	42.74	1.344	56.644
5	7054	26.89	42.83	1.345	56.545
0	7436	0.00	31.23	0.000	0.000
1	7500	18.63	29.28	0.932	57.296
2	7508	18.95	29.04	0.948	58.769
3	7512	19.00	28.92	0.950	59.171
4	7514	19.03	28.86	0.952	59.390
5	7512	19.01	28.92	0.951	59.203

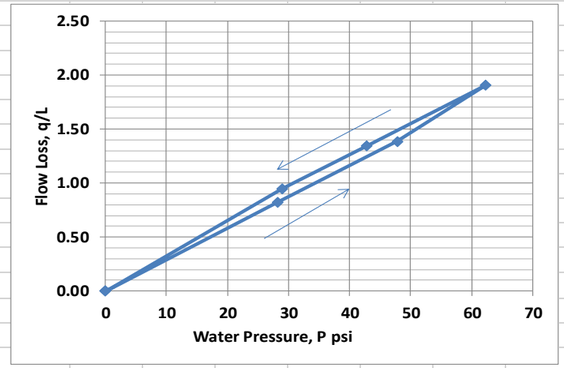


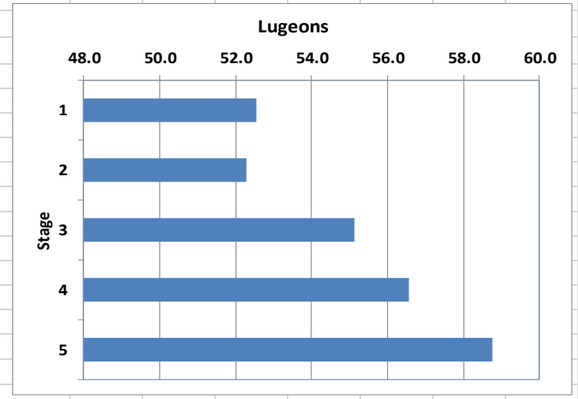












Review the data and select values for pressure, flow loss and Lugeons

Stage	Pressure psi	Flow Loss q/L (gpm/ft)	Lugeons
-	0.00	0.000	0.000
1	28.28	0.825	52.533
2	47.79	1.387	52.293
3	62.24	1.905	55.136
4	42.74	1.342	56.569
5	29.00	0.946	58.762
-	0.00	0.000	0.000

Interpreted Lugeon Value: 59

Interpreted Behavior: Wash Out

Rancho California Water District

AECOM

B-103 PACKER TEST - 47.5-67.5 FEET

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: C. Goetz	DATE: 10/18/2017	FIGURE NO: F-18
CHECKED BY: L. Handfelt	DATE: 10/18/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix F - Packer Tests\Appendix F - Packer Tests103.xlsx\103-47.5ft

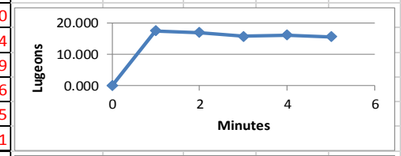
Packer Testing from 67.5 to 87.5 feet in Borehole B-103
Vail Dam (Single Packer)

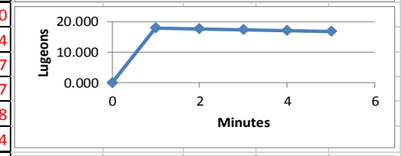
Test Information	
Boring:	B-103
Top of Test Interval (ft):	67.5
Bottom of Test Interval (ft):	87.5
Test Interval Length (m):	6.10
Transducer Depth bgs (ft):	76.7
Cable Length (ft):	150
Test by:	A. Avakian
Make:	Geokon Type S
Model:	4500S -1 MPa
Serial #	1213704*
Date of Calibration	8/1/2012
Factory Zero Reading Temperature T_0 (°C)	24.4
Factory Reading Zero Barometric Pressure S_0 (psi)	14.306
Linear Gage Factor, G psi per digit)	-0.03024
Regression Zero	8471
Polynomial Gage Factor A (psi)	-5.506E-08
Polynomial Gage Factor B (psi)	-0.02957
Polynomial Gage Factor C (psi)	254.4384567
Thermal Factor, K (psi/deg C)	0.03998

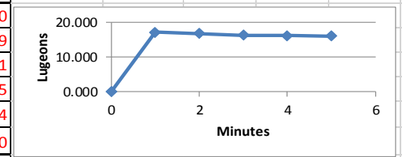
* Purchased June 2013 and put into service on June 26, 2013.

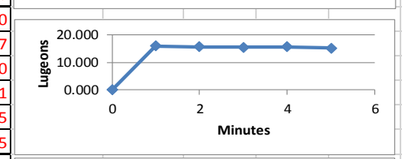
Test	At Testing	
Date	8/3/2017	
Temperature at Testing T_1 °C	28.3	deg C
Barometric Pressure at Testing S_1 psi	14.70	psi
Length of Test Interval	20	feet
Pmax	80	psi

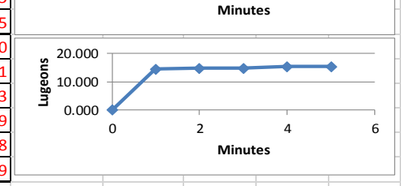
Elapsed Time minutes	Transducer Reading (R_1)	Flow Rate (q) gallons/ min	Pressure (psi)	Flow Loss (gpm/ft)	Lugeons
0	7102	0.00	41.42	0.000	0.000
1	7081	8.15	42.05	0.408	17.454
2	7080	7.92	42.08	0.396	16.949
3	7074	7.38	42.27	0.369	15.726
4	7065	7.64	42.54	0.382	16.175
5	7060	7.40	42.69	0.370	15.611
0	6442	0.00	61.43	0.000	0.000
1	6360	12.74	63.91	0.637	17.954
2	6344	12.66	64.39	0.633	17.707
3	6330	12.52	64.82	0.626	17.397
4	6321	12.40	65.09	0.620	17.158
5	6304	12.32	65.60	0.616	16.914
0	5886	0.00	78.24	0.000	0.000
1	5779	15.46	81.48	0.773	17.089
2	5728	15.44	83.02	0.772	16.751
3	5691	15.26	84.13	0.763	16.335
4	5658	15.26	85.13	0.763	16.144
5	5630	15.36	85.98	0.768	16.090
0	6407	0.00	62.49	0.000	0.000
1	6420	10.96	62.09	0.548	15.897
2	6394	10.94	62.88	0.547	15.670
3	6382	10.92	63.24	0.546	15.551
4	6388	10.94	63.06	0.547	15.625
5	6388	10.66	63.06	0.533	15.225
0	7065	0.00	42.54	0.000	0.000
1	7072	6.82	42.33	0.341	14.511
2	7074	6.90	42.27	0.345	14.703
3	7077	6.93	42.18	0.347	14.799
4	7082	7.18	42.02	0.359	15.388
5	7079	7.14	42.12	0.357	15.269

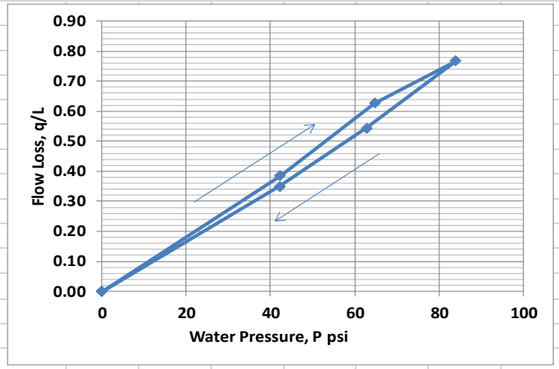


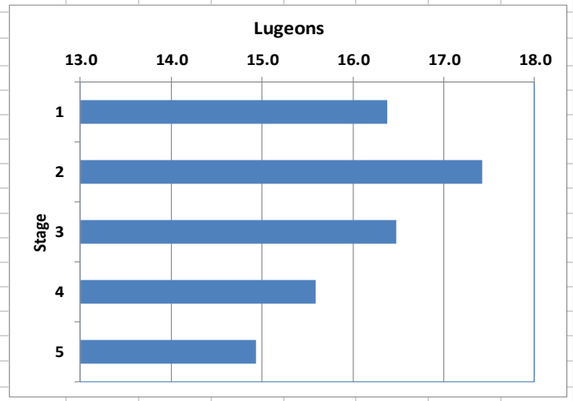












Review the data and select values for pressure, flow loss and Lugeons

Stage	Pressure psi	Flow Loss q/L (gpm/ft)	Lugeons
-	0.00	0.000	0.000
1	42.33	0.385	16.380
2	64.76	0.626	17.423
3	83.95	0.768	16.475
4	62.87	0.544	15.593
5	42.18	0.350	14.933
-	0.00	0.000	0.000

Interpreted Lugeon Value: 16

Interpreted Behavior: Laminar

Rancho California Water District

AECOM

B-103 PACKER TEST - 67.5-87.5 FEET

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: C. Goetz	DATE: 10/18/2017	FIGURE NO: F-19
CHECKED BY: L. Handfelt	DATE: 10/18/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix F - Packer Tests\Appendix F - Packer Tests103.xlsx\103-67.5ft

Packer Testing from 87.5 to 107.5 feet in Borehole B-103
Vail Dam (Single Packer)

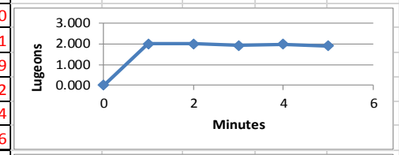
Test Information	
Boring:	B-103
Top of Test Interval (ft):	87.5
Bottom of Test Interval (ft):	107.5
Test Interval Length (m):	6.10
Transducer Depth bgs (ft):	96.7
Cable Length (ft):	200
Test by:	A. Avakian

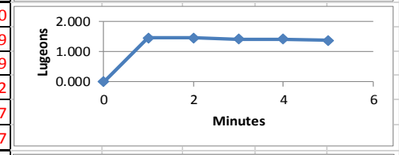
Make:	Geokon Type S
Model:	4500S -1 MPa
Serial #	1213704*
Date of Calibration	8/1/2012
Factory Zero Reading Temperature T_0 (°C)	24.4
Factory Reading Zero Barometric Pressure S_0 (psi)	14.306
Linear Gage Factor, G psi per digit)	-0.03024
Regression Zero	8471
Polynomial Gage Factor A (psi)	-5.506E-08
Polynomial Gage Factor B (psi)	-0.02957
Polynomial Gage Factor C (psi)	254.4384567
Thermal Factor, K (psi/deg C)	0.03998

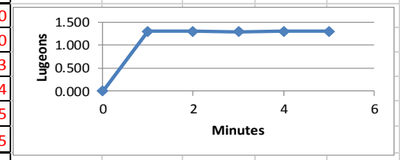
* Purchased June 2013 and put into service on June 26, 2013.

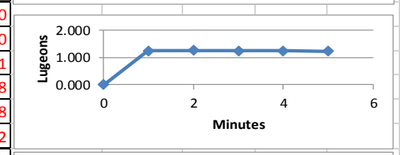
Test	At Testing	
Date	8/3/2017	
Temperature at Testing T_1 °C	24.8	deg C
Barometric Pressure at Testing S_1 psi	14.74	psi
Length of Test Interval	20	feet
Pmax	100	psi

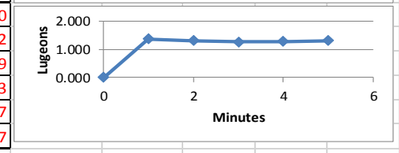
Elapsed Time minutes	Transducer Reading (R_1)	Flow Rate (q) gallons/ min	Pressure (psi)	Flow Loss (gpm/ft)	Lugeons
0	6888	0.00	47.73	0.000	0.000
1	6889	1.06	47.70	0.053	2.001
2	6887	1.06	47.76	0.053	1.999
3	6893	1.01	47.58	0.051	1.912
4	6890	1.05	47.67	0.053	1.984
5	6888	1.01	47.73	0.051	1.906
0	5976	0.00	75.34	0.000	0.000
1	5960	1.22	75.83	0.061	1.449
2	5960	1.22	75.83	0.061	1.449
3	5957	1.19	75.92	0.060	1.412
4	5966	1.19	75.65	0.060	1.417
5	5959	1.16	75.86	0.058	1.377
0	5078	0.00	102.44	0.000	0.000
1	5052	1.49	103.23	0.075	1.300
2	5060	1.49	102.99	0.075	1.303
3	5060	1.48	102.99	0.074	1.294
4	5066	1.49	102.81	0.075	1.305
5	5064	1.49	102.87	0.075	1.305
0	5902	0.00	77.58	0.000	0.000
1	5918	1.07	77.10	0.054	1.250
2	5917	1.08	77.13	0.054	1.261
3	5917	1.06	77.13	0.053	1.238
4	5918	1.06	77.10	0.053	1.238
5	5909	1.05	77.37	0.053	1.222
0	6805	0.00	50.25	0.000	0.000
1	6805	0.76	50.25	0.038	1.362
2	6806	0.73	50.22	0.037	1.309
3	6805	0.71	50.25	0.036	1.273
4	6800	0.72	50.40	0.036	1.287
5	6803	0.73	50.31	0.037	1.307

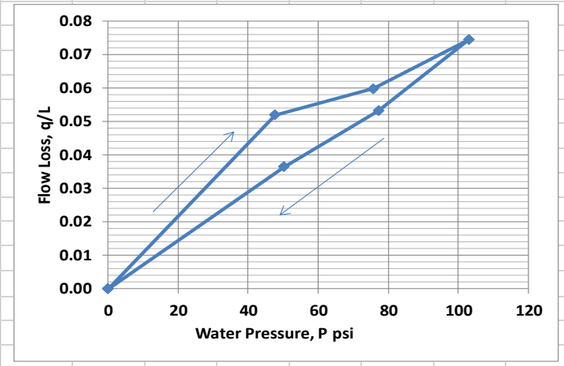


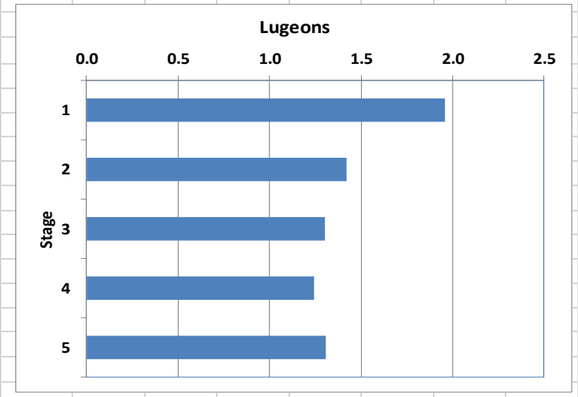












Review the data and select values for pressure, flow loss and Lugeons

Stage	Pressure psi	Flow Loss q/L (gpm/ft)	Lugeons
-	0.00	0.000	0.000
1	47.69	0.052	1.960
2	75.82	0.060	1.421
3	102.97	0.074	1.301
4	77.16	0.053	1.242
5	50.28	0.037	1.308
-	0.00	0.000	0.000

Interpreted Lugeon Value: 1.4

Interpreted Behavior: Laminar

Rancho California Water District | AECOM

B-103 PACKER TEST - 87.5-107.5 FEET

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: C. Goetz	DATE: 10/18/2017	FIGURE NO: F-20
CHECKED BY: L. Handfelt	DATE: 10/18/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix F - Packer Tests\Appendix F - Packer Tests103.xlsx\103-87.5ft

Packer Testing from 107.5 to 127.5 feet in Borehole B-103
Vail Dam (Single Packer)

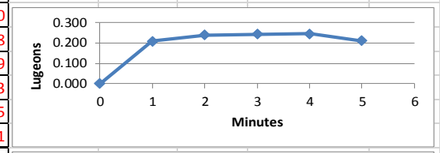
Test Information	
Boring:	B-103
Top of Test Interval (ft):	107.5
Bottom of Test Interval (ft):	127.5
Test Interval Length (m):	6.10
Transducer Depth bgs (ft):	116.7
Cable Length (ft):	200
Test by:	A. Avakian

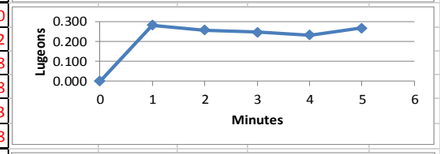
Make:	Geokon Type S
Model:	4500S -1 MPa
Serial #	1213704*
Date of Calibration	8/1/2012
Factory Zero Reading Temperature T_0 (°C)	24.4
Factory Reading Zero Barometric Pressure S_0 (psi)	14.306
Linear Gage Factor, G psi per digit)	-0.03024
Regression Zero	8471
Polynomial Gage Factor A (psi)	-5.506E-08
Polynomial Gage Factor B (psi)	-0.02957
Polynomial Gage Factor C (psi)	254.4384567
Thermal Factor, K (psi/deg C)	0.03998

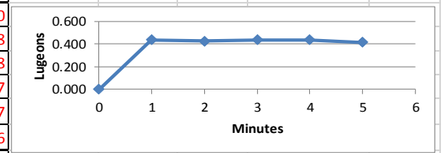
* Purchased June 2013 and put into service on June 26, 2013.

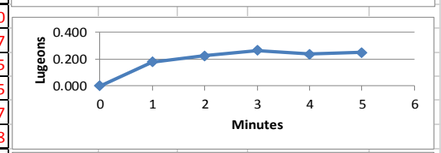
Test	At Testing	
Date	8/3/2017	
Temperature at Testing T_1 °C	24	deg C
Barometric Pressure at Testing S_1 psi	14.74	psi
Length of Test Interval	20	feet
Pmax	120	psi

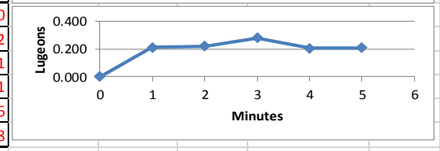
Elapsed Time minutes	Transducer Reading (R_1)	Flow Rate (q) gallons/ min	Pressure (psi)	Flow Loss (gpm/ft)	Lugeons
0	6497	0.00	59.55	0.000	0.000
1	6465	0.14	60.52	0.007	0.208
2	6473	0.16	60.27	0.008	0.239
3	6503	0.16	59.37	0.008	0.243
4	6520	0.16	58.85	0.008	0.245
5	6492	0.14	59.70	0.007	0.211
0	5355	0.00	94.06	0.000	0.000
1	5402	0.29	92.64	0.015	0.282
2	5462	0.26	90.83	0.013	0.258
3	5340	0.26	94.51	0.013	0.248
4	5394	0.24	92.89	0.012	0.233
5	5352	0.28	94.15	0.014	0.268
0	4528	0.00	118.97	0.000	0.000
1	4520	0.58	119.21	0.029	0.438
2	4497	0.57	119.90	0.029	0.428
3	4443	0.59	121.52	0.030	0.437
4	4513	0.58	119.42	0.029	0.437
5	4450	0.56	121.31	0.028	0.416
0	5518	0.00	89.14	0.000	0.000
1	5435	0.18	91.65	0.009	0.177
2	5415	0.23	92.25	0.012	0.225
3	5430	0.27	91.80	0.014	0.265
4	5453	0.24	91.11	0.012	0.237
5	5468	0.25	90.65	0.013	0.248
0	6487	0.00	59.85	0.000	0.000
1	6496	0.14	59.58	0.007	0.212
2	6447	0.15	61.06	0.008	0.221
3	6453	0.19	60.88	0.010	0.281
4	6438	0.14	61.33	0.007	0.206
5	6460	0.14	60.67	0.007	0.208

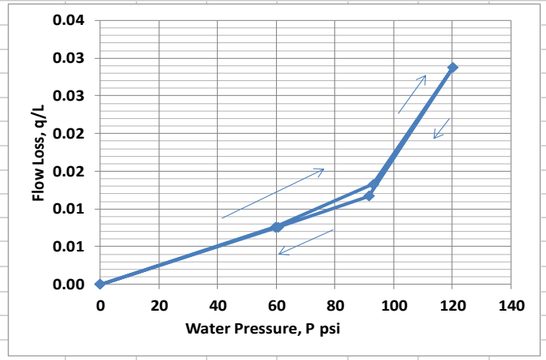


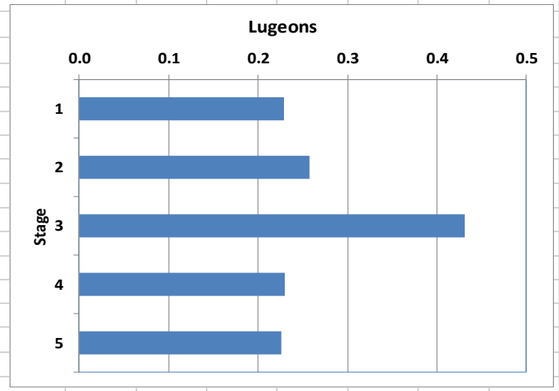












Review the data and select values for pressure, flow loss and Lugeons

Stage	Pressure psi	Flow Loss q/L (gpm/ft)	Lugeons
-	0.00	0.000	0.000
1	59.74	0.008	0.229
2	93.01	0.013	0.258
3	120.27	0.029	0.431
4	91.49	0.012	0.230
5	60.70	0.008	0.226
-	0.00	0.000	0.000

Interpreted Lugeon Value: 0.2

Interpreted Behavior: Dilation

Rancho California Water District

AECOM

B-103 PACKER TEST - 107.5-127.5 FEET

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: C. Goetz	DATE: 10/18/2017	FIGURE NO: F-21
CHECKED BY: L. Handfelt	DATE: 10/18/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix F - Packer Tests\Appendix F - Packer Tests103.xlsx\103-107.5ft

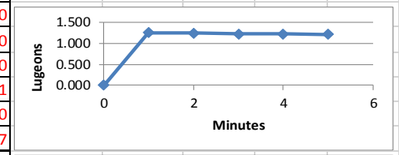
Packer Testing from 127.5 to 147.5 feet in Borehole B-103
Vail Dam (Single Packer)

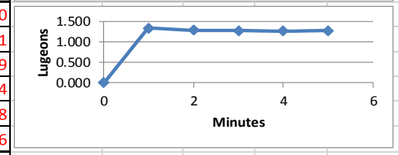
Test Information	
Boring:	B-103
Top of Test Interval (ft):	127.5
Bottom of Test Interval (ft):	147.5
Test Interval Length (m):	6.10
Transducer Depth bgs (ft):	136.7
Cable Length (ft):	200
Test by:	A. Avakian
Make:	Geokon Type S
Model:	4500S -1 MPa
Serial #	1213704*
Date of Calibration	8/1/2012
Factory Zero Reading Temperature T_0 (°C)	24.4
Factory Reading Zero Barometric Pressure S_0 (psi)	14.306
Linear Gage Factor, G psi per digit)	-0.03024
Regression Zero	8471
Polynomial Gage Factor A (psi)	-5.506E-08
Polynomial Gage Factor B (psi)	-0.02957
Polynomial Gage Factor C (psi)	254.4384567
Thermal Factor, K (psi/deg C)	0.03998

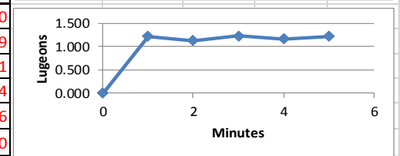
* Purchased June 2013 and put into service on June 26, 2013.

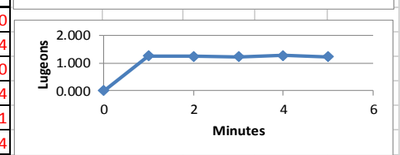
Test	At Testing	
Date	8/4/2017	
Temperature at Testing T_1 ºC	24.8	deg C
Barometric Pressure at Testing S_1 psi	14.74	psi
Length of Test Interval	20	feet
Pmax	140	psi

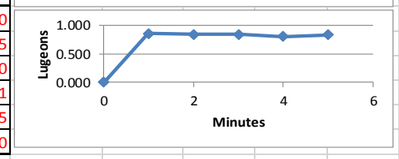
Elapsed Time minutes	Transducer Reading (R_1)	Flow Rate (q) gallons/ min	Pressure (psi)	Flow Loss (gpm/ft)	Lugeons
0	6142	0.00	70.32	0.000	0.000
1	6157	0.97	69.87	0.049	1.250
2	6137	0.97	70.48	0.049	1.240
3	6125	0.96	70.84	0.048	1.221
4	6149	0.95	70.11	0.048	1.220
5	6143	0.95	70.29	0.048	1.217
0	5003	0.00	104.70	0.000	0.000
1	5001	1.56	104.76	0.078	1.341
2	4954	1.52	106.18	0.076	1.289
3	4960	1.50	106.00	0.075	1.274
4	4941	1.50	106.57	0.075	1.268
5	4963	1.50	105.91	0.075	1.276
0	3890	0.00	138.16	0.000	0.000
1	3842	1.89	139.60	0.095	1.219
2	3506	1.88	149.67	0.094	1.131
3	3874	1.90	138.64	0.095	1.234
4	3810	1.82	140.56	0.091	1.166
5	3869	1.88	138.79	0.094	1.220
0	4949	0.00	106.33	0.000	0.000
1	4974	1.47	105.58	0.074	1.254
2	4934	1.47	106.78	0.074	1.240
3	4937	1.45	106.69	0.073	1.224
4	4997	1.48	104.88	0.074	1.271
5	4940	1.46	106.60	0.073	1.234
0	6130	0.00	70.69	0.000	0.000
1	6135	0.67	70.54	0.034	0.855
2	6164	0.65	69.66	0.033	0.840
3	6130	0.66	70.69	0.033	0.841
4	6137	0.63	70.48	0.032	0.805
5	6134	0.65	70.57	0.033	0.830

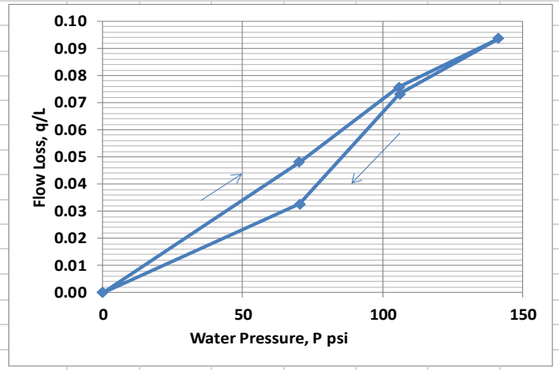


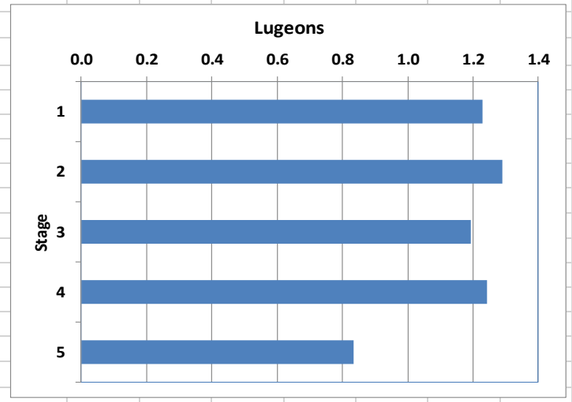












Review the data and select values for pressure, flow loss and Lugeons

Stage	Pressure psi	Flow Loss q/L (gpm/ft)	Lugeons
-	0.00	0.000	0.000
1	70.32	0.048	1.230
2	105.88	0.076	1.289
3	141.45	0.094	1.193
4	106.11	0.073	1.244
5	70.38	0.033	0.834
-	0.00	0.000	0.000

Interpreted Lugeon Value: 1.2

Interpreted Behavior: Laminar

Rancho California Water District | AECOM

B-103 PACKER TEST - 127.5-147.5 FEET

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: C. Goetz	DATE: 10/18/2017	FIGURE NO: F-22
CHECKED BY: L. Handfelt	DATE: 10/18/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix F - Packer Tests\Appendix F - Packer Tests103.xlsx\103-127.5ft

Packer Testing from 147.5 to 167.5 feet in Borehole B-103
Vail Dam (Single Packer)

Test Information	
Boring:	B-103
Top of Test Interval (ft):	147.5
Bottom of Test Interval (ft):	167.5
Test Interval Length (m):	6.10
Transducer Depth bgs (ft):	156.7
Cable Length (ft):	200
Test by:	A. Avakian

Make:	Geokon Type S
Model:	4500S -1 MPa
Serial #	1213704*
Date of Calibration	8/1/2012
Factory Zero Reading Temperature T_0 (°C)	24.4
Factory Reading Zero Barometric Pressure S_0 (psi)	14.306
Linear Gage Factor, G psi per digit)	-0.03024
Regression Zero	8471
Polynomial Gage Factor A (psi)	-5.506E-08
Polynomial Gage Factor B (psi)	-0.02957
Polynomial Gage Factor C (psi)	254.4384567
Thermal Factor, K (psi/deg C)	0.03998

* Purchased June 2013 and put into service on June 26, 2013.

Test	At Testing	
Date	8/4/2017	
Temperature at Testing T_1 ºC	20.75	deg C
Barometric Pressure at Testing S_1 psi	14.74	psi
Length of Test Interval	20	feet
Pmax	160	psi

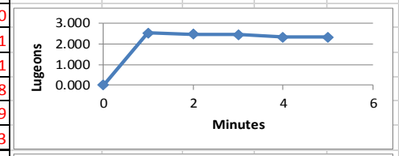
Elapsed Time minutes	Transducer Reading (R_1)	Flow Rate (q) gallons/ min	Pressure (psi)	Flow Loss (gpm/ft)	Lugeons
0	5830	0.00	79.59	0.000	0.000
1	5851	2.21	78.96	0.111	2.521
2	5834	2.18	79.47	0.109	2.471
3	5822	2.17	79.84	0.109	2.448
4	5764	2.11	81.59	0.106	2.329
5	5795	2.08	80.65	0.104	2.323
0	4426	0.00	121.90	0.000	0.000
1	4338	5.20	124.55	0.260	3.760
2	4322	5.11	125.03	0.256	3.681
3	4256	5.03	127.01	0.252	3.567
4	4180	4.92	129.29	0.246	3.427
5	4218	4.84	128.15	0.242	3.401
0	3161	0.00	159.84	0.000	0.000
1	3069	6.40	162.59	0.320	3.545
2	2994	6.45	164.83	0.323	3.524
3	2967	6.42	165.64	0.321	3.491
4	3000	6.48	164.65	0.324	3.544
5	2960	6.44	165.85	0.322	3.497
0	4535	0.00	118.63	0.000	0.000
1	4447	4.13	121.27	0.207	3.067
2	4455	4.11	121.03	0.206	3.058
3	4467	4.08	120.67	0.204	3.045
4	4404	4.10	122.56	0.205	3.013
5	4435	4.06	121.63	0.203	3.006
0	5808	0.00	80.26	0.000	0.000
1	5791	1.44	80.77	0.072	1.606
2	5776	1.44	81.23	0.072	1.597
3	5762	1.48	81.65	0.074	1.633
4	5771	1.48	81.38	0.074	1.638
5	5604	1.47	86.42	0.074	1.532

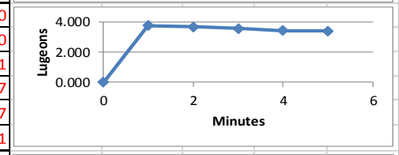
Review the data and select values for pressure, flow loss and Lugeons

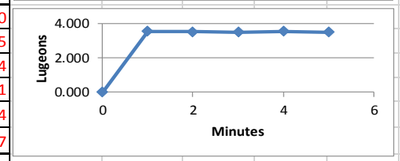
Stage	Pressure psi	Flow Loss q/L (gpm/ft)	Lugeons
-	0.00	0.000	0.000
1	80.10	0.108	2.417
2	126.81	0.251	3.565
3	164.71	0.322	3.520
4	121.43	0.205	3.038
5	82.29	0.073	1.600
-	0.00	0.000	0.000

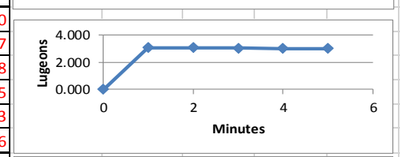
Interpreted Lugeon Value: 3.5

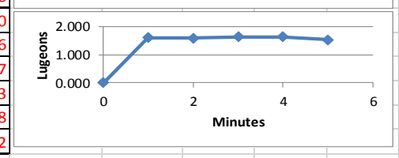
Interpreted Behavior: Dilation (?)

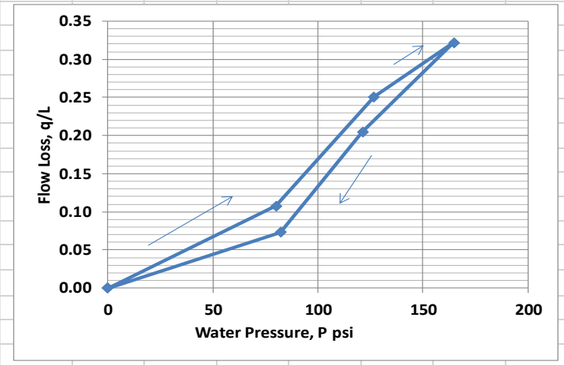


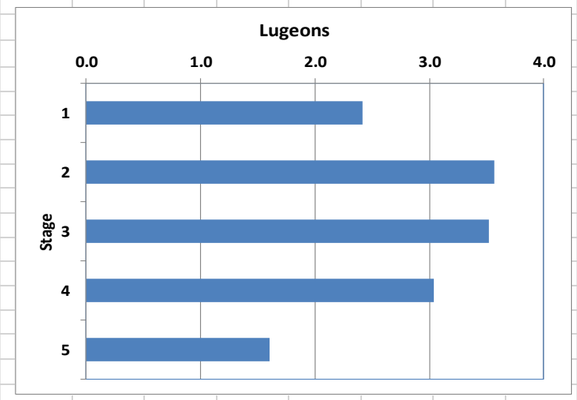












Rancho California Water District | AECOM

B-103 PACKER TEST - 147.5-167.5 FEET

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: C. Goetz	DATE: 10/18/2017	FIGURE NO: F-23
CHECKED BY: L. Handfelt	DATE: 10/18/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix F - Packer Tests\Appendix F - Packer Tests103.xlsx\103-147.5ft

Packer Testing from 167.5 to 187.5 feet in Borehole B-103
Vail Dam (Single Packer)

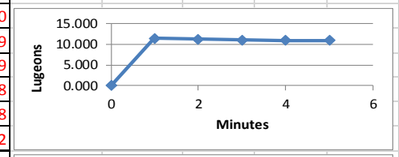
Test Information	
Boring:	B-103
Top of Test Interval (ft):	167.5
Bottom of Test Interval (ft):	187.5
Test Interval Length (m):	6.10
Transducer Depth bgs (ft):	176.7
Cable Length (ft):	200
Test by:	A. Avakian

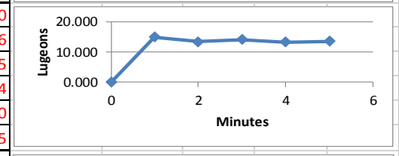
Make:	Geokon Type S
Model:	4500S -1 MPa
Serial #	1213704*
Date of Calibration	8/1/2012
Factory Zero Reading Temperature T_0 (°C)	24.4
Factory Reading Zero Barometric Pressure S_0 (psi)	14.306
Linear Gage Factor, G psi per digit)	-0.03024
Regression Zero	8471
Polynomial Gage Factor A (psi)	-5.506E-08
Polynomial Gage Factor B (psi)	-0.02957
Polynomial Gage Factor C (psi)	254.4384567
Thermal Factor, K (psi/deg C)	0.03998

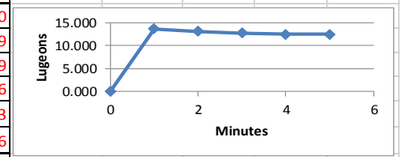
* Purchased June 2013 and put into service on June 26, 2013.

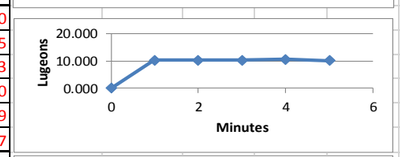
Test	At Testing	
Date	8/4/2017	
Temperature at Testing T_1 ºC	20.75	deg C
Barometric Pressure at Testing S_1 psi	14.74	psi
Length of Test Interval	20	feet
Pmax	160	psi

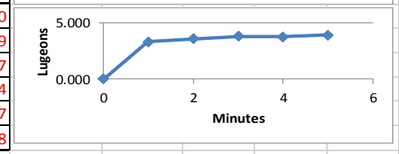
Elapsed Time minutes	Transducer Reading (R_1)	Flow Rate (q) gallons/ min	Pressure (psi)	Flow Loss (gpm/ft)	Lugeons
0	5384	0.00	93.06	0.000	0.000
1	5365	11.84	93.63	0.592	11.389
2	5363	11.65	93.69	0.583	11.199
3	5345	11.57	94.23	0.579	11.058
4	5327	11.50	94.78	0.575	10.928
5	5341	11.40	94.35	0.570	10.882
0	3766	0.00	141.72	0.000	0.000
1	3700	23.91	143.70	1.196	14.986
2	3665	21.64	144.74	1.082	13.465
3	3750	22.22	142.20	1.111	14.074
4	3627	21.56	145.88	1.078	13.310
5	3590	22.27	146.99	1.114	13.645
0	2561	0.00	177.77	0.000	0.000
1	2340	27.98	184.36	1.399	13.669
2	2179	27.68	189.16	1.384	13.179
3	2038	27.43	193.37	1.372	12.776
4	1934	27.23	196.46	1.362	12.483
5	1850	27.54	198.97	1.377	12.466
0	4077	0.00	132.39	0.000	0.000
1	4098	15.12	131.76	0.756	10.335
2	4081	15.16	132.27	0.758	10.323
3	4074	15.18	132.48	0.759	10.320
4	4082	15.46	132.24	0.773	10.529
5	4065	15.00	132.75	0.750	10.177
0	5450	0.00	91.07	0.000	0.000
1	5473	3.31	90.37	0.166	3.299
2	5472	3.59	90.40	0.180	3.577
3	5494	3.79	89.74	0.190	3.804
4	5481	3.77	90.13	0.189	3.767
5	5497	3.88	89.65	0.194	3.898

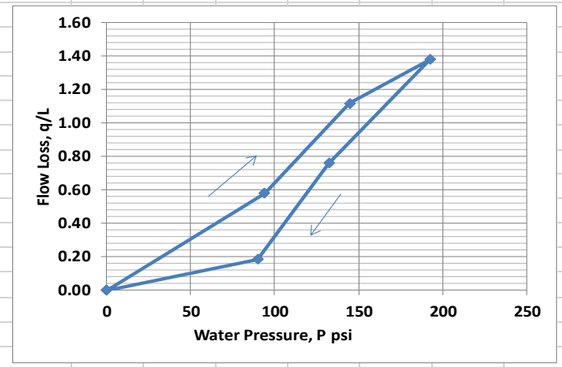


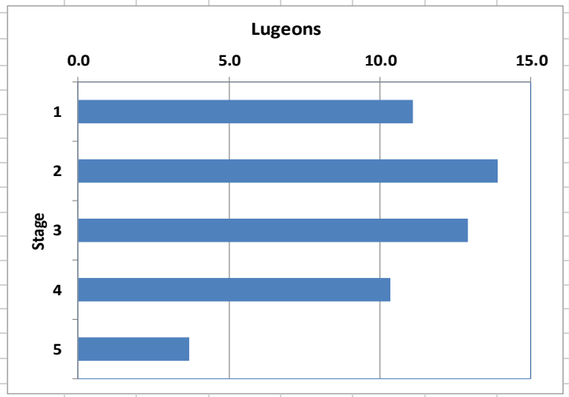












Review the data and select values for pressure, flow loss and Lugeons

Stage	Pressure psi	Flow Loss q/L (gpm/ft)	Lugeons
-	0.00	0.000	0.000
1	94.14	0.580	11.090
2	144.70	1.116	13.892
3	192.46	1.379	12.902
4	132.30	0.759	10.337
5	90.06	0.183	3.668
-	0.00	0.000	0.000

Interpreted Lugeon Value: 10

Interpreted Behavior: Laminar

Rancho California Water District | AECOM

B-103 PACKER TEST - 167.5-187.5 FEET

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: C. Goetz	DATE: 10/18/2017	FIGURE NO: F-24
CHECKED BY: L. Handfelt	DATE: 10/18/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix F - Packer Tests\Appendix F - Packer Tests103.xlsx\103-167.5ft

Packer Testing from 187.5 to 200 feet in Borehole B-103
Vail Dam (Single Packer)

Test Information	
Boring:	B-103
Top of Test Interval (ft):	187.5
Bottom of Test Interval (ft):	200.0
Test Interval Length (m):	3.81
Transducer Depth bgs (ft):	196.7
Cable Length (ft):	200
Test by:	A. Avakian

Make:	Geokon Type S
Model:	4500S -1 MPa
Serial #	1213704*
Date of Calibration	8/1/2012
Factory Zero Reading Temperature T_0 (°C)	24.4
Factory Reading Zero Barometric Pressure S_0 (psi)	14.306
Linear Gage Factor, G psi per digit)	-0.03024
Regression Zero	8471
Polynomial Gage Factor A (psi)	-5.506E-08
Polynomial Gage Factor B (psi)	-0.02957
Polynomial Gage Factor C (psi)	254.4384567
Thermal Factor, K (psi/deg C)	0.03998

* Purchased June 2013 and put into service on June 26, 2013.

Test	At Testing	
Date	8/4/2017	
Temperature at Testing T_1 ºC	20.75	deg C
Barometric Pressure at Testing S_1 psi	14.74	psi
Length of Test Interval	12.5	feet
Pmax	200	psi

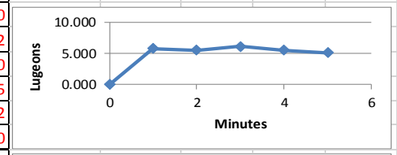
Elapsed Time minutes	Transducer Reading (R_1)	Flow Rate (q) gallons/ min	Pressure (psi)	Flow Loss (gpm/ft)	Lugeons
0	5152	0.00	100.05	0.000	0.000
1	5132	4.06	100.66	0.325	5.812
2	5135	3.88	100.56	0.310	5.560
3	5115	4.30	101.17	0.344	6.125
4	5115	3.87	101.17	0.310	5.512
5	5111	3.62	101.29	0.290	5.150
0	3502	0.00	149.63	0.000	0.000
1	3462	9.67	150.83	0.774	9.239
2	3434	9.60	151.67	0.768	9.121
3	3424	9.53	151.97	0.762	9.037
4	3408	9.48	152.44	0.758	8.961
5	3428	9.41	151.85	0.753	8.930
0	1870	0.00	198.37	0.000	0.000
1	1864	23.62	198.55	1.890	17.143
2	1667	24.10	204.41	1.928	16.989
3	1599	23.70	206.44	1.896	16.544
4	1807	24.02	200.25	1.922	17.285
5	1716	22.34	202.95	1.787	15.862
0	3463	0.00	150.80	0.000	0.000
1	3494	13.36	149.87	1.069	12.846
2	3443	13.32	151.40	1.066	12.678
3	3498	13.30	149.75	1.064	12.798
4	3447	13.30	151.28	1.064	12.669
5	3444	13.28	151.37	1.062	12.643
0	5145	0.00	100.26	0.000	0.000
1	5157	4.34	99.90	0.347	6.260
2	5164	4.40	99.69	0.352	6.360
3	5161	4.47	99.78	0.358	6.455
4	5150	4.53	100.11	0.362	6.520
5	5149	4.53	100.14	0.362	6.518

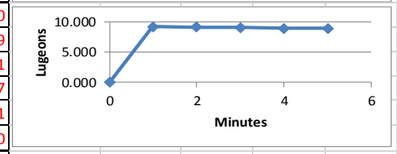
Review the data and select values for pressure, flow loss and Lugeons

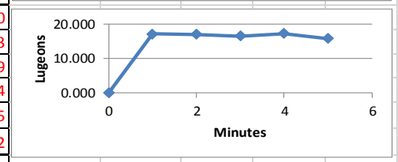
Stage	Pressure psi	Flow Loss q/L (gpm/ft)	Lugeons
-	0.00	0.000	0.000
1	100.97	0.316	5.632
2	151.75	0.763	9.057
3	202.52	1.884	16.761
4	150.73	1.065	12.726
5	99.93	0.356	6.423
-	0.00	0.000	0.000

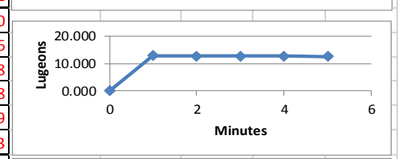
Interpreted Lugeon Value: 5.6

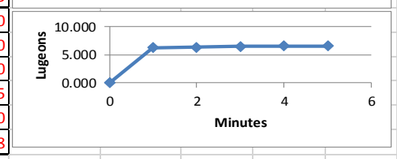
Interpreted Behavior: Dilation

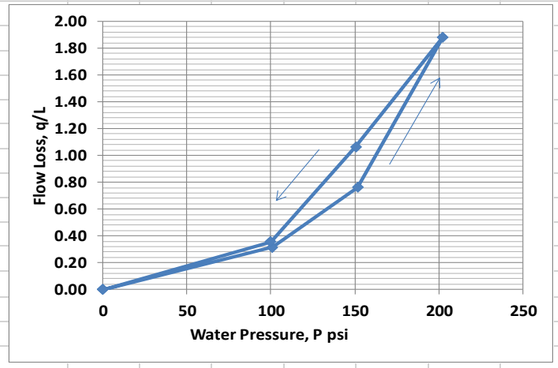


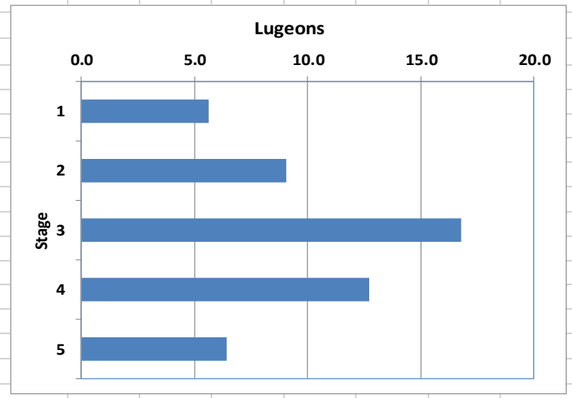












Rancho California Water District | AECOM

B-103 PACKER TEST - 187.0-200.0 FEET

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: C. Goetz	DATE: 10/18/2017	FIGURE NO: F-25
CHECKED BY: L. Handfelt	DATE: 10/18/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix F - Packer Tests\Appendix F - Packer Tests103.xlsx\103-187ft

Packer Testing from 12.5 to 30 feet in Borehole B-104
Vail Dam (Single Packer)

Test Information	
Boring:	B-104
Top of Test Interval (ft):	12.5
Bottom of Test Interval (ft):	30.0
Test Interval Length (m):	5.33
Transducer Depth bgs (ft):	21.7
Cable Length (ft):	150
Test by:	A. Avakian

Make:	Geokon Type S
Model:	4500S -1 MPa
Serial #	1213704*
Date of Calibration	8/1/2012
Factory Zero Reading Temperature T_0 (°C)	24.4
Factory Reading Zero Barometric Pressure S_0 (psi)	14.306
Linear Gage Factor, G psi per digit)	-0.03024
Regression Zero	8471
Polynomial Gage Factor A (psi)	-5.506E-08
Polynomial Gage Factor B (psi)	-0.02957
Polynomial Gage Factor C (psi)	254.4384567
Thermal Factor, K (psi/deg C)	0.03998

* Purchased June 2013 and put into service on June 26, 2013.

Test	At Testing	
Date	7/22/2017	
Temperature at Testing T_1 °C	28.2	deg C
Barometric Pressure at Testing S_1 psi	14.74	psi
Length of Test Interval	17.5	feet
Pmax	21	psi

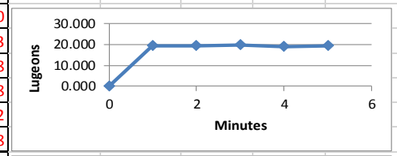
Elapsed Time minutes	Transducer Reading (R_1)	Flow Rate (q) gallons/ min	Pressure (psi)	Flow Loss (gpm/ft)	Lugeons
0	8107	0.00	10.81	0.000	0.000
1	8107	2.05	10.81	0.117	19.513
2	8107	2.04	10.81	0.117	19.418
3	8107	2.08	10.81	0.119	19.798
4	8107	1.99	10.81	0.114	18.942
5	8107	2.04	10.81	0.117	19.418
0	7941	0.00	15.87	0.000	0.000
1	7941	3.32	15.87	0.190	21.534
2	7941	3.33	15.87	0.190	21.599
3	7941	3.35	15.87	0.191	21.729
4	7941	3.35	15.87	0.191	21.729
5	7941	3.34	15.87	0.191	21.664
0	7776	0.00	20.89	0.000	0.000
1	7776	5.20	20.89	0.297	25.621
2	7776	5.23	20.89	0.299	25.768
3	7776	5.21	20.89	0.298	25.670
4	7776	5.22	20.89	0.298	25.719
5	7776	5.22	20.89	0.298	25.719
0	7941	0.00	15.87	0.000	0.000
1	7941	3.88	15.87	0.222	25.167
2	7941	3.94	15.87	0.225	25.556
3	7941	3.92	15.87	0.224	25.426
4	7941	3.92	15.87	0.224	25.426
5	7941	3.90	15.87	0.223	25.296
0	8107	0.00	10.81	0.000	0.000
1	8107	2.78	10.81	0.159	26.461
2	8107	2.86	10.81	0.163	27.223
3	8107	2.86	10.81	0.163	27.223
4	8107	2.76	10.81	0.158	26.271
5	8107	2.88	10.81	0.165	27.413

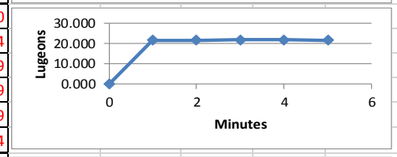
Review the data and select values for pressure, flow loss and Lugeons

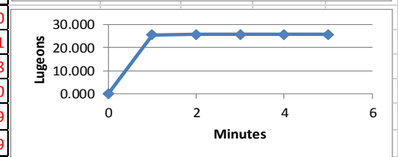
Stage	Pressure psi	Flow Loss q/L (gpm/ft)	Lugeons
-	0.00	0.000	0.000
1	10.81	0.117	19.418
2	15.87	0.191	21.651
3	20.89	0.298	25.699
4	15.87	0.224	25.374
5	10.81	0.162	26.918
-	0.00	0.000	0.000

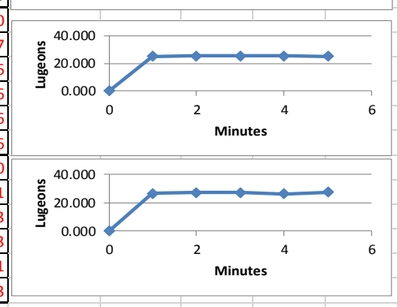
Interpreted Lugeon Value: 23.6

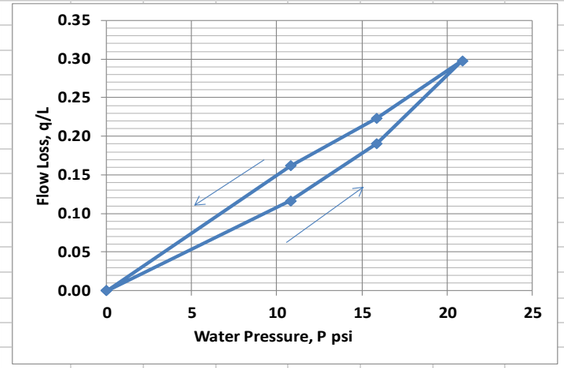
Interpreted Behavior: Laminar

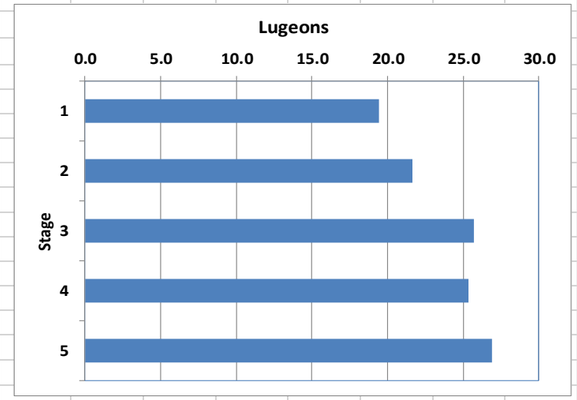












Rancho California Water District

AECOM

B-104 PACKER TEST - 12.5-30.0 FEET

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: C. Goetz	DATE: 10/18/2017	FIGURE NO: F-26
CHECKED BY: L. Handfelt	DATE: 10/18/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix F - Packer Tests\Appendix F - Packer Tests104.xlsx\104-12.5ft

Packer Testing from 30 to 50 feet in Borehole B-104
Vail Dam (Single Packer)

Test Information	
Boring:	B-104
Top of Test Interval (ft):	30
Bottom of Test Interval (ft):	50.0
Test Interval Length (m):	6.10
Transducer Depth bgs (ft):	39.2
Cable Length (ft):	150
Test by:	A. Avakian

Make:	Geokon Type S
Model:	4500S -1 MPa
Serial #	1213704*
Date of Calibration	8/1/2012
Factory Zero Reading Temperature T_0 (°C)	24.4
Factory Reading Zero Barometric Pressure S_0 (psi)	14.306
Linear Gage Factor, G psi per digit)	-0.03024
Regression Zero	8471
Polynomial Gage Factor A (psi)	-5.506E-08
Polynomial Gage Factor B (psi)	-0.02957
Polynomial Gage Factor C (psi)	254.4384567
Thermal Factor, K (psi/deg C)	0.03998

* Purchased June 2013 and put into service on June 26, 2013.

Test	At Testing	
Date	7/22/2017	
Temperature at Testing T_1 ºC	28.1	deg C
Barometric Pressure at Testing S_1 psi	14.74	psi
Length of Test Interval	20	feet
Pmax	40	psi

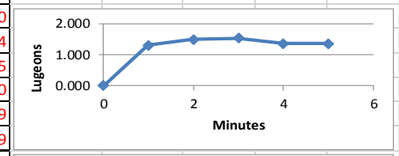
Elapsed Time minutes	Transducer Reading (R_1)	Flow Rate (q) gallons/ min	Pressure (psi)	Flow Loss (gpm/ft)	Lugeons
0	7809	0.00	19.88	0.000	0.000
1	7809	0.29	19.88	0.015	1.314
2	7809	0.33	19.88	0.017	1.495
3	7809	0.34	19.88	0.017	1.540
4	7809	0.30	19.88	0.015	1.359
5	7809	0.30	19.88	0.015	1.359
0	7479	0.00	29.92	0.000	0.000
1	7479	1.91	29.92	0.096	5.750
2	7479	1.98	29.92	0.099	5.960
3	7479	2.03	29.92	0.102	6.111
4	7479	2.06	29.92	0.103	6.201
5	7479	2.11	29.92	0.106	6.352
0	7148	0.00	39.97	0.000	0.000
1	7148	17.64	39.97	0.882	39.745
2	7148	17.72	39.97	0.886	39.925
3	7148	17.68	39.97	0.884	39.835
4	7148	17.73	39.97	0.887	39.948
5	7148	17.69	39.97	0.885	39.858
0	7479	0.00	29.92	0.000	0.000
1	7479	13.18	29.92	0.659	39.676
2	7479	13.16	29.92	0.658	39.615
3	7479	13.10	29.92	0.655	39.435
4	7479	13.07	29.92	0.654	39.345
5	7479	13.10	29.92	0.655	39.435
0	7809	0.00	19.88	0.000	0.000
1	7809	8.29	19.88	0.415	37.552
2	7809	8.34	19.88	0.417	37.778
3	7809	8.31	19.88	0.416	37.642
4	7809	8.28	19.88	0.414	37.506
5	7809	8.25	19.88	0.413	37.370

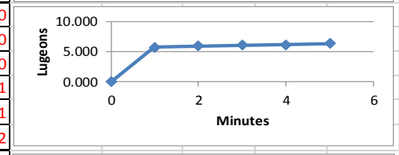
Review the data and select values for pressure, flow loss and Lugeons

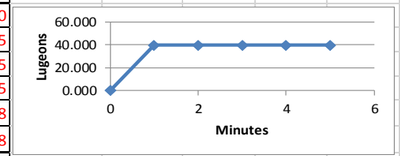
Stage	Pressure psi	Flow Loss q/L (gpm/ft)	Lugeons
-	0.00	0.000	0.000
1	19.88	0.016	1.413
2	29.92	0.101	6.075
3	39.97	0.885	39.862
4	29.92	0.656	39.501
5	19.88	0.415	37.570
-	0.00	0.000	0.000

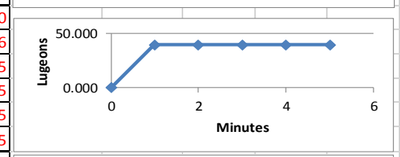
Interpreted Lugeon Value: 39.9

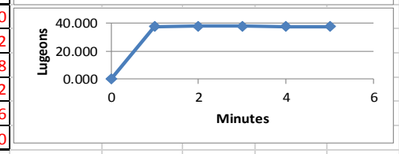
Interpreted Behavior: Wash Out (?)

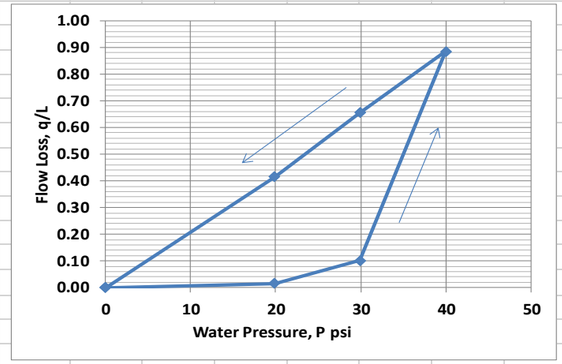


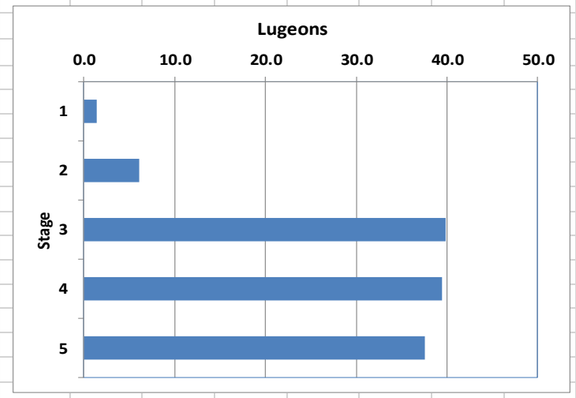












Rancho California Water District | AECOM

B-104 PACKER TEST - 30.0-50.0 FEET

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: C. Goetz	DATE: 10/18/2017	FIGURE NO: F-27
CHECKED BY: L. Handfelt	DATE: 10/18/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix F - Packer Tests\Appendix F - Packer Tests104.xlsx\104-30ft

Packer Testing from 50 to 70 feet in Borehole B-104
Vail Dam (Single Packer)

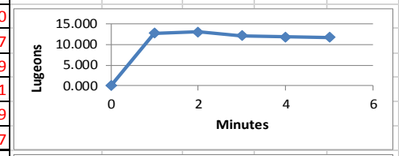
Test Information	
Boring:	B-104
Top of Test Interval (ft):	50
Bottom of Test Interval (ft):	70.0
Test Interval Length (m):	6.10
Transducer Depth bgs (ft):	59.2
Cable Length (ft):	150
Test by:	A. Avakian

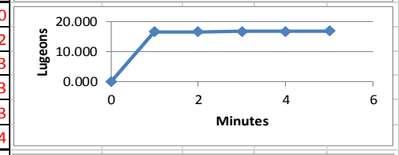
Make:	Geokon Type S
Model:	4500S -1 MPa
Serial #	1213704*
Date of Calibration	8/1/2012
Factory Zero Reading Temperature T_0 (°C)	24.4
Factory Reading Zero Barometric Pressure S_0 (psi)	14.306
Linear Gage Factor, G psi per digit)	-0.03024
Regression Zero	8471
Polynomial Gage Factor A (psi)	-5.506E-08
Polynomial Gage Factor B (psi)	-0.02957
Polynomial Gage Factor C (psi)	254.4384567
Thermal Factor, K (psi/deg C)	0.03998

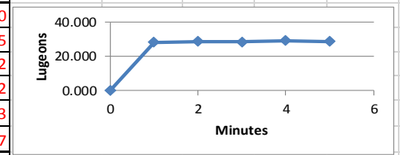
* Purchased June 2013 and put into service on June 26, 2013.

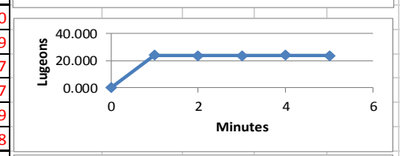
Test	At Testing	
Date	7/24/2017	
Temperature at Testing T_1 ºC	23.8	deg C
Barometric Pressure at Testing S_1 psi	14.74	psi
Length of Test Interval	20	feet
Pmax	55	psi

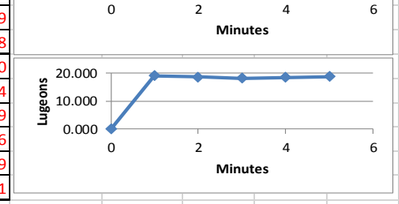
Elapsed Time minutes	Transducer Reading (R_1)	Flow Rate (q) gallons/ min	Pressure (psi)	Flow Loss (gpm/ft)	Lugeons
0	7479	0.00	29.75	0.000	0.000
1	7479	4.22	29.75	0.211	12.777
2	7479	4.29	29.75	0.215	12.989
3	7479	4.01	29.75	0.201	12.141
4	7479	3.92	29.75	0.196	11.869
5	7479	3.88	29.75	0.194	11.747
0	6983	0.00	44.81	0.000	0.000
1	6983	8.26	44.81	0.413	16.602
2	6983	8.30	44.81	0.415	16.683
3	6983	8.32	44.81	0.416	16.723
4	6983	8.32	44.81	0.416	16.723
5	6983	8.38	44.81	0.419	16.844
0	6660	0.00	54.60	0.000	0.000
1	6660	17.16	54.60	0.858	28.305
2	6660	17.34	54.60	0.867	28.602
3	6660	17.31	54.60	0.866	28.552
4	6660	17.65	54.60	0.883	29.113
5	6660	17.38	54.60	0.869	28.667
0	6983	0.00	44.81	0.000	0.000
1	6983	11.94	44.81	0.597	23.999
2	6983	11.77	44.81	0.589	23.657
3	6983	11.78	44.81	0.589	23.677
4	6983	11.90	44.81	0.595	23.919
5	6983	11.81	44.81	0.591	23.738
0	7479	0.00	29.75	0.000	0.000
1	7479	6.28	29.75	0.314	19.014
2	7479	6.12	29.75	0.306	18.529
3	7479	5.99	29.75	0.300	18.136
4	7479	6.11	29.75	0.306	18.499
5	7479	6.17	29.75	0.309	18.681

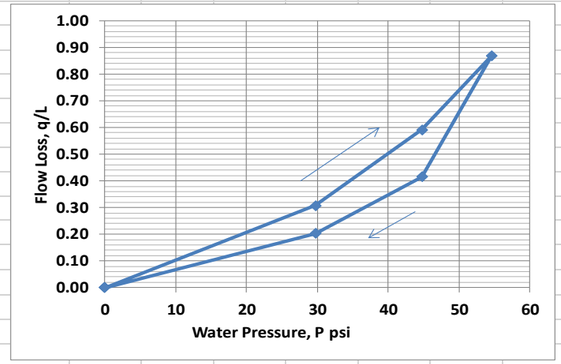


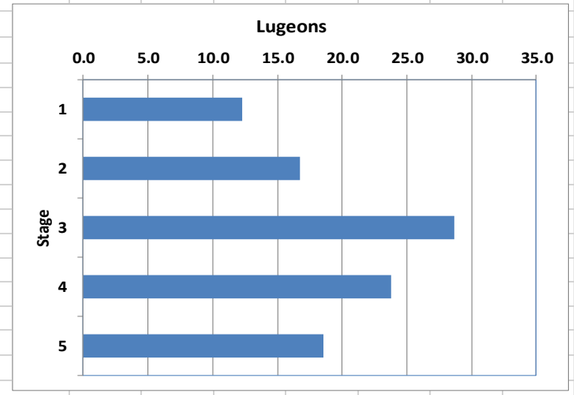












Review the data and select values for pressure, flow loss and Lugeons

Stage	Pressure psi	Flow Loss q/L (gpm/ft)	Lugeons
-	0.00	0.000	0.000
1	29.75	0.203	12.305
2	44.81	0.416	16.715
3	54.60	0.868	28.648
4	44.81	0.592	23.798
5	29.75	0.307	18.572
-	0.00	0.000	0.000

Interpreted Lugeon Value: 12.3

Interpreted Behavior: Dilation

Rancho California Water District | AECOM

B-104 PACKER TEST - 50.0-70.0 FEET

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: C. Goetz	DATE: 10/18/2017	FIGURE NO: F-28
CHECKED BY: L. Handfelt	DATE: 10/18/2017	

Packer Testing from 70 to 90 feet in Borehole B-104
Vail Dam (Single Packer)

Test Information	
Boring:	B-104
Top of Test Interval (ft):	70
Bottom of Test Interval (ft):	90.0
Test Interval Length (m):	6.10
Transducer Depth bgs (ft):	79.2
Cable Length (ft):	150
Test by:	A. Avakian

Make:	Geokon Type S
Model:	4500S -1 MPa
Serial #	1213704*
Date of Calibration	8/1/2012
Factory Zero Reading Temperature T_0 (°C)	24.4
Factory Reading Zero Barometric Pressure S_0 (psi)	14.306
Linear Gage Factor, G psi per digit)	-0.03024
Regression Zero	8471
Polynomial Gage Factor A (psi)	-5.506E-08
Polynomial Gage Factor B (psi)	-0.02957
Polynomial Gage Factor C (psi)	254.4384567
Thermal Factor, K (psi/deg C)	0.03998

* Purchased June 2013 and put into service on June 26, 2013.

Test	At Testing	
Date	7/24/2017	
Temperature at Testing T_1 ºC	24	deg C
Barometric Pressure at Testing S_1 psi	14.74	psi
Length of Test Interval	20	feet
Pmax	70	psi

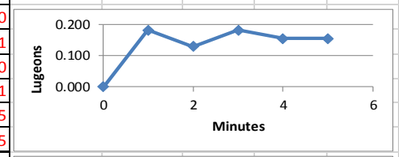
Elapsed Time minutes	Transducer Reading (R_1)	Flow Rate (q) gallons/ min	Pressure (psi)	Flow Loss (gpm/ft)	Lugeons
0	7314	0.00	34.77	0.000	0.000
1	7314	0.07	34.77	0.004	0.181
2	7314	0.05	34.77	0.003	0.130
3	7314	0.07	34.77	0.004	0.181
4	7314	0.06	34.77	0.003	0.155
5	7314	0.06	34.77	0.003	0.155
0	6718	0.00	52.85	0.000	0.000
1	6718	0.88	52.85	0.044	1.500
2	6718	0.84	52.85	0.042	1.431
3	6718	0.86	52.85	0.043	1.465
4	6718	0.88	52.85	0.044	1.500
5	6718	0.89	52.85	0.045	1.517
0	6156	0.00	69.87	0.000	0.000
1	6156	1.33	69.87	0.067	1.714
2	6156	1.36	69.87	0.068	1.753
3	6156	1.34	69.87	0.067	1.727
4	6156	1.30	69.87	0.065	1.676
5	6156	1.31	69.87	0.066	1.689
0	6718	0.00	52.85	0.000	0.000
1	6718	0.91	52.85	0.046	1.551
2	6718	0.90	52.85	0.045	1.534
3	6718	0.90	52.85	0.045	1.534
4	6718	0.88	52.85	0.044	1.500
5	6718	0.88	52.85	0.044	1.500
0	7314	0.00	34.77	0.000	0.000
1	7314	0.33	34.77	0.017	0.855
2	7314	0.34	34.77	0.017	0.881
3	7314	0.33	34.77	0.017	0.855
4	7314	0.34	34.77	0.017	0.881
5	7314	0.36	34.77	0.018	0.933

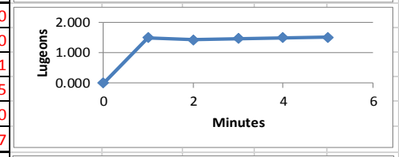
Review the data and select values for pressure, flow loss and Lugeons

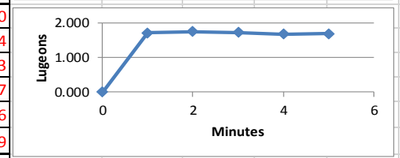
Stage	Pressure psi	Flow Loss q/L (gpm/ft)	Lugeons
-	0.00	0.000	0.000
1	34.77	0.003	0.161
2	52.85	0.044	1.483
3	69.87	0.066	1.712
4	52.85	0.045	1.523
5	34.77	0.017	0.881
-	0.00	0.000	0.000

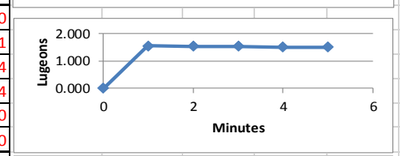
Interpreted Lugeon Value: 1.5

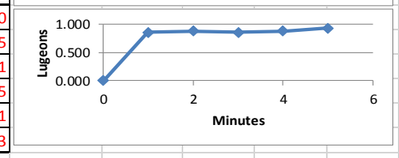
Interpreted Behavior: Dilation (?)

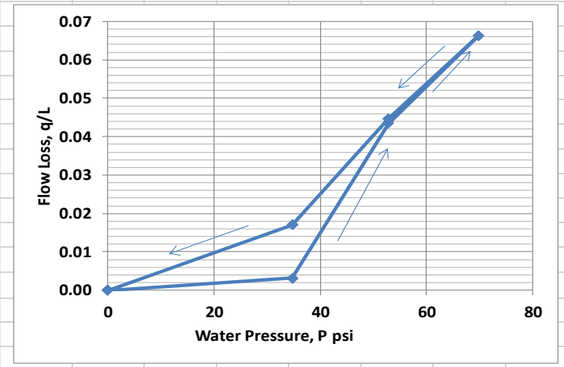


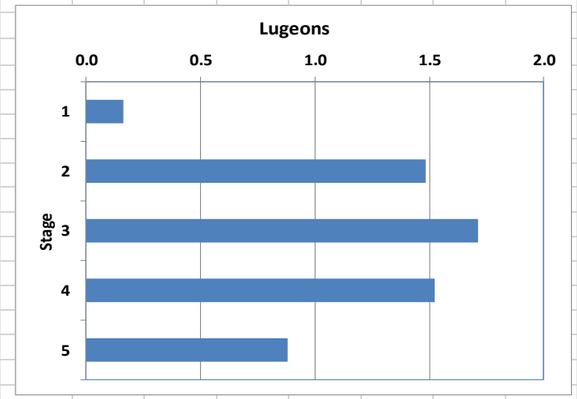












Rancho California Water District | AECOM

B-104 PACKER TEST - 70.0-90.0 FEET

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: C. Goetz	DATE: 10/18/2017	FIGURE NO: F-29
CHECKED BY: L. Handfelt	DATE: 10/18/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix F - Packer Tests\Appendix F - Packer Tests104.xlsx\104-70ft

Packer Testing from 90 to 110 feet in Borehole B-104
Vail Dam (Single Packer)

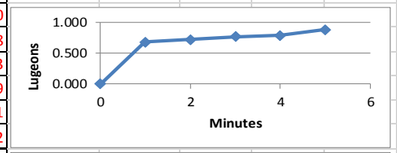
Test Information	
Boring:	B-104
Top of Test Interval (ft):	90
Bottom of Test Interval (ft):	110.0
Test Interval Length (m):	6.10
Transducer Depth bgs (ft):	99.2
Cable Length (ft):	150
Test by:	A. Avakian

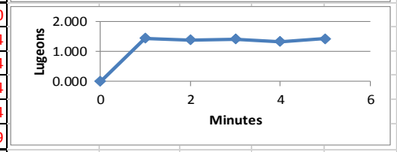
Make:	Geokon Type S
Model:	4500S -1 MPa
Serial #	1213704*
Date of Calibration	8/1/2012
Factory Zero Reading Temperature T_0 (°C)	24.4
Factory Reading Zero Barometric Pressure S_0 (psi)	14.306
Linear Gage Factor, G psi per digit)	-0.03024
Regression Zero	8471
Polynomial Gage Factor A (psi)	-5.506E-08
Polynomial Gage Factor B (psi)	-0.02957
Polynomial Gage Factor C (psi)	254.4384567
Thermal Factor, K (psi/deg C)	0.03998

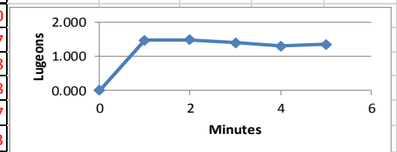
* Purchased June 2013 and put into service on June 26, 2013.

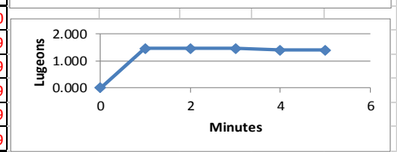
Test	At Testing	
Date	7/24/2017	
Temperature at Testing T_1 °C	24.8	deg C
Barometric Pressure at Testing S_1 psi	14.74	psi
Length of Test Interval	20	feet
Pmax	80	psi

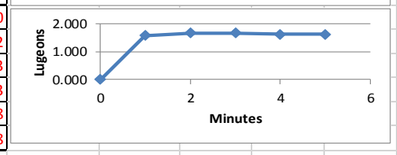
Elapsed Time minutes	Transducer Reading (R_1)	Flow Rate (q) gallons/ min	Pressure (psi)	Flow Loss (gpm/ft)	Lugeons
0	7148	0.00	39.84	0.000	0.000
1	7148	0.30	39.84	0.015	0.678
2	7148	0.32	39.84	0.016	0.723
3	7148	0.34	39.84	0.017	0.769
4	7148	0.35	39.84	0.018	0.791
5	7148	0.39	39.84	0.020	0.882
0	6487	0.00	59.88	0.000	0.000
1	6487	0.96	59.88	0.048	1.444
2	6487	0.92	59.88	0.046	1.384
3	6487	0.94	59.88	0.047	1.414
4	6487	0.88	59.88	0.044	1.324
5	6487	0.95	59.88	0.048	1.429
0	5826	0.00	79.88	0.000	0.000
1	5826	1.31	79.88	0.066	1.477
2	5826	1.32	79.88	0.066	1.488
3	5826	1.24	79.88	0.062	1.398
4	5826	1.15	79.88	0.058	1.297
5	5826	1.20	79.88	0.060	1.353
0	6487	0.00	59.88	0.000	0.000
1	6487	0.97	59.88	0.049	1.459
2	6487	0.97	59.88	0.049	1.459
3	6487	0.97	59.88	0.049	1.459
4	6487	0.93	59.88	0.047	1.399
5	6487	0.93	59.88	0.047	1.399
0	7148	0.00	39.84	0.000	0.000
1	7148	0.70	39.84	0.035	1.582
2	7148	0.74	39.84	0.037	1.673
3	7148	0.74	39.84	0.037	1.673
4	7148	0.72	39.84	0.036	1.628
5	7148	0.72	39.84	0.036	1.628

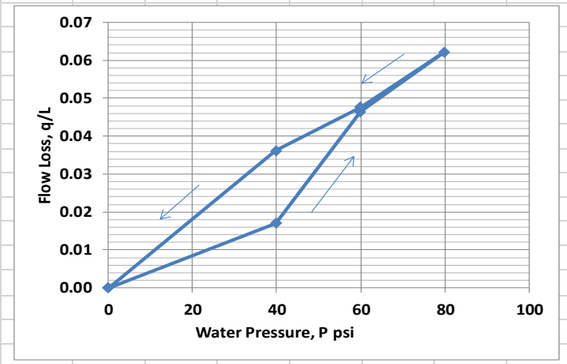


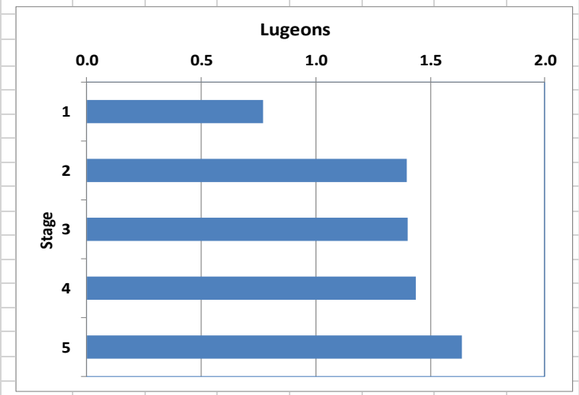












Review the data and select values for pressure, flow loss and Lugeons

Stage	Pressure psi	Flow Loss q/L (gpm/ft)	Lugeons
-	0.00	0.000	0.000
1	39.84	0.017	0.769
2	59.88	0.047	1.399
3	79.88	0.062	1.403
4	59.88	0.048	1.435
5	39.84	0.036	1.637
-	0.00	0.000	0.000

Interpreted Lugeon Value: 1.6

Interpreted Behavior: Wash Out (?)

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B-104 PACKER TEST - 90.0-110.0 FEET

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: C. Goetz	DATE: 10/18/2017	FIGURE NO: F-30
CHECKED BY: L. Handfelt	DATE: 10/18/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix F - Packer Tests\Appendix F - Packer Tests104.xlsx\104-90ft

Packer Testing from 110 to 130 feet in Borehole B-104
Vail Dam (Single Packer)

Test Information	
Boring:	B-104
Top of Test Interval (ft):	110
Bottom of Test Interval (ft):	130.0
Test Interval Length (m):	6.10
Transducer Depth bgs (ft):	119.2
Cable Length (ft):	150
Test by:	A. Avakian

Make:	Geokon Type S
Model:	4500S -1 MPa
Serial #	1213704*
Date of Calibration	8/1/2012
Factory Zero Reading Temperature T_0 (°C)	24.4
Factory Reading Zero Barometric Pressure S_0 (psi)	14.306
Linear Gage Factor, G psi per digit)	-0.03024
Regression Zero	8471
Polynomial Gage Factor A (psi)	-5.506E-08
Polynomial Gage Factor B (psi)	-0.02957
Polynomial Gage Factor C (psi)	254.4384567
Thermal Factor, K (psi/deg C)	0.03998

* Purchased June 2013 and put into service on June 26, 2013.

Test	At Testing	
Date	7/18/2017	
Temperature at Testing T_1 ºC	20.75	deg C
Barometric Pressure at Testing S_1 psi	14.74	psi
Length of Test Interval	20	feet
Pmax	100	psi

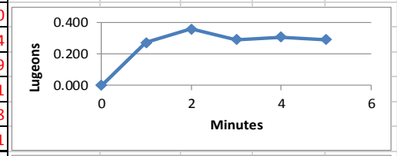
Elapsed Time minutes	Transducer Reading (R_1)	Flow Rate (q) gallons/ min	Pressure (psi)	Flow Loss (gpm/ft)	Lugeons
0	6720	0.00	52.66	0.000	0.000
1	6720	0.16	52.66	0.008	0.274
2	6720	0.21	52.66	0.011	0.359
3	6720	0.17	52.66	0.009	0.291
4	6720	0.18	52.66	0.009	0.308
5	6720	0.17	52.66	0.009	0.291
0	5991	0.00	74.73	0.000	0.000
1	5991	1.14	74.73	0.057	1.374
2	5991	1.16	74.73	0.058	1.398
3	5991	1.18	74.73	0.059	1.422
4	5991	1.21	74.73	0.061	1.458
5	5991	1.26	74.73	0.063	1.519
0	5164	0.00	99.69	0.000	0.000
1	5164	1.45	99.69	0.073	1.310
2	5164	1.34	99.69	0.067	1.211
3	5164	1.37	99.69	0.069	1.238
4	5164	1.36	99.69	0.068	1.229
5	5164	1.31	99.69	0.066	1.183
0	5991	0.00	74.73	0.000	0.000
1	5991	1.29	74.73	0.065	1.555
2	5991	1.31	74.73	0.066	1.579
3	5991	1.33	74.73	0.067	1.603
4	5991	1.33	74.73	0.067	1.603
5	5991	1.35	74.73	0.068	1.627
0	6720	0.00	52.66	0.000	0.000
1	6720	0.24	52.66	0.012	0.410
2	6720	0.26	52.66	0.013	0.445
3	6720	0.28	52.66	0.014	0.479
4	6720	0.24	52.66	0.012	0.410
5	6720	0.24	52.66	0.012	0.410

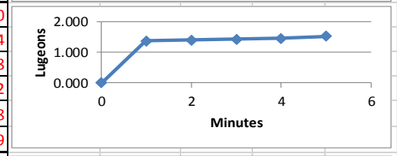
Review the data and select values for pressure, flow loss and Lugeons

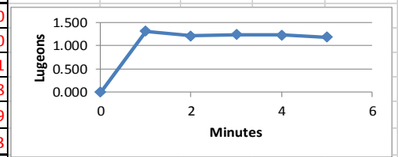
Stage	Pressure psi	Flow Loss q/L (gpm/ft)	Lugeons
-	0.00	0.000	0.000
1	52.66	0.009	0.304
2	74.73	0.060	1.434
3	99.69	0.068	1.234
4	74.73	0.066	1.593
5	52.66	0.013	0.431
-	0.00	0.000	0.000

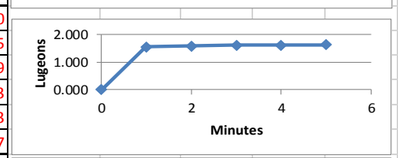
Interpreted Lugeon Value: 1.0

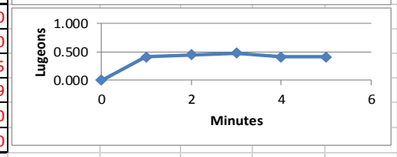
Interpreted Behavior: Laminar (?)

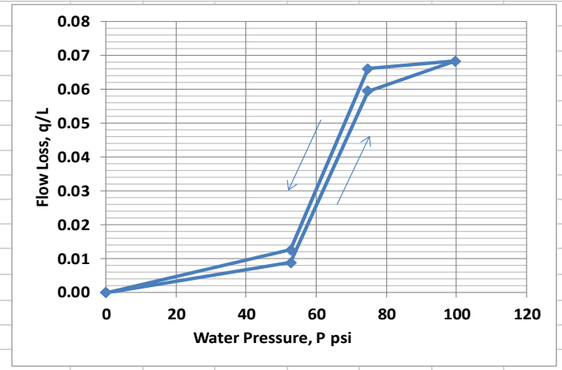


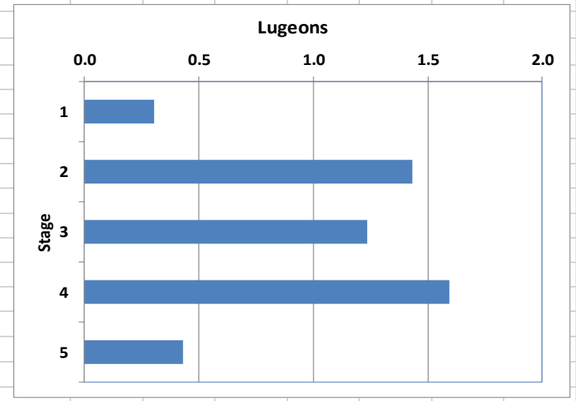












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B-104 PACKER TEST - 110.0-130.0 FEET

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: C. Goetz	DATE: 10/18/2017	FIGURE NO: F-31
CHECKED BY: L. Handfelt	DATE: 10/18/2017	

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Packer Testing from 130 to 150 feet in Borehole B-104
Vail Dam (Single Packer)

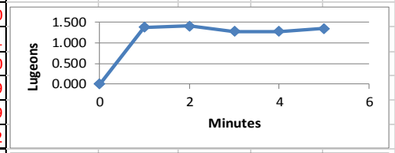
Test Information	
Boring:	B-104
Top of Test Interval (ft):	130
Bottom of Test Interval (ft):	150.0
Test Interval Length (m):	6.10
Transducer Depth bgs (ft):	139.2
Cable Length (ft):	150
Test by:	A. Avakian

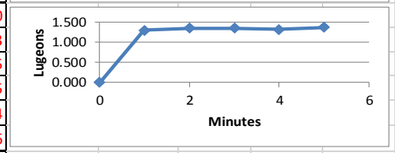
Make:	Geokon Type S
Model:	4500S -1 MPa
Serial #	1213704*
Date of Calibration	8/1/2012
Factory Zero Reading Temperature T_0 (°C)	24.4
Factory Reading Zero Barometric Pressure S_0 (psi)	14.306
Linear Gage Factor, G psi per digit)	-0.03024
Regression Zero	8471
Polynomial Gage Factor A (psi)	-5.506E-08
Polynomial Gage Factor B (psi)	-0.02957
Polynomial Gage Factor C (psi)	254.4384567
Thermal Factor, K (psi/deg C)	0.03998

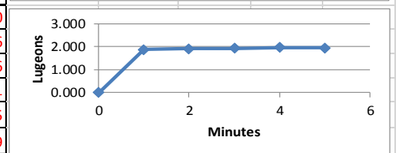
* Purchased June 2013 and put into service on June 26, 2013.

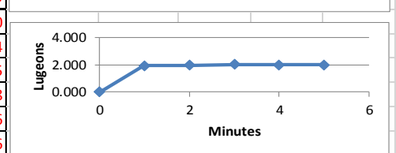
Test	At Testing	
Date	7/25/2017	
Temperature at Testing T_1 °C	20.75	deg C
Barometric Pressure at Testing S_1 psi	14.74	psi
Length of Test Interval	20	feet
Pmax	115	psi

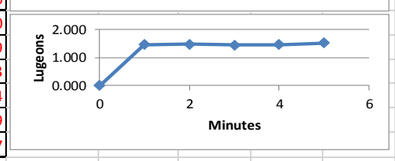
Elapsed Time minutes	Transducer Reading (R_1)	Flow Rate (q) gallons/ min	Pressure (psi)	Flow Loss (gpm/ft)	Lugeons
0	6420	0.00	61.75	0.000	0.000
1	6420	0.94	61.75	0.047	1.371
2	6420	0.96	61.75	0.048	1.400
3	6420	0.87	61.75	0.044	1.269
4	6420	0.87	61.75	0.044	1.269
5	6420	0.92	61.75	0.046	1.342
0	5627	0.00	85.72	0.000	0.000
1	5627	1.24	85.72	0.062	1.303
2	5627	1.28	85.72	0.064	1.345
3	5627	1.28	85.72	0.064	1.345
4	5627	1.26	85.72	0.063	1.324
5	5627	1.30	85.72	0.065	1.366
0	4669	0.00	114.60	0.000	0.000
1	4669	2.40	114.60	0.120	1.886
2	4669	2.45	114.60	0.123	1.926
3	4669	2.47	114.60	0.124	1.941
4	4669	2.50	114.60	0.125	1.965
5	4669	2.48	114.60	0.124	1.949
0	5627	0.00	85.72	0.000	0.000
1	5627	1.85	85.72	0.093	1.944
2	5627	1.88	85.72	0.094	1.975
3	5627	1.94	85.72	0.097	2.038
4	5627	1.89	85.72	0.095	1.986
5	5627	1.89	85.72	0.095	1.986
0	6420	0.00	61.75	0.000	0.000
1	6420	1.00	61.75	0.050	1.459
2	6420	1.01	61.75	0.051	1.473
3	6420	0.99	61.75	0.050	1.444
4	6420	1.00	61.75	0.050	1.459
5	6420	1.04	61.75	0.052	1.517

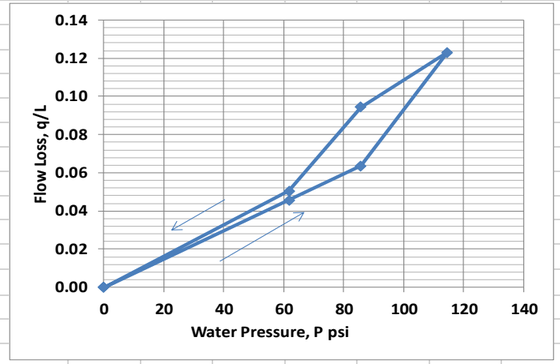


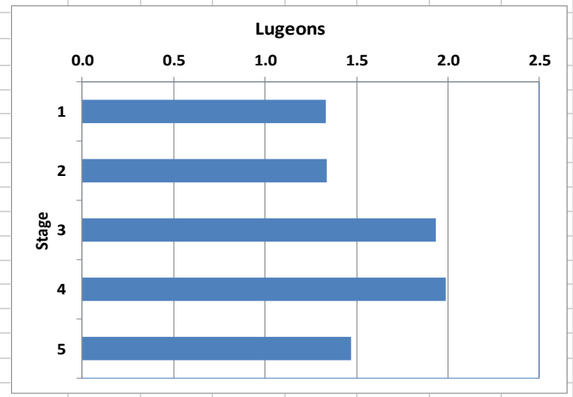












Review the data and select values for pressure, flow loss and Lugeons

Stage	Pressure psi	Flow Loss q/L (gpm/ft)	Lugeons
-	0.00	0.000	0.000
1	61.75	0.046	1.330
2	85.72	0.064	1.336
3	114.60	0.123	1.933
4	85.72	0.095	1.986
5	61.75	0.050	1.470
-	0.00	0.000	0.000

Interpreted Lugeon Value: 1.6

Interpreted Behavior: Laminar

Rancho California Water District | AECOM

B-104 PACKER TEST - 130.0-150.0 FEET

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: C. Goetz	DATE: 10/18/2017	FIGURE NO: F-32
CHECKED BY: L. Handfelt	DATE: 10/18/2017	

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Orange, CA 92868
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Geotechnical Data Report
Vail Dam Seismic and Hydrologic Remediation Project
(Volume 2 of 2)

Prepared for:
Rancho California Water District
42135 Winchester Road
Temecula, California
RCWD Project No. D1911

Prepared by:
AECOM Technical Services, Inc.
Orange, California
AECOM Project No. 60539527

December 12, 2021

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Volume 2 of 2

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Acronyms

AECOM	AECOM Technical Services, Inc.
ASTM	American Society for Testing and Materials (now ASTM International)
ATV	Acoustic Televiewer
bgs	below ground surface
CatEx	Categorical Exemption
CEG	State of California Certified Engineering Geologist
CEQA	California Environmental Quality Act
Dig Alert	Underground Service Alert
District	Rancho California Water District
DSOD	California Department of Water Resources Division of Safety of Dams
fps	feet per second
ft	feet
GDR	Geotechnical Data Report
GBDR	Geotechnical Basis of Design Report
GEOVision	GEOVision Geophysical Services
GPS	Global Positioning System
KJm1	Gneiss
KJm2	Migmatitic Gneiss
Kt	Cretaceous Tonalite
MSL	Mean Sea Level (National Geodetic Vertical Datum of 1929)
NAVD 88	North American Vertical Datum of 1988
NOE	Notice of Exemption
MPa	Megapascal
PG	State of California Registered Professional Geologist
Pmax	baseline pressure
P-S	Primary and shear
psf	pounds per square foot
psi	pounds per square inch
P-Wave	Primary wave
Qal	Alluvium
Qf	Fill
Qt	Quaternary age terrace deposits
RCC	Roller Compacted Concrete
RQD	Rock Quality Designation
SH	horizontal shear
V_p	p-wave velocity
V_s	shear wave velocity

Appendix G

Acoustic Televiewer and Seismic Velocity Surveys

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VAIL DAM

BOREHOLE GEOPHYSICS

BOREHOLES B-101 THROUGH B-106

TEMECULA, CALIFORNIA

September 11, 2017

Report 17264-01 rev 0

VAIL DAM

BOREHOLE GEOPHYSICS

BOREHOLES B-101 THROUGH B-106

TEMECULA, CALIFORNIA

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Report 17264-01 rev 0

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APPENDICES

APPENDIX A **SUSPENSION VELOCITY MEASUREMENT QUALITY ASSURANCE SUSPENSION SOURCE TO RECEIVER ANALYSIS RESULTS**

APPENDIX B **ACOUSTIC TELEVIEWER CALIPER LOGS**

APPENDIX C **TELEVIEWER FEATURES**

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APPENDIX E **GEOPHYSICAL LOGGING SYSTEMS - NIST TRACEABLE CALIBRATION RECORDS**

INTRODUCTION

GEO*Vision* acquired borehole geophysical data in six (6) boreholes at Vail Dam in Temecula, California. The work was performed under contract with AECOM. Fieldwork was performed by Jonathan Jordan, Victor Gonzalez, and Glenn Goss. Data analysis was completed by Victor Gonzalez and Emily Feldman, and reviewed by John Diehl, Professional Engineer, and Victor Gonzalez, Professional Geophysicist, respectively. Report was prepared by Emily Feldman and reviewed by Victor Gonzalez.

SCOPE OF WORK

This report presents results of borehole geophysical measurements acquired in six boreholes between July 20 and August 21, 2017, as detailed in Table 1. The purpose of these measurements was to supplement stratigraphic information by acquiring geophysical data as a function of depth.

The OYO Suspension PS Logging System (Suspension System) was used to obtain in-situ horizontal shear (S_H) and compressional (P) wave velocity measurements in six uncased boreholes at 1.6 foot intervals. Measurements followed **GEO***Vision* Procedure for P-S Suspension Seismic Velocity Logging, revision 1.5. Acquired data were analyzed and a profile of velocity versus depth was produced for both S_H and P waves.

A detailed reference for the suspension PS velocity measurement techniques used in this study is:

> Guidelines for Determining Design Basis Ground Motions, Report TR-102293, Electric Power Research Institute, Palo Alto, California, November 1993, Sections 7 and 8.

A Robertson Geologging High Resolution Acoustic Televiewer (HiRAT) and/or Optical Televiewer (OPTV) were used to collect borehole deviation data on at least 0.04 foot intervals and televiewer images at 0.004 foot intervals in all boreholes. Acquired data were analyzed and presented as profiles of borehole deviation versus depth for each boring. Boring images were

analyzed and planar features such as bedding planes and fractures were identified for dip and azimuth processing. Additionally, an acoustic image with 4 arm caliper dimensions superimposed was produced for the borings logged with acoustic televiewer.

INSTRUMENTATION

Suspension Velocity Instrumentation

Suspension velocity measurements were performed using the suspension PS logging system, manufactured by OYO Corporation, and their subsidiary, Robertson Geologging. This system directly determines the average velocity of a 3.3-foot high segment of the soil column surrounding the borehole of interest by measuring the elapsed time between arrivals of a wave propagating upward through the soil column. The receivers that detect the wave, and the source that generates the wave, are moved as a unit in the borehole producing relatively constant amplitude signals at all depths.

The suspension system probe consists of a combined reversible polarity solenoid horizontal shear-wave source (S_H) and compressional-wave source (P), joined to two biaxial receivers by a flexible isolation cylinder, as shown in Figure 1. The separation of the two receivers is 3.3 feet, allowing average wave velocity in the region between the receivers to be determined by inversion of the wave travel time between the two receivers. The total length of the probe as used in these surveys is approximately 25 feet, with the center point of the receiver pair 12.5 feet above the bottom end of the probe.

The probe receives control signals from, and sends the digitized receiver signals to, instrumentation on the surface via an armored multi-conductor cable. The cable is wound onto the drum of a winch and is used to support the probe. Cable travel is measured to provide probe depth data using a sheave of known circumference fitted with a digital rotary encoder.

The entire probe is suspended in the borehole by the cable, therefore, source motion is not coupled directly to the borehole walls; rather, the source motion creates a horizontally propagating impulsive pressure wave in the fluid filling the borehole and surrounding the source. This pressure wave is converted to P and S_H-waves in the surrounding soil and rock as it passes through the casing and grout annulus and impinges upon the wall of the borehole. These waves propagate

through the soil and rock surrounding the borehole, in turn causing a pressure wave to be generated in the fluid surrounding the receivers as the soil waves pass their location. Separation of the P and S_H-waves at the receivers is performed using the following steps:

1. Orientation of the horizontal receivers is maintained parallel to the axis of the source, maximizing the amplitude of the recorded S_H -wave signals.
2. At each depth, S_H-wave signals are recorded with the source actuated in opposite directions, producing S_H-wave signals of opposite polarity, providing a characteristic S_H-wave signature distinct from the P-wave signal.
3. The 6.3 foot separation of source and receiver 1 permits the P-wave signal to pass and damp significantly before the slower S_H-wave signal arrives at the receiver. In faster soils or rock, the isolation cylinder is extended to allow greater separation of the P- and S_H-wave signals.
4. In saturated soils, the received P-wave signal is typically of much higher frequency than the received S_H-wave signal, permitting additional separation of the two signals by low pass filtering.
5. Direct arrival of the original pressure pulse in the fluid is not detected at the receivers because the wavelength of the pressure pulse in fluid is significantly greater than the dimension of the fluid annulus surrounding the probe (feet versus inches scale), preventing significant energy transmission through the fluid medium.

In operation, a distinct, repeatable pattern of impulses is generated at each depth as follows:

1. The source is fired in one direction producing dominantly horizontal shear with some vertical compression, and the signals from the horizontal receivers situated parallel to the axis of motion of the source are recorded.
2. The source is fired again in the opposite direction and the horizontal receiver signals are recorded.
3. The source is fired again and the vertical receiver signals are recorded. The repeated source pattern facilitates the picking of the P and S_H-wave arrivals; reversal of the source changes the polarity of the S_H-wave pattern but not the P-wave pattern.

The data from each receiver during each source activation is recorded as a different channel on the recording system. The Suspension PS system has six channels (two simultaneous recording channels), each with a 1024 sample record. The recorded data are displayed as six channels with a common time scale. Data are stored on disk for further processing.

Review of the displayed data on the recorder or computer screen allows the operator to set the gains, filters, delay time, pulse length (energy), and sample rate to optimize the quality of the data before recording. Verification of the calibration of the Suspension PS digital recorder is performed every twelve months using a NIST traceable frequency source and counter, as presented in Appendix E.

Acoustic Televiewer / Boring Deviation Instrumentation

Boring deviation data and acoustic images of the borings walls were collected using a High Resolution Acoustic Televiewer probe (HiRAT) manufactured by Robertson Geologging, Ltd. A concept illustration of the HiRAT probe is shown in Figure 4.

In this application, this probe is useful in the following studies:

- Measurement of boring inclination and deviation from vertical
- Determination of need to correct soil and geophysical log depths to true vertical depths
- Acoustic imaging of the boring wall to identify fractures, dikes, and weathered zones, and determine dip and azimuth of these features

The probe receives control signals from, and sends the digitized measurement values to, a MLII unit on the surface via an armored cable. The cable is wound onto the drum of a winch and is used to support the probe. Cable travel is measured to provide probe depth using a sheave of known circumference fitted with a digital rotary encoder. The probe and depth data are transmitted by USB link from the MLII unit to a laptop computer where it is displayed and stored.

This system produces images of the boring wall based on the amplitude and travel time of an ultrasonic beam reflected from the formation wall. The ultrasonic energy is generated by a piezoelectric transducer at a frequency of 1.4 MHz. A periodic acoustic energy wave is emitted by the transducer and travels through the acoustic head and boring fluid until it reaches the interface between the boring fluid and the boring wall. Here a portion of the energy is reflected back to the transducer, the remainder continuing into the formation. By careful time sequencing, the piezoelectric transducer acts as both the transmitter of the ultrasonic pulse and receiver of the reflected wave. The travel time of the energy wave is the period between transmission of the source energy pulse and the return of the reflected wave measured at the point of maximum wave amplitude. The magnitude of the energy wave is measured in dB, a unitless ratio of the detected echo wave amplitude divided by the amplitude of the transmitted wave. The strength of the reflected signal depends primarily on the impedance contrast of the boring fluid and the boring wall formation.

The acoustic wave propagates along the axis of the probe and then is reflected perpendicular to this axis by a reflector that focuses the beam to a 0.08 inch diameter spot about 2 inches from the central axis of the probe. This reflector is mounted on the shaft of a stepper motor enabling the position of the measurement to be rotated through 360°. Sampling rates of 90, 180 and 360 measured points per revolution are available. Typically data are collected at 360 samples per revolution. It should be noted that during logging the probe is moving in the boring, so that the measured points describe a very fine pitch spiral.

The probe contains a fluxgate magnetometer to monitor magnetic north, and all raw televiewer data are referenced to magnetic north. The processed data were referenced to true north, using site and logging date-specific declination (11.7 degrees east) obtained from NOAA (http://www.ngdc.noaa.gov/geomag-web/#declination). Also, a three-axis accelerometer is enclosed in the probe to record boring deviation data while logging; this permits correction of structure dip angle from apparent dip, referenced to boring axis, to true dip (referenced to a vertical axis) in non-vertical borings.

Data are transmitted by USB link from the MLII unit to a laptop computer for operator review while logging and stored for later processing.

Optical Televiewer Instrumentation

Boring deviation data and optical images of the boring walls were collected using a digital optical televiewer (OPTV) probe manufactured by Robertson Geologging, Ltd.

In this application, this probe is useful in the following studies:

- Measurement of boring inclination and deviation from vertical
- Determination of need to correct soil and geophysical log depths to true vertical depths
- Optical imaging of the boring wall to identify fractures, dikes, and weathered zones, and determine dip and azimuth of these features

The probe receives control signals from, and sends the digitized measurement values to, a MLII unit on the surface via an armored cable. The cable is wound onto the drum of a winch and is used to support the probe. Cable travel is measured to provide depth using a sheave of known circumference fitted with a digital rotary encoder. The probe and depth data are transmitted by USB link from the MLII unit to a laptop computer where it is displayed and stored.

This system produces images of the boring based on periodic annular scans of the boring wall. A video camera is mounted looking down the axis of the probe at a hyperbolic mirror, which produces an annular image of the boring wall on the camera. A constant “ring” of pixels on the camera face are output at each subsequent measurement depth, allowing assembly of a cylindrical image of the boring wall. This image is referenced to magnetic north, allowing the cylinder to be “unwrapped” with north as the edge of the unwrapped image. Sampling rates of 720 or 360 points per annulus are available. Typically data are collected at 720 points per annulus, providing an equivalent horizontal pixel size of approximately 0.02 inches on the boring wall.

MEASUREMENT PROCEDURES

Suspension Velocity Measurement Procedures

The boreholes were logged uncased and filled with fresh water mud. Measurements followed the **GEO***Vision* Procedure for P-S Suspension Seismic Velocity Logging, revision 1.5. Prior to the logging run, the probe was positioned with the top of the probe even with a stationary reference point. The electronic depth counter was set to the distance between the mid-point of the receiver and the top of the probe, minus the height of the stationary reference point, if any. Measurements were verified with a tape measure, and calculations recorded on a field log.

The probe was lowered to the bottom of the borehole, stopping at 1.6 foot intervals to collect data, as summarized in Table 2. At each measurement depth the measurement sequence of two opposite horizontal records and one vertical record was performed. Gains were adjusted as required. The data from each depth were viewed on the computer display, checked, and saved to disk before moving to the next depth.

Upon completion of the measurements, the probe was returned to the surface and the zero depth indication at the depth reference point was verified prior to removal from the borehole.

Acoustic Televiewer / Boring Deviation Measurement Procedures

Measurement procedures followed **GEO***Vision* HiRAT procedure revision 2.0. In addition, the measurement procedures conform to the following ASTM standard:

- ASTM D5753-05 (Re-approved 2010), “Planning and Conducting Borehole Geophysical Logging”

The HiRAT probe requires a fluid filled boring for proper operation. Prior to use, the probe tiltmeter and compass functions were checked by comparison with a Brunton surveyors’ compass.

Prior to logging, measurement depths were referenced to ground level. This was done by placing the top of the probe even with a fixed reference point, such as top of casing or drill mud bucket. Then the electronic depth counter was set to the probe length minus the height of the reference point. Once verified with a tape measure, these calculations were recorded on a field log. Offset distances between probe tip and imaging window are corrected by the acquisition software.

Initially, the probe was lowered to the bottom of the boring while acquiring a low vertical resolution image. Subsequently, an upward, high vertical resolution image log was recorded on ascent. The probe was returned to the surface at approximately 3 feet/minute, with an acquisition rate of 250 samples/foot, giving an equivalent vertical pixel size of 0.004 feet (0.048 inches). The rotational scan resolution was set to 360 samples per revolution, giving a horizontal pixel size of 0.035 inches.

Upon completion of the measurements, the probe zero depth indication at the depth reference point was verified prior to removal from the boring.

Optical Televiewer Measurement Procedures

Measurement procedures conformed to the following ASTM standard:

- ASTM D5753-05 (Re-approved 2010), “Planning and Conducting Boring Geophysical Logging”

The OPTV probe does not require a fluid filled boring for proper operation. Borings were logged with the optical televiewer above static water table, and below water table until the image was obscured by sediment, or the bottom of the boring was encountered. In accordance with the manufacturer’s recommended procedures, the probe was inspected and tested prior to use.

Prior to logging, measurement depths were referenced to ground level. This was done by placing the top of the probe even with a fixed reference point, such as top of casing or drill mud bucket. Then the electronic depth counter was set to the probe length minus the height of the reference

point. Once verified with a tape measure, these calculations were recorded on a field log. Offset distances between probe tip and imaging window are corrected by the acquisition software.

The rotational scan resolution was set to 720 samples per revolution, giving a horizontal pixel size of 0.02 inches. Acquisition was started on the laptop computer and the probe was lowered at a nominal rate of 3 feet per minute to the bottom of the boring, with an acquisition rate of 250 samples/foot, giving an equivalent vertical pixel size of 0.004 feet (approximately 0.05 inches).

Upon completion of the measurements, the probe zero depth reference was verified prior to removal from the boring.

DATA ANALYSIS

Suspension Velocity Analysis

Using the proprietary OYO program PSLOG.EXE version 1.0, the recorded digital waveforms were analyzed to locate the most prominent first minima, first maxima, or first break on the vertical axis records, indicating the arrival of P-wave energy. The difference in travel time between receiver 1 and receiver 2 (R1-R2) arrivals was used to calculate the P-wave velocity for that 1.0 meter segment of the soil column. When observable, P-wave arrivals on the horizontal axis records were used to verify the velocities determined from the vertical axis data. The time picks were then transferred into a Microsoft Excel® template to complete the velocity calculations based on the arrival time picks made in PSLOG. The Microsoft Excel® analysis files that were previously delivered to the client.

The P-wave velocity over the 6.3-foot interval from source to receiver 1 (S-R1) was also picked using PSLOG, and calculated and plotted in Microsoft Excel®, for quality assurance of the velocity derived from the travel time between receivers. In this analysis, the depth values as recorded were increased by 4.8 feet to correspond to the mid-point of the 6.33-foot S-R1 interval. Travel times were obtained by picking the first break of the P-wave signal at receiver 1 and subtracting the calculated and experimentally verified delay, in milliseconds, from source trigger pulse (beginning of record) to source impact. This delay corresponds to the duration of acceleration of the solenoid before impact.

As with the P-wave records, the recorded digital waveforms were analyzed to locate clear S_H-wave pulses, as indicated by the presence of opposite polarity pulses on each pair of horizontal records. Ideally, the S_H-wave signals from the 'normal' and 'reverse' source pulses are very nearly inverted images of each other. Digital Fast Fourier Transform – Inverse Fast Fourier Transform (FFT – IFFT) lowpass filtering was used to remove the higher frequency P-wave signal from the S_H-wave signal. Different filter cutoffs were used to separate P- and S_H-waves at different depths, ranging from 600 Hz in the slowest zones to 4000 Hz in the regions of highest velocity. At each depth, the

filter frequency was selected to be at least twice the fundamental frequency of the S_H-wave signal being filtered.

Generally, the first maxima were picked for the 'normal' signals and the first minima for the 'reverse' signals, although other points on the waveform were used if the first pulse was distorted. The absolute arrival time of the 'normal' and 'reverse' signals may vary by +/- 0.2 milliseconds, due to differences in the actuation time of the solenoid source caused by constant mechanical bias in the source or by borehole inclination. This variation does not affect the R1-R2 velocity determinations, as the differential time is measured between arrivals of waves created by the same source actuation. The final velocity value is the average of the values obtained from the 'normal' and 'reverse' source actuations.

As with the P-wave data, S_H-wave velocity calculated from the travel time over the 6.33-foot interval from source to receiver 1 was calculated and plotted for verification of the velocity derived from the travel time between receivers. In this analysis, the depth values were increased by 4.8 feet to correspond to the mid-point of the 6.33-foot S-R1 interval. Travel times were obtained by picking the first break of the S_H-wave signal at the near receiver and subtracting the calculated and experimentally verified delay, in milliseconds, from the beginning of the record at the source trigger pulse to source impact.

Poisson's Ratio, **ν**, was calculated in the Microsoft Excel® template using the following formula:

$$\nu = \frac{\left(\frac{v_s}{v_p}\right)^2 - 0.5}{\left(\frac{v_s}{v_p}\right)^2 - 1.0}$$

Data and analyses were reviewed by a **GEO***Vision* Professional Geophysicist or Engineer as a component of the in-house data validation program.

Figure 2 shows an example of R1 - R2 measurements on a sample filtered suspension record. In Figure 2, the time difference over the 3.3 foot interval of 1.88 milliseconds for the horizontal signals is equivalent to an S_H-wave velocity of 1745 feet/second. Whenever possible, time differences were determined from several phase points on the S_H-waveform records to verify the data obtained from the first arrival of the S_H-wave pulse. Figure 3 displays the same record before filtering of the S_H-waveform record with a 1400 Hz FFT - IFFT digital lowpass filter, illustrating the presence of higher frequency P-wave energy at the beginning of the record, and distortion of the lower frequency S_H-wave by residual P-wave signal.

Acoustic Televiewer Analysis

Acoustic televiewer feature classification followed **GEO***Vision* Televiewer Feature Notes and Picking Criteria (Appendix C). The acoustic televiewer data were processed using Robertson's RGLDIP software, version 6.2. Sinusoidal projections of bedding planes and fractures in the boring walls were interactively picked on the un-wrapped televiewer image, and are presented on the logs as green and blue sinusoids, respectively, and superimposed over the televiewer image. The sinusoidal projections were processed using the standard boring gauge of 3.8 inches to calculate apparent dip angle. True dip was calculated, correcting for the plunge of the borings using the recorded data from the accelerometers located in the probes, and presented in arrow format, with true dip indicated by the arrow position across the plot. Azimuth of dip (not strike), is indicated by the direction of the arrow tail, with true north being "up". These values are presented with the comments to the right of the arrow plots, as dip azimuth followed by dip angle (See logs in Appendix C).

The televiewer images were also processed to create a simulated core image of the borings. It must be noted that the simulated core image represents a core that would have the full 3.8 inch diameter of the boring, not the diameter of any cores removed during drilling, so that direct comparison between the two is not possible. Also, the unwrapped image is viewed from the perspective of an observer in the center of the boring looking outward. The simulated core image is viewed from the

"outside" of the boring looking inward, so there is a reversal of the position of east and west relative to north between the two images (see Appendix C).

The televiewer data were also processed to extract the deviation data and produce an ASCII file and plots of boring deviation, as well as a synthetic 4-arm caliper log, derived from the acoustic travel time data, if available.

Optical Televiewer Analysis

Optical televiewer feature classification followed **GEO***Vision* Televiewer Feature Notes and Picking Criteria (Appendix C). The optical televiewer data was processed using Robertson's RGLDIP software, version 6.2. Sinusoidal projections of bedding planes and fractures in the boring walls were interactively picked on the un-wrapped televiewer image, and are presented on the logs as green and blue sinusoids, respectively, and superimposed over the televiewer image. The sinusoidal projections were processed using the standard boring gauge of 3.8 inches to calculate apparent dip angle. True dip was calculated, correcting for the plunge of the borings using the recorded data from the accelerometers located in the probes, and presented in arrow format, with true dip indicated by the arrow position across the plot. Azimuth of dip (not strike), is indicated by the direction of the arrow tail, with true north being "up". These values are presented with the comments to the right of the arrow plots, as dip azimuth followed by dip angle (also in Appendix C)

The televiewer images were also processed to create a simulated core image of the borings. Remember that the simulated core image represents a core that would have the full 3.8 inch diameter of the boring, not the diameter of the cores removed during drilling, so that direct comparison between the two is not possible. Also, the unwrapped image is viewed from the perspective of an observer in the center of the boring looking outward. The simulated core image is viewed from the "outside" of the boring looking inward, so there is a reversal of the position of east and west relative to north between the two images.

The televiewer data were also processed to extract the deviation data and produce an ASCII file and plots of boring deviation.

RESULTS

Suspension Velocity Results

Suspension R1-R2 P- and S_H-wave velocities for boreholes B-102 and B-103 are plotted in Figures 8 and 12, and data compiled in Tables 5 and 7, respectively. The associated Microsoft Excel® analysis files also accompany this report.

P- and S_H-wave velocity data from R1-R2 analysis and quality assurance analysis of S-R1 data are plotted together in Figures A-1 and A-2 in Appendix A to aid in visual comparison. Note that R1-R2 data are an average velocity over a 3.3-foot segment of the soil column; S-R1 data are an average over 6.3 feet, creating a significant smoothing relative to the R1-R2 plots. The S-R1 velocity data displayed in these figures are also compiled in Tables A-1 and A-2. Included in the Microsoft Excel® analysis files are Poisson's Ratio calculations, tabulated data and plots.

Acoustic Televiewer / Boring Deviation Results

Acoustic televiewer data and boring deviation data were collected and processed in boreholes B-101 through B-105, and in three sections for borehole B-106 due to logging difficulties. Acoustic Televiewer based caliper logs are presented in Appendix B. Per standard procedure, acoustic televiewer feature classification followed **GEO***Vision* Televiewer Feature Notes and Picking Criteria (Appendix C). Acoustic televiewer feature depth, dip and azimuth of dip data are provided in Tables 4, 6, 8, 9, 10, 12, 13, and 14, in Microsoft Excel® format in the boring specific sub-directories included with this report, and on the multi-page acoustic televiewer feature log sheets in Appendix C. Depths on all figures and tables are referenced to ground surface.

A feature distribution histogram is presented for each borehole log in Appendix D.

Acoustic stereonet diagrams for the acoustic televiewer logs are presented as Figures 5, 9, 13, 16, 19, 24, 26, and 28, respectively and rose diagrams are presented as Figures 6, 10, 14, 17, 20, 25,

27, and 29, respectively. These are also provided as PDF in the data directory. The mean dip data for each of the stereonet clusters is presented in text format in the data directory, along with the stereonet statistics for all features in each section.

The borings did not exhibit different zones of feature orientation; the feature orientations appeared to be fairly evenly distributed over the boring depths, so the borings were processed as single zone models.

Deviation data is summarized in Table 3. Individual borehole deviation data are presented graphically in Figures 7, 11, 15, 18, 21, and 30. Deviation data logged at 1.0 foot stations are presented in text and graphic format in the data directories that accompany this report.

Optical Televiewer / Boring Deviation Results

Optical televiewer data and boring deviation data were collected and processed in one borehole, B-105. Per standard procedure, optical televiewer feature classification followed **GEO***Vision* Televiewer Feature Notes and Picking Criteria (Appendix C). Optical televiewer feature depth, dip and azimuth of dip data are provided in Table 11, on the multi-page optical televiewer feature log sheets in Appendix C and in Microsoft Excel® format in the boring specific sub-directories that are included with this report. Depths on all figures and tables are referenced to ground surface.

A feature distribution histogram is presented for borehole B-105 in Appendix D.

The stereonet diagram for the optical televiewer log of B-105 is presented in Figure 22 and rose diagram is presented in Figure 23. These are also provided as PDF in the data directory. The mean dip data for each of the stereonet clusters is presented in text format in the data directory, along with the stereonet statistics for all features in each section.

The boring did not exhibit different zones of feature orientation; the feature orientations appeared to be fairly evenly distributed over the boring depths, so the boring was processed as a single zone model.

Deviation data is summarized in Table 3. Deviation data logged at 1.0 foot stations are presented in text and graphic format in the data directories that accompany this report.

SUMMARY

Discussion of Suspension Velocity Results

Suspension PS velocity data are ideally collected in uncased fluid filled boreholes drilled with rotary methods, as were the boreholes for this project. Overall, Suspension PS velocity data quality is judged on 5 criteria, as summarized in the following table.

	Criteria	B-102 and B-103
1	Consistent data between receiver to receiver (R1 – R2) and source to receiver (S – R1) data.	Yes.
2	Consistency between data from adjacent depth intervals.	Yes
3	Consistent relationship between P-wave and S_H-wave (excluding transition to saturated soils)	Yes
4	Clarity of P-wave and S_H-wave onset, as well as damping of later oscillations.	S-wave is very good in the rock. P-wave data was difficult to interpret, in fast rock, at the bottom of the borehole. PS Suspension source frequencies are not high enough to deliver sharp breaks in the waveforms, so picking is more subjective. See NOTE.
5	Consistency of profile between adjacent borings, if available.	Very similar except in the zones from 75 – 90 ft bgs, and from 115 – 140 ft bgs.

NOTE: The PS logger source has its peak energy at about 1 KHz, with a distribution that gives enough energy up at 3-4 KHz to be quite pickable. The lower frequencies don't couple effectively into the rock, so it acts as a high-pass filter, leaving us with the higher frequencies that we want. That said, we find that even at these frequencies, our P-wave pick resolution is marginal in high velocity rock. This means different analysts can easily make similar but different pick selections that will result in differing velocities, increasing the possibility of error.

Discussion of Televiewer / Boring Deviation Results

Acoustic or Optical televiewer data and borehole deviation data were collected in all borings below and above water level, respectively.

Acoustic and/or Optical televiewer images were of good quality. Data reveal identifiable hairline and open fractures generally in agreement with PS results, where available. Several open voids are clearly visible, as well as zones of greater weathering or softer rock.

Quality Assurance

These borehole geophysical measurements were performed using industry-standard or better methods for measurements and analyses. All work was performed under **GEO***Vision* quality assurance procedures, which include:

- Use of NIST-traceable calibrations, where applicable, for field and laboratory instrumentation
- Use of standard field data logs
- Use of independent verification of velocity data by comparison of receiver-to-receiver and source-to-receiver velocities
- Independent review of calculations and results by a registered professional engineer, geologist, or geophysicist.

Suspension Velocity Data Reliability

P- and S_H-wave velocity measurement using the Suspension Method gives average velocities over a 3.3-foot interval of depth. This high resolution results in the scatter of values shown in the graphs. Individual S-wave measurements are very reliable with estimated precision of +/- 5%.

In portions of these boreholes where P-wave velocities are very fast, and the rock is highly fractured, resulting in more subjective arrival picking, P-wave measurements are reliable with estimated precision of +/- 10%.

Depth indications are very reliable with estimated precision of +/- 0.2 feet. Standardized field procedures and quality assurance checks contribute to the reliability of these data.

Televiewer Data Reliability

Depth indications are very reliable with estimated precision of +/- 0.2 feet. Estimated precision of dip is +/- 5 degrees and azimuth of dip is +/- 10 degrees. Standardized field procedures and quality assurance checks add to the reliability of these data.

CERTIFICATION

All geophysical data, analysis, interpretations, conclusions, and recommendations in this document have been prepared under the supervision of and reviewed by a **GEO***Vision* California Professional Geophysicist.

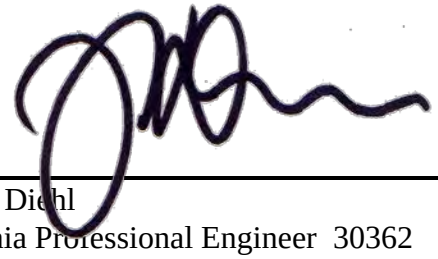
Prepared by



9/11/2017

Emily Feldman — Date
Senior Staff Geophysicist
GEO*Vision* Geophysical Services

Reviewed and approved by





9/11/2017

John G. Diehl — Date
California Professional Engineer 30362
GEO*Vision* Geophysical Services

* This geophysical investigation was conducted under the supervision of a California Professional Geophysicist using industry standard methods and equipment. A high degree of professionalism was maintained during all aspects of the project from the field investigation and data acquisition, through data processing, interpretation and reporting. All original field data files, field notes and observations, and other pertinent information are maintained in the project files and are available for the client to review for a period of at least one year.

  A professional geophysicist's certification of interpreted geophysical conditions comprises a declaration of his/her professional judgment. It does not constitute a warranty or guarantee, expressed or implied, nor does it relieve any other party of its responsibility to abide by contract documents, applicable codes, standards, regulations or ordinances.

Table 1. Borehole locations and logging dates

BOREHOLE DESIGNATION	DATES LOGGED	COORDINATES (FEET) [1]		ELEVATION (GROUND SURFACE) [1] (FEET)
		NORTHING	EASTING	
B-101	7/20/2017			
B-102	7/31-8/1/2017			
B-103	8/5/2017			
B-104	7/25/2017			
B-105	8/16/2017			
B-106	8/21/2017			

[1] Survey locations not available

Table 2. Logging dates and depth ranges

BOREHOLE NUMBER	TOOL AND RUN NUMBER	DEPTH RANGE (feet)	OPEN HOLE (FEET)	SAMPLE INTERVAL (FEET)	LOGGING DATE
B-101	ATV UP01-02	150 – 11	150	0.004	7/20/2017
B-102	ATV UP01	198.5 – 24.0	200	0.004	7/31/2017
B-102	SUSPENSION DOWN01	27.89 – 187.01	200	1.6	8/1/2017
B-103	ATV UP01	200 – 4.73	200	0.004	8/5/2017
B-103	SUSPENSION DOWN01	42.65 – 187.01	200	1.6	8/5/2017
B-104	ATV UP01-02	148.25 – 6.0	150	0.004	7/25/2017
B-105	ATV UP01	100 – 37	100	0.004	8/16/2017
B-105	OTV UP01-02	50 – 5	100	0.004	8/16/2017
B-106	ATV UP01	63.0 – 28.5	100	0.004	8/21/2017
B-106	ATV UP101	83.0 – 57.0	100	0.004	8/21/2017
B-106	ATV UP201	99.75 – 87.0	100	0.004	8/21/2017

Table 3. Televiewer Deviation Data Summary

BORING NUMBER AND TOOL/RUN	MEAN DEVIATION AND AZIMUTH (DEGREES TN)	SURVEY DEPTH (FEET)	VERTICAL DEPTH (FEET)	DEPTH ERROR (FEET)	HORIZONTAL OFFSET (FEET)
B-101 ATV	0.2 – N29	149.83	149.77	0.06	0.49
B-102 ATV	0.7 – N119	198.32	198.31	0.01	2.51
B-103 ATV	0.5 – N130	200.00	199.98	0.02	1.86
B-104 ATV	0.2 – N301	148.26	148.24	0.02	0.57
B-105 ATV	0.3 – N289	100.06	100.06	0.00	0.53
B-106 ATV LOWER	0.8 – N239	99.61	99.60	0.01	1.46

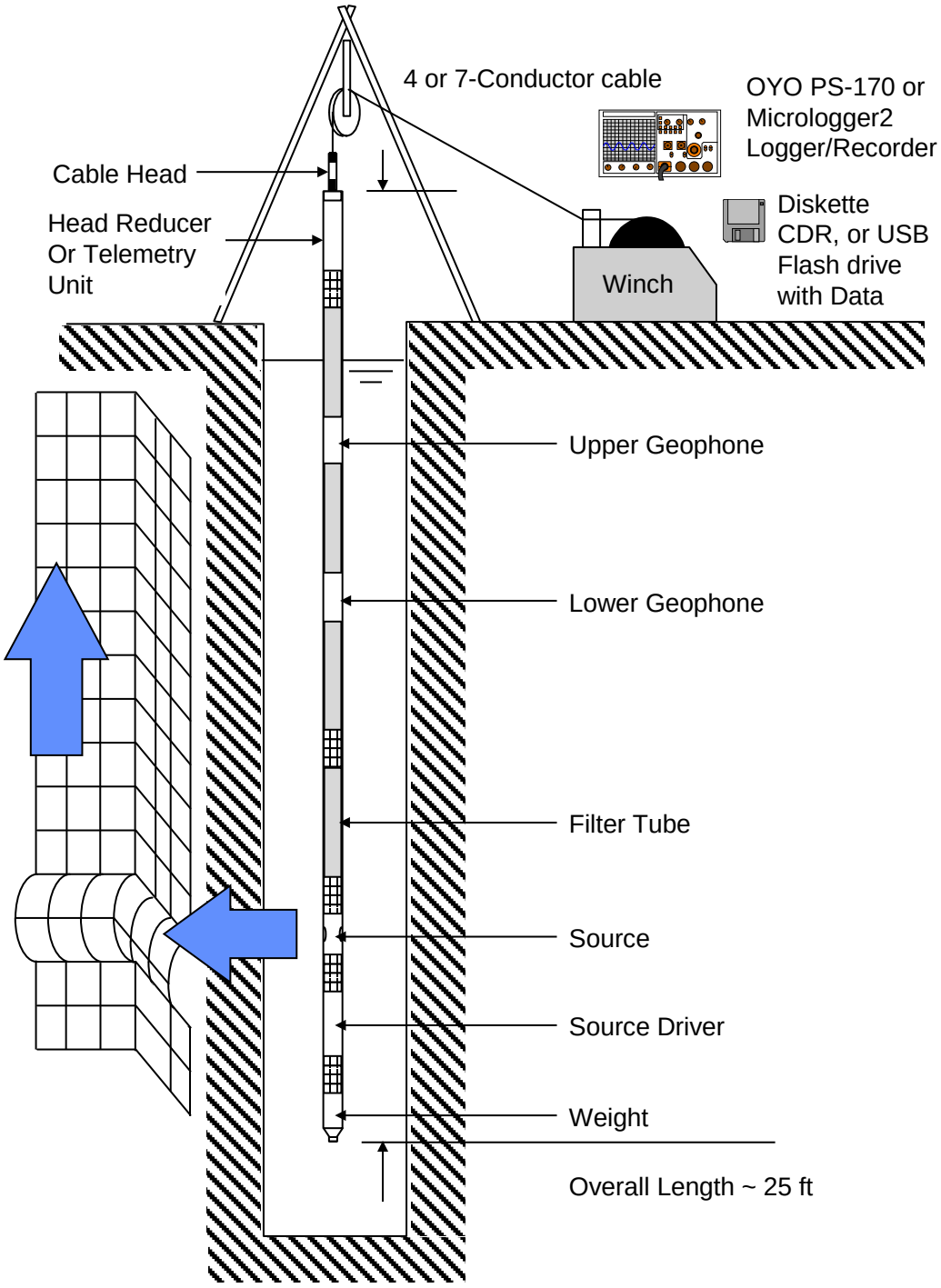


Figure 1: Concept illustration of P-S logging system

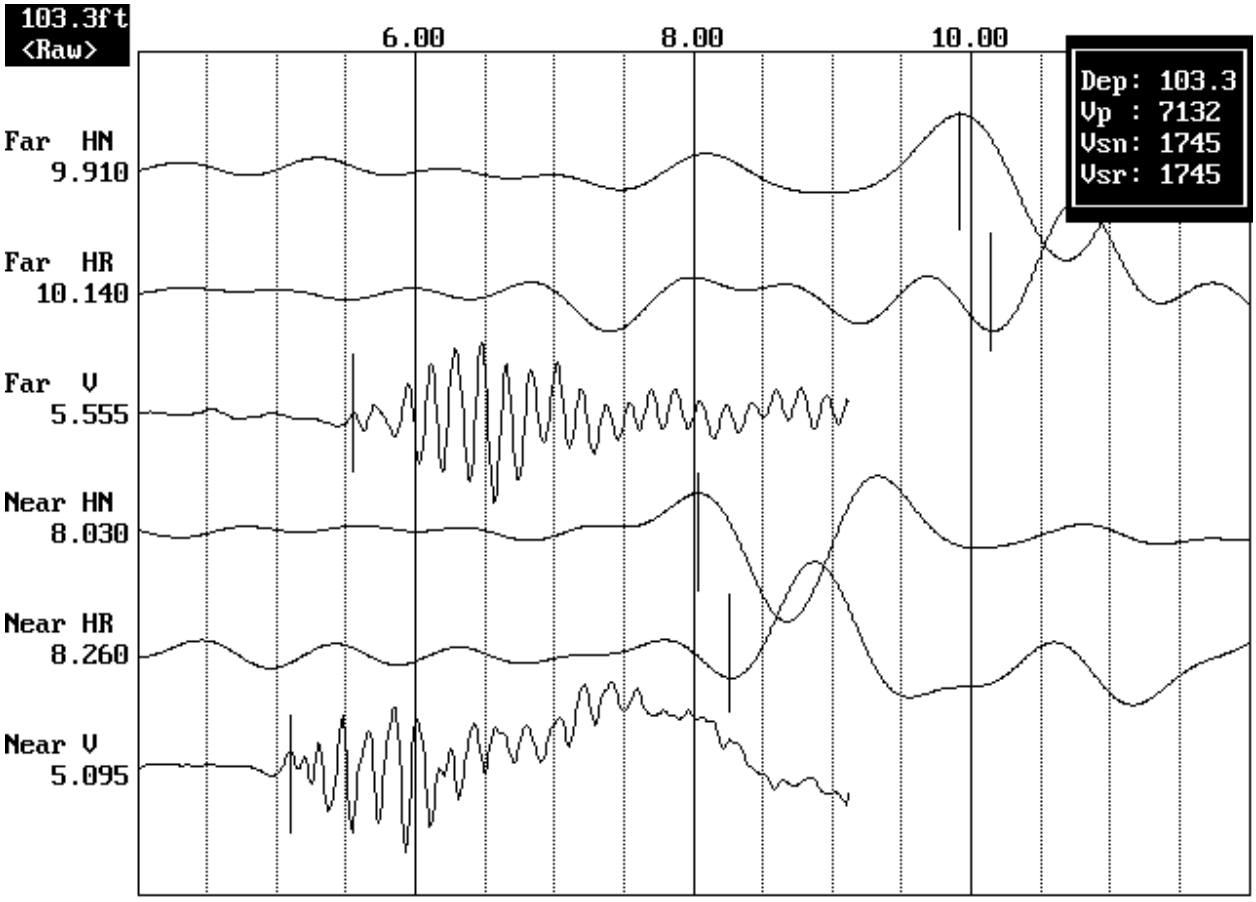


Figure 2: Example of filtered (1400 Hz lowpass) suspension record

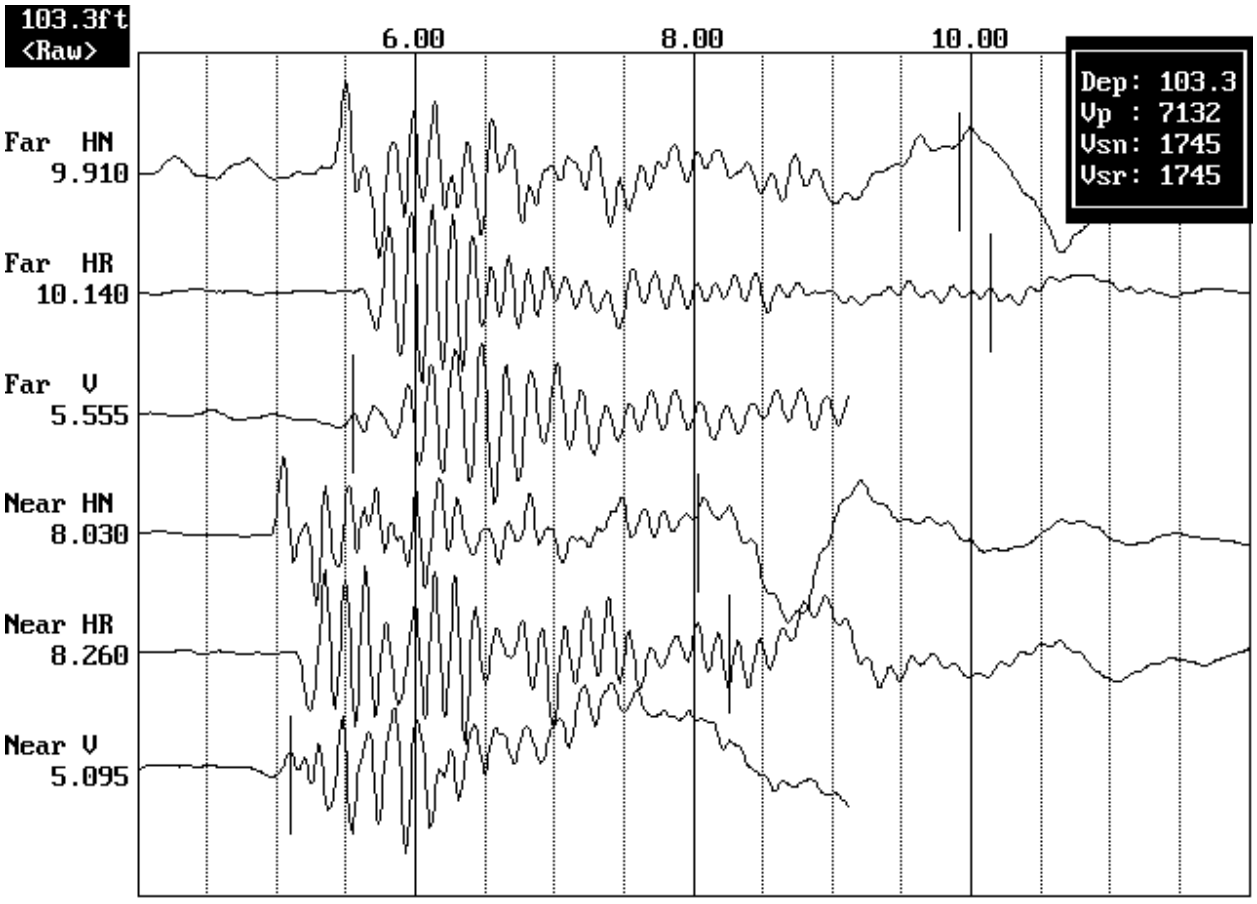


Figure 3. Example of unfiltered suspension record

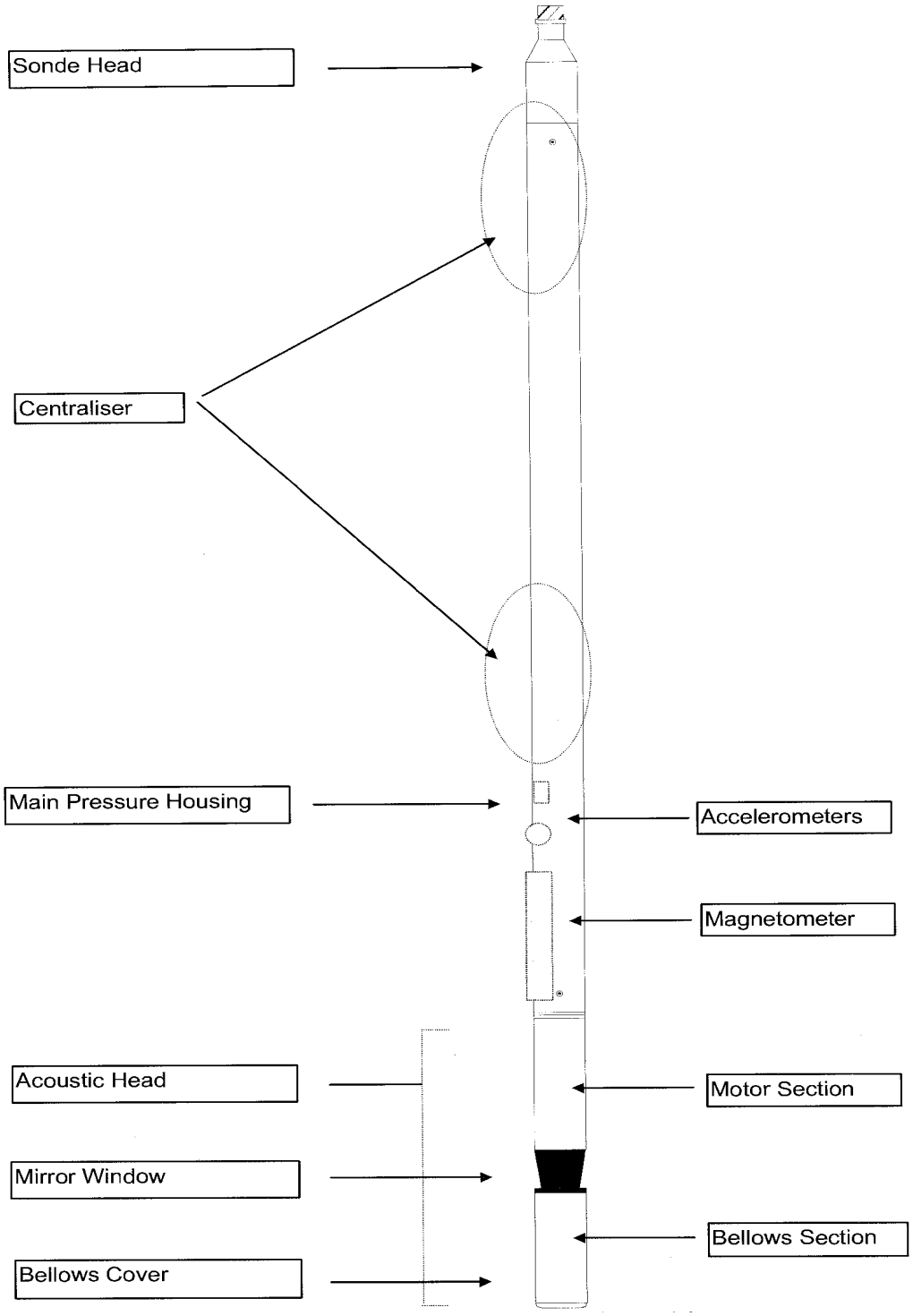


Figure 4: Concept illustration of televiewer probe

Table 4. Boring B-101, Acoustic Televiewer Feature depth, dip azimuth, dip and description

Depth (feet)	Dip azimuth	Dip	Structure description
12.6	N353	37	Fracture Discontinuous Open-fracture
12.9	N129	45	Fracture Discontinuous Open-fracture
13.1	N346	46	Fracture Discontinuous Open-fracture
13.2	N337	15	Fracture Planar Open-fracture
13.7	N359	52	Fracture Planar Hairline-fracture
13.8	N344	77	Fracture Planar Hairline-fracture
13.9	N341	21	Fracture Planar Hairline-fracture
14.1	N162	59	Fracture Planar Hairline-fracture
14.1	N190	13	Fracture Planar Hairline-fracture
14.6	N326	19	Fracture Discontinuous Open-fracture
15.0	N119	17	Fracture Planar Hairline-fracture
15.4	N122	17	Fracture Planar Hairline-fracture
15.4	N096	70	Fracture Planar Hairline-fracture
16.0	N031	31	Fracture Planar Hairline-fracture
16.0	N092	74	Fracture Discontinuous Open-fracture
16.1	N235	45	Fracture Planar Hairline-fracture
16.7	N065	82	Fracture Planar Hairline-fracture
17.5	N194	24	Fracture Planar Hairline-fracture
18.0	N266	30	Fracture Planar Hairline-fracture
18.7	N077	74	Planar Laminated-structure
19.6	N072	76	Planar Laminated-structure
20.6	N092	78	Planar Laminated-structure
20.8	N272	58	Fracture Planar Hairline-fracture
21.5	N254	53	Fracture Planar Hairline-fracture
22.0	N312	24	Fracture Planar Hairline-fracture
22.5	N282	57	Fracture Planar Hairline-fracture
23.4	N259	39	Fracture Planar Hairline-fracture
24.1	N057	57	Fracture Discontinuous Hairline-fracture
26.9	N072	44	Fracture Planar Hairline-fracture
27.5	N150	27	Fracture Planar Hairline-fracture
29.2	N080	71	Fracture Irregular Hairline-fracture
29.4	N300	68	Fracture Planar Hairline-fracture
29.8	N088	60	Fracture Planar Hairline-fracture
30.3	N062	57	Fracture Planar Hairline-fracture
30.8	N081	76	Planar Laminated-structure
30.9	N098	29	Fracture Planar Hairline-fracture
31.3	N020	4	Fracture Discontinuous Hairline-fracture
31.6	N295	71	Fracture Planar Hairline-fracture

Depth (feet)	Dip azimuth	Dip	Structure description
31.9	N230	61	Fracture Planar Hairline-fracture
32.5	N223	37	Fracture Discontinuous Hairline-fracture
32.8	N172	52	Fracture Planar Hairline-fracture
33.0	N043	79	Fracture Planar Hairline-fracture
33.1	N209	31	Fracture Planar Hairline-fracture
33.2	N181	62	Fracture Planar Hairline-fracture
33.5	N190	41	Fracture Planar Hairline-fracture
33.7	N186	41	Fracture Planar Hairline-fracture
35.3	N313	80	Fracture Irregular Hairline-fracture
35.7	N145	78	Fracture Irregular Hairline-fracture
35.8	N082	85	Planar Laminated-structure
36.0	N039	68	Fracture Irregular Hairline-fracture
36.9	N181	56	Fracture Planar Hairline-fracture
37.0	N321	67	Fracture Planar Hairline-fracture
38.2	N327	77	Fracture Planar Open-fracture
38.9	N099	67	Fracture Planar Hairline-fracture
39.0	N222	13	Fracture Planar Hairline-fracture
39.0	N094	74	Fracture Planar Hairline-fracture
39.4	N097	35	Fracture Planar Open-fracture
39.6	N119	66	Fracture Planar Open-fracture
40.1	N153	76	Fracture Planar Hairline-fracture
40.1	N042	70	Fracture Planar Hairline-fracture
40.8	N280	33	Fracture Planar Hairline-fracture
41.0	N129	73	Fracture Planar Open-fracture
41.3	N095	34	Fracture Planar Open-fracture
41.4	N341	71	Fracture Discontinuous Open-fracture
43.0	N340	80	Fracture Planar Hairline-fracture
43.9	N021	78	Fracture Planar Hairline-fracture
43.9	N295	76	Fracture Planar Hairline-fracture
44.5	N088	75	Fracture Planar Hairline-fracture
44.5	N278	49	Fracture Planar Hairline-fracture
45.1	N321	60	Fracture Planar Hairline-fracture
45.6	N334	57	Fracture Planar Hairline-fracture
46.7	N304	73	Fracture Planar Hairline-fracture
47.3	N327	76	Fracture Planar Hairline-fracture
48.3	N141	54	Fracture Planar Hairline-fracture
49.0	N245	32	Fracture Planar Hairline-fracture
49.1	N236	60	Fracture Planar Hairline-fracture
49.8	N125	47	Fracture Discontinuous Open-fracture

Depth (feet)	Dip azimuth	Dip	Structure description
49.9	N034	79	Fracture Planar Hairline-fracture
50.0	N134	41	Fracture Planar Hairline-fracture
50.5	N150	39	Fracture Planar Hairline-fracture
51.4	N127	66	Fracture Planar Hairline-fracture
51.9	N132	76	Fracture Planar Hairline-fracture
52.0	N319	80	Fracture Planar Hairline-fracture
52.2	N298	64	Fracture Planar Hairline-fracture
52.4	N317	78	Fracture Planar Hairline-fracture
52.5	N115	70	Fracture Planar Hairline-fracture
53.7	N269	58	Fracture Planar Hairline-fracture
55.0	N289	65	Fracture Planar Hairline-fracture
55.3	N195	70	Fracture Planar Hairline-fracture
56.0	N193	64	Fracture Planar Hairline-fracture
56.1	N303	65	Fracture Planar Hairline-fracture
56.2	N130	65	Fracture Planar Hairline-fracture
56.8	N316	52	Fracture Planar Hairline-fracture
56.9	N305	75	Fracture Planar Hairline-fracture
57.2	N307	67	Fracture Planar Hairline-fracture
57.3	N325	38	Fracture Planar Hairline-fracture
58.3	N235	76	Fracture Planar Hairline-fracture
59.0	N074	83	Fracture Discontinuous Hairline-fracture
59.0	N262	67	Fracture Planar Hairline-fracture
59.0	N315	54	Fracture Discontinuous Open-fracture
59.1	N067	69	Fracture Planar Hairline-fracture
60.8	N050	73	Fracture Planar Hairline-fracture
61.0	N324	79	Fracture Irregular Hairline-fracture
61.3	N302	53	Fracture Planar Open-fracture
61.9	N300	71	Fracture Planar Open-fracture
62.9	N281	79	Fracture Planar Hairline-fracture
63.1	N009	77	Fracture Planar Hairline-fracture
63.5	N275	77	Fracture Planar Hairline-fracture
64.3	N306	79	Planar Laminated-structure
65.3	N296	72	Fracture Planar Hairline-fracture
65.9	N314	72	Fracture Planar Hairline-fracture
66.1	N307	75	Fracture Planar Hairline-fracture
67.3	N307	68	Fracture Planar Hairline-fracture
68.1	N336	62	Fracture Irregular Hairline-fracture
70.7	N067	55	Fracture Planar Hairline-fracture
71.1	N166	42	Fracture Planar Hairline-fracture

Depth (feet)	Dip azimuth	Dip	Structure description
71.3	N132	55	Fracture Planar Hairline-fracture
71.5	N086	86	Fracture Irregular Hairline-fracture
72.1	N247	47	Fracture Planar Hairline-fracture
77.8	N042	21	Fracture Planar Hairline-fracture
81.3	N316	49	Fracture Planar Hairline-fracture
82.3	N069	20	Fracture Planar Hairline-fracture
82.6	N003	45	Fracture Planar Hairline-fracture
82.6	N133	32	Fracture Planar Hairline-fracture
83.2	N045	22	Fracture Planar Hairline-fracture
84.5	N067	68	Fracture Discontinuous Hairline-fracture
85.0	N168	16	Fracture Discontinuous Hairline-fracture
86.5	N038	71	Fracture Irregular Hairline-fracture
86.7	N309	31	Fracture Planar Hairline-fracture
87.8	N331	22	Fracture Planar Hairline-fracture
88.1	N063	82	Planar Laminated-structure
90.1	N263	84	Fracture Irregular Hairline-fracture
90.3	N293	26	Fracture Planar Hairline-fracture
91.0	N037	31	Fracture Planar Hairline-fracture
91.3	N009	72	Fracture Planar Hairline-fracture
91.5	N029	44	Fracture Planar Hairline-fracture
93.3	N167	60	Fracture Planar Hairline-fracture
97.9	N266	66	Fracture Planar Hairline-fracture
98.0	N255	83	Planar Laminated-structure
99.6	N063	27	Fracture Planar Hairline-fracture
101.0	N326	73	Fracture Irregular Hairline-fracture
101.6	N346	74	Fracture Discontinuous Hairline-fracture
102.8	N075	75	Fracture Planar Hairline-fracture
103.0	N179	69	Fracture Planar Hairline-fracture
103.3	N094	69	Fracture Planar Hairline-fracture
104.2	N163	76	Fracture Planar Hairline-fracture
104.6	N035	37	Fracture Planar Hairline-fracture
105.4	N352	33	Fracture Planar Hairline-fracture
105.8	N187	73	Fracture Planar Hairline-fracture
106.9	N179	70	Fracture Planar Hairline-fracture
107.2	N183	68	Fracture Planar Hairline-fracture
108.2	N150	78	Fracture Planar Hairline-fracture
110.8	N153	55	Fracture Planar Hairline-fracture
112.9	N327	60	Fracture Planar Hairline-fracture
113.0	N142	53	Fracture Planar Hairline-fracture

Depth (feet)	Dip azimuth	Dip	Structure description
113.4	N030	37	Fracture Planar Hairline-fracture
113.6	N038	25	Fracture Planar Hairline-fracture
114.2	N053	70	Fracture Irregular Hairline-fracture
115.3	N247	79	Fracture Irregular Hairline-fracture
116.5	N177	59	Fracture Planar Hairline-fracture
117.3	N063	73	Fracture Planar Hairline-fracture
118.6	N073	71	Fracture Planar Hairline-fracture
121.7	N166	57	Fracture Planar Hairline-fracture
122.5	N143	55	Fracture Planar Hairline-fracture
122.7	N049	46	Fracture Planar Hairline-fracture
124.0	N028	30	Fracture Planar Hairline-fracture
125.5	N184	74	Fracture Planar Hairline-fracture
126.1	N130	44	Fracture Planar Hairline-fracture
126.4	N081	25	Fracture Planar Hairline-fracture
126.8	N095	85	Fracture Discontinuous Hairline-fracture
127.1	N070	52	Fracture Planar Hairline-fracture
127.4	N026	38	Fracture Planar Hairline-fracture
127.6	N288	87	Fracture Irregular Hairline-fracture
130.3	N030	54	Fracture Planar Hairline-fracture
130.8	N027	43	Fracture Planar Hairline-fracture
131.5	N245	66	Planar Laminated-structure
131.9	N246	62	Planar Laminated-structure
132.7	N057	54	Fracture Planar Hairline-fracture
132.8	N204	56	Fracture Planar Hairline-fracture
133.3	N073	64	Fracture Planar Hairline-fracture
133.7	N073	58	Fracture Planar Hairline-fracture
134.7	N130	68	Fracture Planar Hairline-fracture
135.0	N083	78	Fracture Discontinuous Hairline-fracture
135.4	N142	64	Fracture Planar Hairline-fracture
136.7	N089	68	Fracture Planar Hairline-fracture
136.8	N120	53	Fracture Planar Open-fracture
137.3	N166	53	Fracture Planar Hairline-fracture
137.5	N086	76	Fracture Planar Hairline-fracture
137.9	N086	39	Fracture Planar Hairline-fracture
138.5	N129	58	Fracture Planar Open-fracture
138.9	N121	80	Fracture Discontinuous Open-fracture
139.7	N219	63	Fracture Planar Hairline-fracture
140.2	N146	67	Fracture Planar Hairline-fracture
141.2	N188	56	Fracture Planar Hairline-fracture

Depth (feet)	Dip azimuth	Dip	Structure description
141.6	N125	69	Fracture Irregular Hairline-fracture
141.8	N141	70	Fracture Planar Hairline-fracture
142.5	N139	71	Fracture Planar Hairline-fracture
144.6	N082	79	Fracture Irregular Hairline-fracture
145.7	N007	40	Fracture Planar Hairline-fracture
147.9	N347	39	Fracture Planar Hairline-fracture
149.1	N155	66	Fracture Planar Hairline-fracture

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DIP DATA INTERPRETATION
RGLDIP vsn 6.2
FRACTURE ANALYSIS STEREOGRAMS

AECOM

Borehole: B-101

VAIL DAM

top of borehole.....
East:_
North:
Elev:_

North ref: true
Depth units are feet

Zone from 149.583 to 12.118ft
Mean dip format: dip-azimuth and dip

Interpretation 1

Dip data sets .....
BHTV dips

B-101
Zone 0. 12.118 - 149.573ft
Deviation 0.20 N 36.80

dipdata sets.....
BHTV dips

	mean dip	n	f
N076 70	N076 70	36	0.76
N311 71	N311 71	25	0.55
N134 59	N134 59	19	0.27
N032 32	N032 32	11	(0.09)
N175 60	N175 60	12	(0.17)

intersections

	N076 70	N311 71	N134 59	N032 32	N175 60
N076 70		53 N014	59 N129	27 N357	54 N136
N311 71	53 N014		03 N222	32 N029	39 N237
N134 59	59 N129	03 N222		28 N063	58 N151
N032 32	27 N357	32 N029	28 N063		16 N095
N175 60	54 N136	39 N237	58 N151	16 N095	

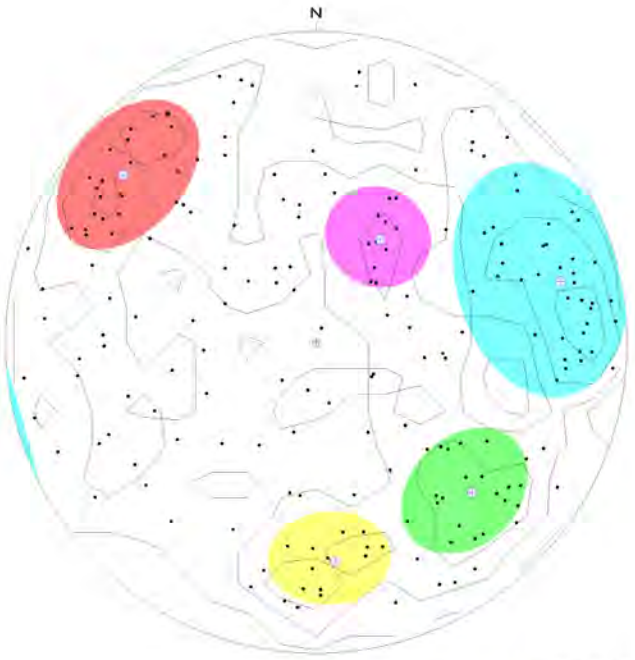


Figure 5. Boring B-101, Acoustic Stereonet Diagram

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DIP DATA INTERPRETATION
RGLDIP vsn 6.2
DIP-AZIMUTH, FRACTURE ROSE-DIAGRAM

AECOM

Borehole: B-101

VAIL DAM

top of borehole.....
East:_
North:
Alt: _

North ref. is true
Depth units are feet

Zone from 149.583 to 12.118ft

Interpretation 1

Dip data sets .....
BHTV dips

B-101
12.118 - 149.583ft
Dip-azimuth, fracture rose-diagram

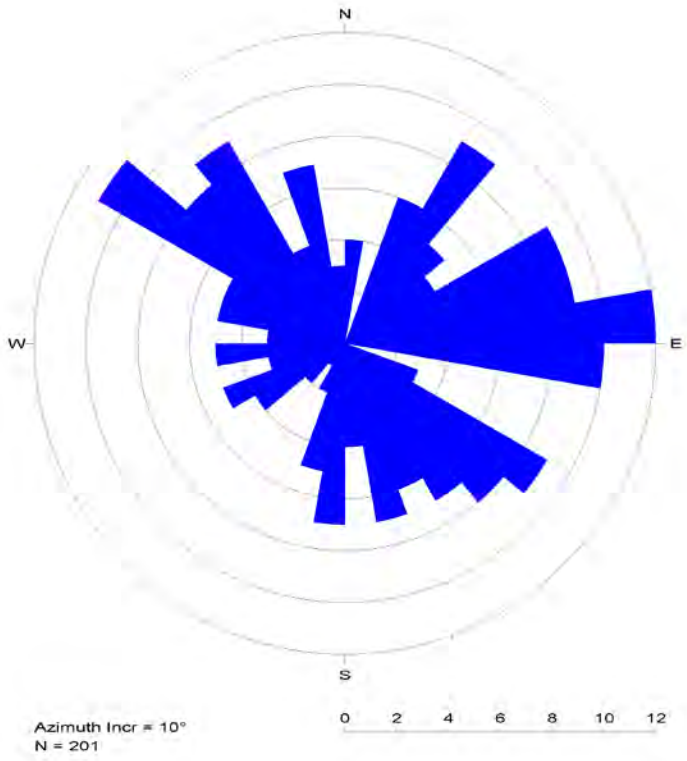


Figure 6. Boring B-101, Acoustic Rose Diagram

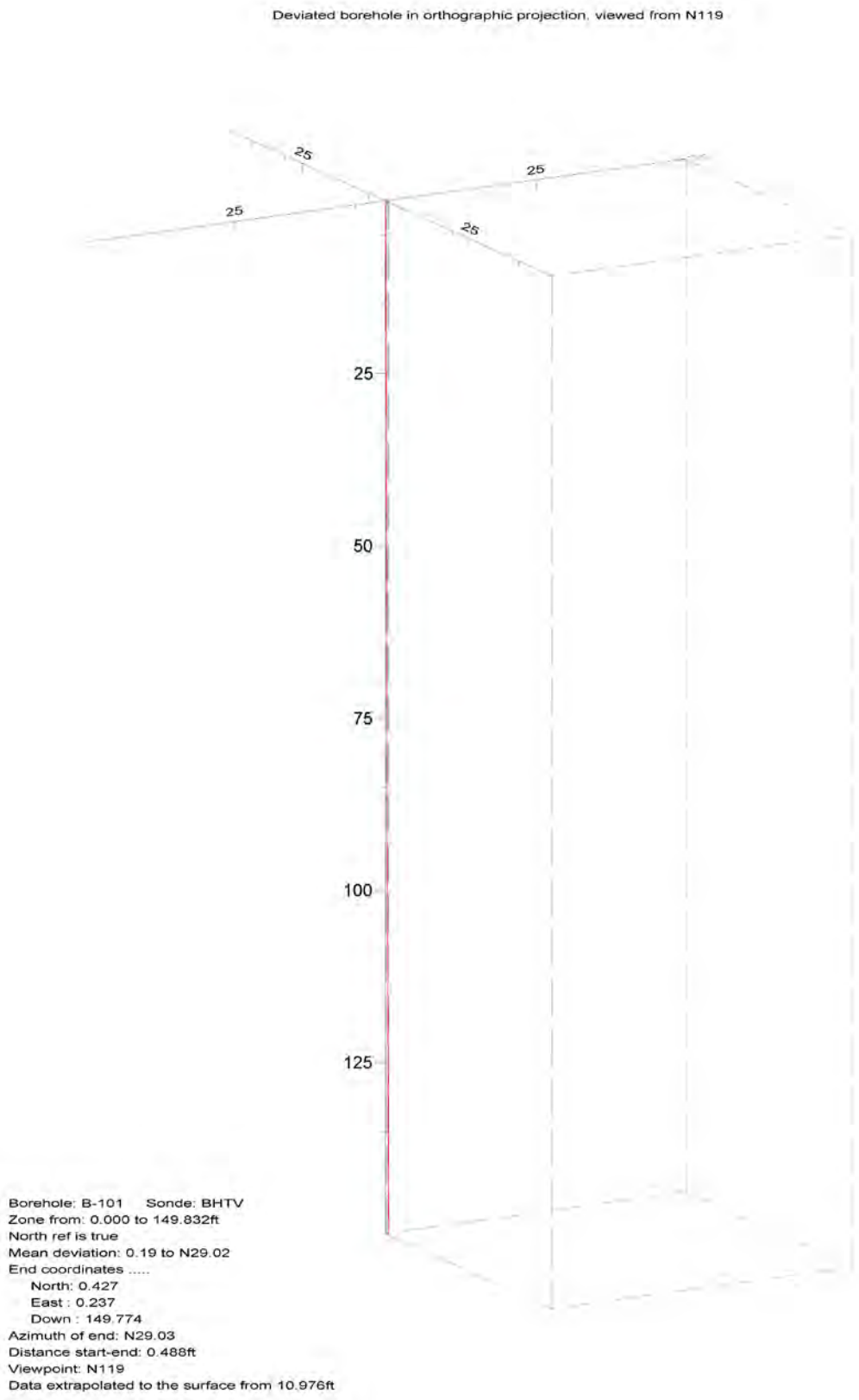


Figure 7. Boring B-101, Acoustic Deviation Projection

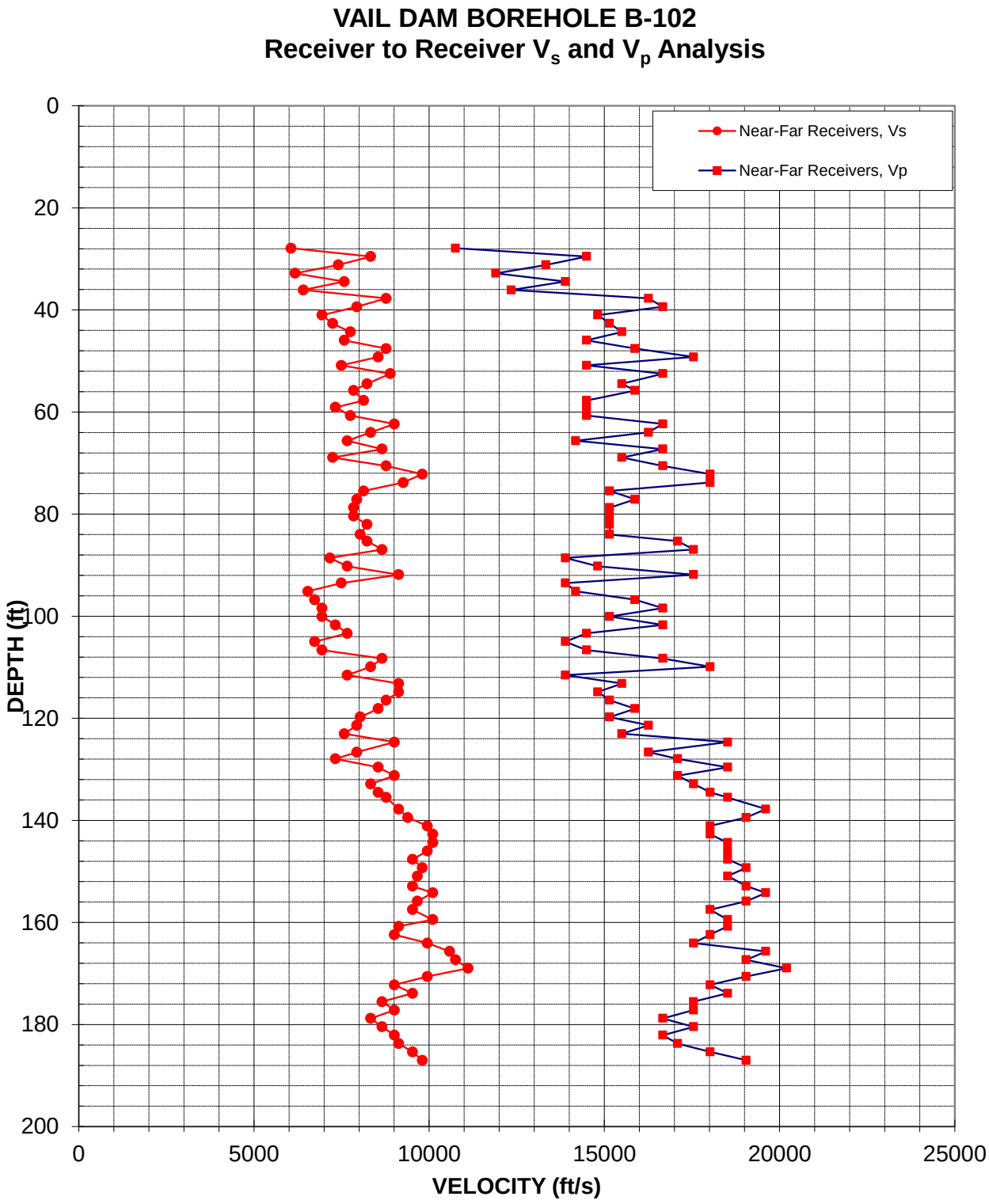


Figure 8: Boring B-102 Suspension R1-R2 P- and S_H-wave velocities

Table 5. Boring B-102 Suspension R1-R2 depths and P- and S_H-wave velocities

Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio Based on Receiver-to-Receiver Travel Time Data - Borehole B-102

American Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V_s	V_p	
(ft)	(ft/s)	(ft/s)	
27.9	6060	10750	0.27
29.5	8330	14490	0.25
31.2	7410	13330	0.28
32.8	6170	11900	0.32
34.5	7580	13890	0.29
36.1	6410	12350	0.32
37.7	8770	16260	0.29
39.4	7940	16670	0.35
41.0	6940	14810	0.36
42.7	7250	15150	0.35
44.3	7750	15500	0.33
45.9	7580	14490	0.31
47.6	8770	15870	0.28
49.2	8550	17540	0.34
50.9	7490	14490	0.32
52.5	8890	16670	0.30
54.5	8230	15500	0.30
55.8	7840	15870	0.34
57.7	8130	14490	0.27
59.1	7330	14490	0.33
60.7	7750	14490	0.30
62.3	9010	16670	0.29
64.0	8330	16260	0.32
65.6	7660	14180	0.29
67.3	8660	16670	0.32
68.9	7250	15500	0.36
70.5	8770	16670	0.31
72.2	9800	18020	0.29
73.8	9260	18020	0.32
75.5	8130	15150	0.30
77.1	7940	15870	0.33
78.7	7840	15150	0.32
80.4	7840	15150	0.32
82.0	8230	15150	0.29
84.0	8030	15150	0.30
85.3	8230	17090	0.35
86.9	8660	17540	0.34
88.6	7170	13890	0.32

Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V_s	V_p	
(m)	(m/s)	(m/s)	
8.5	1850	3280	0.27
9.0	2540	4420	0.25
9.5	2260	4060	0.28
10.0	1880	3630	0.32
10.5	2310	4230	0.29
11.0	1950	3760	0.32
11.5	2670	4960	0.29
12.0	2420	5080	0.35
12.5	2120	4520	0.36
13.0	2210	4620	0.35
13.5	2360	4730	0.33
14.0	2310	4420	0.31
14.5	2670	4840	0.28
15.0	2610	5350	0.34
15.5	2280	4420	0.32
16.0	2710	5080	0.30
16.6	2510	4730	0.30
17.0	2390	4840	0.34
17.6	2480	4420	0.27
18.0	2230	4420	0.33
18.5	2360	4420	0.30
19.0	2750	5080	0.29
19.5	2540	4960	0.32
20.0	2340	4320	0.29
20.5	2640	5080	0.32
21.0	2210	4730	0.36
21.5	2670	5080	0.31
22.0	2990	5490	0.29
22.5	2820	5490	0.32
23.0	2480	4620	0.30
23.5	2420	4840	0.33
24.0	2390	4620	0.32
24.5	2390	4620	0.32
25.0	2510	4620	0.29
25.6	2450	4620	0.30
26.0	2510	5210	0.35
26.5	2640	5350	0.34
27.0	2180	4230	0.32

Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole B-102

American Units				Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio	Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V_s	V_p			V_s	V_p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
90.2	7660	14810	0.32	27.5	2340	4520	0.32
91.9	9130	17540	0.31	28.0	2780	5350	0.31
93.5	7490	13890	0.29	28.5	2280	4230	0.29
95.1	6540	14180	0.37	29.0	1990	4320	0.37
96.8	6730	15870	0.39	29.5	2050	4840	0.39
98.4	6940	16670	0.39	30.0	2120	5080	0.39
100.1	6940	15150	0.37	30.5	2120	4620	0.37
101.7	7330	16670	0.38	31.0	2230	5080	0.38
103.4	7660	14490	0.31	31.5	2340	4420	0.31
105.0	6730	13890	0.35	32.0	2050	4230	0.35
106.6	6940	14490	0.35	32.5	2120	4420	0.35
108.3	8660	16670	0.32	33.0	2640	5080	0.32
109.9	8330	18020	0.36	33.5	2540	5490	0.36
111.6	7660	13890	0.28	34.0	2340	4230	0.28
113.2	9130	15500	0.23	34.5	2780	4730	0.23
114.8	9130	14810	0.19	35.0	2780	4520	0.19
116.5	8770	15150	0.25	35.5	2670	4620	0.25
118.1	8550	15870	0.30	36.0	2610	4840	0.30
119.8	8030	15150	0.30	36.5	2450	4620	0.30
121.4	7940	16260	0.34	37.0	2420	4960	0.34
123.0	7580	15500	0.34	37.5	2310	4730	0.34
124.7	9010	18520	0.34	38.0	2750	5640	0.34
126.6	7940	16260	0.34	38.6	2420	4960	0.34
128.0	7330	17090	0.39	39.0	2230	5210	0.39
129.6	8550	18520	0.36	39.5	2610	5640	0.36
131.2	9010	17090	0.31	40.0	2750	5210	0.31
132.9	8330	17540	0.35	40.5	2540	5350	0.35
134.5	8550	18020	0.35	41.0	2610	5490	0.35
135.5	8770	18520	0.36	41.3	2670	5640	0.36
137.8	9130	19610	0.36	42.0	2780	5980	0.36
139.4	9390	19050	0.34	42.5	2860	5810	0.34
141.1	9950	18020	0.28	43.0	3030	5490	0.28
142.7	10100	18020	0.27	43.5	3080	5490	0.27
144.4	10100	18520	0.29	44.0	3080	5640	0.29
146.0	9950	18520	0.30	44.5	3030	5640	0.30
147.6	9520	18520	0.32	45.0	2900	5640	0.32
149.3	9800	19050	0.32	45.5	2990	5810	0.32
150.9	9660	18520	0.31	46.0	2940	5640	0.31
152.9	9520	19050	0.33	46.6	2900	5810	0.33

Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole B-102

American Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V_s	V_p	
(ft)	(ft/s)	(ft/s)	
154.2	10100	19610	0.32
155.8	9660	19050	0.33
157.5	9520	18020	0.31
159.5	10100	18520	0.29
160.8	9130	18520	0.34
162.4	9010	18020	0.33
164.0	9950	17540	0.26
165.7	10580	19610	0.29
167.3	10750	19050	0.27
169.0	11110	20200	0.28
170.6	9950	19050	0.31
172.2	9010	18020	0.33
173.9	9520	18520	0.32
175.5	8660	17540	0.34
177.2	9010	17540	0.32
178.8	8330	16670	0.33
180.5	8660	17540	0.34
182.1	9010	16670	0.29
183.7	9130	17090	0.30
185.4	9520	18020	0.31
187.0	9800	19050	0.32

Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V_s	V_p	
(m)	(m/s)	(m/s)	
47.0	3080	5980	0.32
47.5	2940	5810	0.33
48.0	2900	5490	0.31
48.6	3080	5640	0.29
49.0	2780	5640	0.34
49.5	2750	5490	0.33
50.0	3030	5350	0.26
50.5	3230	5980	0.29
51.0	3280	5810	0.27
51.5	3390	6160	0.28
52.0	3030	5810	0.31
52.5	2750	5490	0.33
53.0	2900	5640	0.32
53.5	2640	5350	0.34
54.0	2750	5350	0.32
54.5	2540	5080	0.33
55.0	2640	5350	0.34
55.5	2750	5080	0.29
56.0	2780	5210	0.30
56.5	2900	5490	0.31
57.0	2990	5810	0.32

Table 6. Boring B-102, Acoustic Televiewer Feature depth, dip azimuth, dip and description

Depth (feet)	Dip azimuth	Dip	Structure description
29.1	N263	83	Planar Laminated-structure
29.3	N074	49	Fracture Planar Hairline-fracture
31.5	N241	47	Fracture Planar Hairline-fracture
31.9	N010	38	Fracture Planar Hairline-fracture
32.4	N003	39	Fracture Planar Hairline-fracture
32.9	N245	37	Fracture Planar Hairline-fracture
33.9	N247	44	Fracture Planar Hairline-fracture
36.3	N248	46	Fracture Irregular Hairline-fracture
36.6	N316	61	Fracture Planar Hairline-fracture
37.0	N275	48	Fracture Planar Hairline-fracture
38.3	N272	81	Planar Laminated-structure
39.0	N089	26	Fracture Planar Hairline-fracture
39.5	N149	53	Fracture Planar Hairline-fracture
39.7	N053	54	Fracture Planar Hairline-fracture
40.6	N210	29	Fracture Planar Hairline-fracture
42.0	N275	78	Planar Laminated-structure
42.0	N073	36	Fracture Planar Hairline-fracture
42.1	N225	38	Fracture Planar Hairline-fracture
42.7	N235	36	Fracture Planar Hairline-fracture
44.0	N265	81	Fracture Discontinuous Hairline-fracture
44.7	N010	24	Fracture Planar Hairline-fracture
45.4	N052	62	Fracture Planar Hairline-fracture
45.7	N035	11	Fracture Planar Hairline-fracture
45.9	N293	29	Fracture Planar Hairline-fracture
47.1	N096	19	Fracture Discontinuous Hairline-fracture
47.3	N104	16	Fracture Planar Open-fracture
47.7	N059	16	Fracture Planar Hairline-fracture
48.3	N071	21	Fracture Planar Hairline-fracture
49.9	N245	81	Fracture Discontinuous Hairline-fracture
51.7	N347	31	Fracture Planar Open-fracture
51.8	N000	27	Fracture Planar Hairline-fracture
54.1	N266	77	Planar Laminated-structure
54.2	N105	43	Fracture Planar Hairline-fracture
54.6	N094	39	Fracture Planar Hairline-fracture
57.3	N245	58	Fracture Irregular Hairline-fracture
58.2	N245	68	Fracture Planar Hairline-fracture
59.3	N255	78	Planar Laminated-structure
60.3	N001	23	Fracture Planar Hairline-fracture

Depth (feet)	Dip azimuth	Dip	Structure description
60.8	N263	84	Planar Laminated-structure
60.9	N339	14	Fracture Planar Open-fracture
62.1	N018	51	Fracture Planar Hairline-fracture
63.6	N090	35	Fracture Planar Hairline-fracture
65.0	N051	10	Fracture Planar Hairline-fracture
65.4	N084	46	Fracture Planar Hairline-fracture
66.1	N358	19	Fracture Planar Hairline-fracture
67.1	N087	45	Fracture Planar Hairline-fracture
68.4	N079	43	Fracture Planar Hairline-fracture
69.0	N275	71	Fracture Planar Hairline-fracture
69.1	N087	25	Fracture Planar Hairline-fracture
70.2	N279	57	Fracture Planar Hairline-fracture
71.1	N272	49	Fracture Planar Hairline-fracture
71.6	N247	82	Fracture Irregular Hairline-fracture
71.8	N076	39	Fracture Planar Hairline-fracture
72.3	N089	23	Fracture Planar Hairline-fracture
72.9	N267	66	Fracture Planar Hairline-fracture
74.0	N074	38	Fracture Planar Hairline-fracture
74.0	N268	68	Fracture Planar Hairline-fracture
77.0	N237	82	Fracture Planar Open-fracture
77.0	N242	77	Planar Laminated-structure
77.6	N237	74	Fracture Planar Open-fracture
77.8	N244	74	Planar Laminated-structure
79.7	N251	81	Planar Laminated-structure
81.4	N265	37	Fracture Planar Hairline-fracture
83.3	N021	19	Fracture Planar Hairline-fracture
83.7	N107	44	Fracture Planar Hairline-fracture
84.0	N262	66	Fracture Discontinuous Hairline-fracture
84.5	N264	21	Fracture Planar Hairline-fracture
84.9	N133	42	Fracture Planar Hairline-fracture
85.5	N136	36	Fracture Planar Hairline-fracture
86.8	N254	73	Fracture Irregular Hairline-fracture
87.7	N252	77	Planar Laminated-structure
89.8	N051	29	Fracture Planar Hairline-fracture
91.6	N316	83	Fracture Planar Hairline-fracture
94.1	N227	71	Fracture Discontinuous Hairline-fracture
94.1	N129	78	Fracture Discontinuous Hairline-fracture
95.4	N064	32	Fracture Planar Hairline-fracture
95.8	N006	23	Fracture Planar Hairline-fracture

Depth (feet)	Dip azimuth	Dip	Structure description
95.9	N158	78	Fracture Planar Hairline-fracture
96.1	N333	58	Fracture Planar Hairline-fracture
96.1	N158	79	Fracture Planar Hairline-fracture
96.4	N038	48	Fracture Planar Hairline-fracture
96.9	N001	43	Fracture Planar Hairline-fracture
98.3	N173	72	Fracture Planar Hairline-fracture
98.6	N300	43	Fracture Planar Hairline-fracture
99.1	N289	40	Fracture Planar Hairline-fracture
99.1	N083	25	Planar Laminated-structure
99.3	N128	22	Fracture Planar Hairline-fracture
99.5	N315	42	Fracture Planar Hairline-fracture
100.8	N093	13	Fracture Planar Hairline-fracture
101.2	N140	23	Fracture Planar Hairline-fracture
101.5	N140	11	Fracture Planar Hairline-fracture
101.7	N140	43	Fracture Planar Hairline-fracture
102.1	N063	19	Planar Laminated-structure
103.5	N173	20	Fracture Planar Hairline-fracture
104.0	N130	67	Fracture Planar Hairline-fracture
104.8	N172	52	Fracture Planar Hairline-fracture
107.2	N015	21	Fracture Planar Hairline-fracture
107.8	N037	64	Fracture Planar Hairline-fracture
108.3	N110	16	Fracture Planar Hairline-fracture
109.2	N104	31	Fracture Planar Hairline-fracture
109.6	N098	25	Fracture Planar Hairline-fracture
110.2	N292	60	Fracture Planar Hairline-fracture
110.6	N103	32	Fracture Planar Hairline-fracture
110.9	N110	35	Fracture Planar Hairline-fracture
111.2	N096	21	Fracture Planar Hairline-fracture
111.5	N101	24	Fracture Planar Hairline-fracture
111.8	N079	21	Fracture Planar Hairline-fracture
112.7	N277	82	Fracture Irregular Hairline-fracture
112.8	N240	56	Fracture Planar Hairline-fracture
113.6	N082	49	Fracture Planar Hairline-fracture
114.1	N271	58	Fracture Planar Hairline-fracture
114.7	N086	34	Fracture Planar Hairline-fracture
114.9	N013	23	Fracture Planar Hairline-fracture
115.8	N021	15	Fracture Planar Hairline-fracture
118.9	N290	82	Fracture Discontinuous Hairline-fracture
119.3	N063	24	Fracture Planar Hairline-fracture

Depth (feet)	Dip azimuth	Dip	Structure description
121.0	N147	69	Fracture Discontinuous Hairline-fracture
121.3	N003	40	Fracture Planar Hairline-fracture
121.5	N062	34	Fracture Planar Hairline-fracture
123.5	N022	24	Fracture Planar Hairline-fracture
124.5	N147	50	Fracture Planar Hairline-fracture
125.1	N040	29	Fracture Planar Hairline-fracture
125.3	N270	70	Fracture Planar Hairline-fracture
125.8	N135	54	Fracture Planar Hairline-fracture
126.1	N133	54	Fracture Planar Hairline-fracture
126.3	N143	43	Fracture Planar Hairline-fracture
126.4	N131	50	Fracture Planar Hairline-fracture
127.4	N136	39	Fracture Planar Hairline-fracture
127.4	N265	75	Fracture Planar Hairline-fracture
127.7	N138	49	Fracture Planar Hairline-fracture
128.6	N058	31	Fracture Planar Hairline-fracture
129.0	N071	56	Fracture Planar Hairline-fracture
130.6	N315	32	Fracture Planar Hairline-fracture
131.0	N116	9	Fracture Planar Hairline-fracture
132.1	N353	85	Fracture Planar Hairline-fracture
132.1	N186	46	Fracture Planar Hairline-fracture
132.3	N065	17	Fracture Planar Hairline-fracture
132.6	N090	28	Fracture Planar Hairline-fracture
133.7	N071	18	Fracture Planar Hairline-fracture
134.8	N255	15	Fracture Planar Hairline-fracture
135.0	N103	27	Fracture Planar Hairline-fracture
136.0	N285	60	Fracture Planar Hairline-fracture
136.8	N140	78	Fracture Planar Hairline-fracture
137.7	N157	70	Fracture Planar Hairline-fracture
138.0	N051	31	Fracture Planar Hairline-fracture
138.4	N159	71	Fracture Planar Hairline-fracture
140.0	N021	11	Fracture Planar Hairline-fracture
153.6	N159	34	Fracture Planar Hairline-fracture
159.4	N157	29	Fracture Planar Hairline-fracture
162.4	N109	21	Fracture Planar Hairline-fracture
163.1	N061	34	Fracture Planar Hairline-fracture
165.8	N335	56	Planar Laminated-structure
168.8	N298	12	Fracture Planar Hairline-fracture
170.0	N000	38	Fracture Planar Hairline-fracture
170.8	N138	23	Fracture Planar Hairline-fracture

Depth (feet)	Dip azimuth	Dip	Structure description
173.7	N135	86	Fracture Discontinuous Hairline-fracture
175.3	N284	75	Fracture Irregular Hairline-fracture
175.8	N258	67	Fracture Planar Open-fracture
176.6	N290	50	Fracture Planar Open-fracture
176.8	N262	60	Fracture Planar Open-fracture
177.5	N260	72	Fracture Planar Open-fracture
178.6	N250	72	Fracture Planar Hairline-fracture
179.2	N270	9	Fracture Planar Hairline-fracture
179.5	N283	76	Fracture Planar Hairline-fracture
181.7	N271	35	Planar Laminated-structure
182.3	N266	81	Fracture Planar Hairline-fracture
182.5	N117	21	Fracture Planar Hairline-fracture
184.9	N068	85	Fracture Planar Hairline-fracture
185.0	N334	81	Fracture Planar Hairline-fracture
188.4	N026	24	Fracture Planar Hairline-fracture
188.4	N197	46	Fracture Planar Hairline-fracture
190.4	N249	66	Fracture Planar Hairline-fracture
193.6	N267	53	Fracture Planar Hairline-fracture
195.2	N155	38	Fracture Planar Hairline-fracture
196.4	N271	62	Fracture Planar Hairline-fracture
197.5	N270	57	Fracture Planar Hairline-fracture

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DIP DATA INTERPRETATION
RGLDIP vsn 6.2
FRACTURE ANALYSIS STEREOGRAMS

AECOM

Borehole: B-102

VAIL DAM

top of borehole.....
East:_
North:
Elev:_

North ref: true
Depth units are feet

Zone from 198.024 to 28.590ft
Mean dip format: dip-azimuth and dip

Interpretation 1

Dip data sets .....
BHTV dips

B-102
Zone 0. 28.590 - 198.014ft
Deviation 0.70 N122.00

dipdata sets.....
BHTV dips

	mean dip	n	f
N063 19	N063 19	74	0.46
N260 71	N260 71	42	0.73
N137 47	N137 47	9	(0.08)

intersections

	N063 19	N260 71	N137 47
N063 19		05 N348	19 N066
N260 71	05 N348		36 N184
N137 47	19 N066	36 N184	

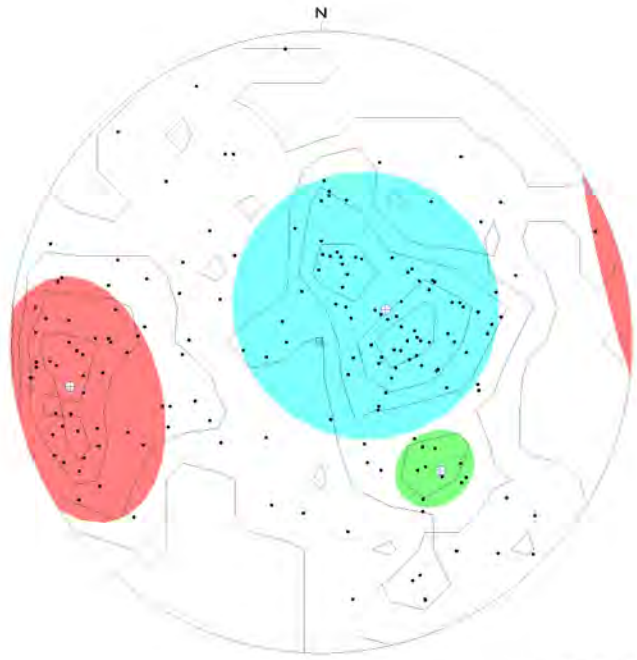


Figure 9. Boring B-102, Acoustic Stereonet Diagram

GEOVision geophysical services

DIP DATA INTERPRETATION
RGLDIP vsn 6.2
DIP-AZIMUTH, FRACTURE ROSE-DIAGRAM

AECOM

Borehole: B-102

VAIL DAM

top of borehole.....
East:_
North:
Alt: _

North ref. is true
Depth units are feet

Zone from 198.024 to 28.590ft

Interpretation 1

Dip data sets .....
BHTV dips

B-102
28.590 - 198.024ft
Dip-azimuth, fracture rose-diagram

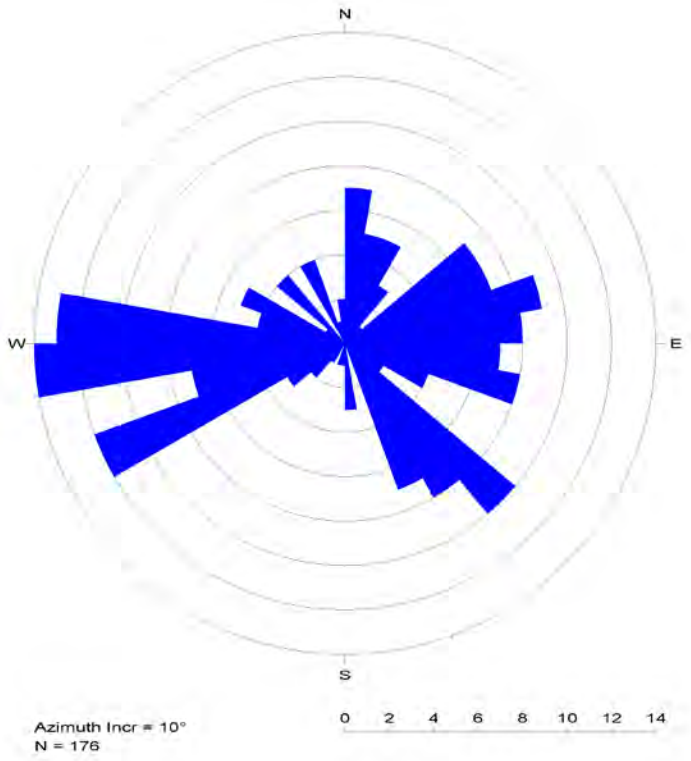


Figure 10. Boring B-102, Acoustic Rose Diagram

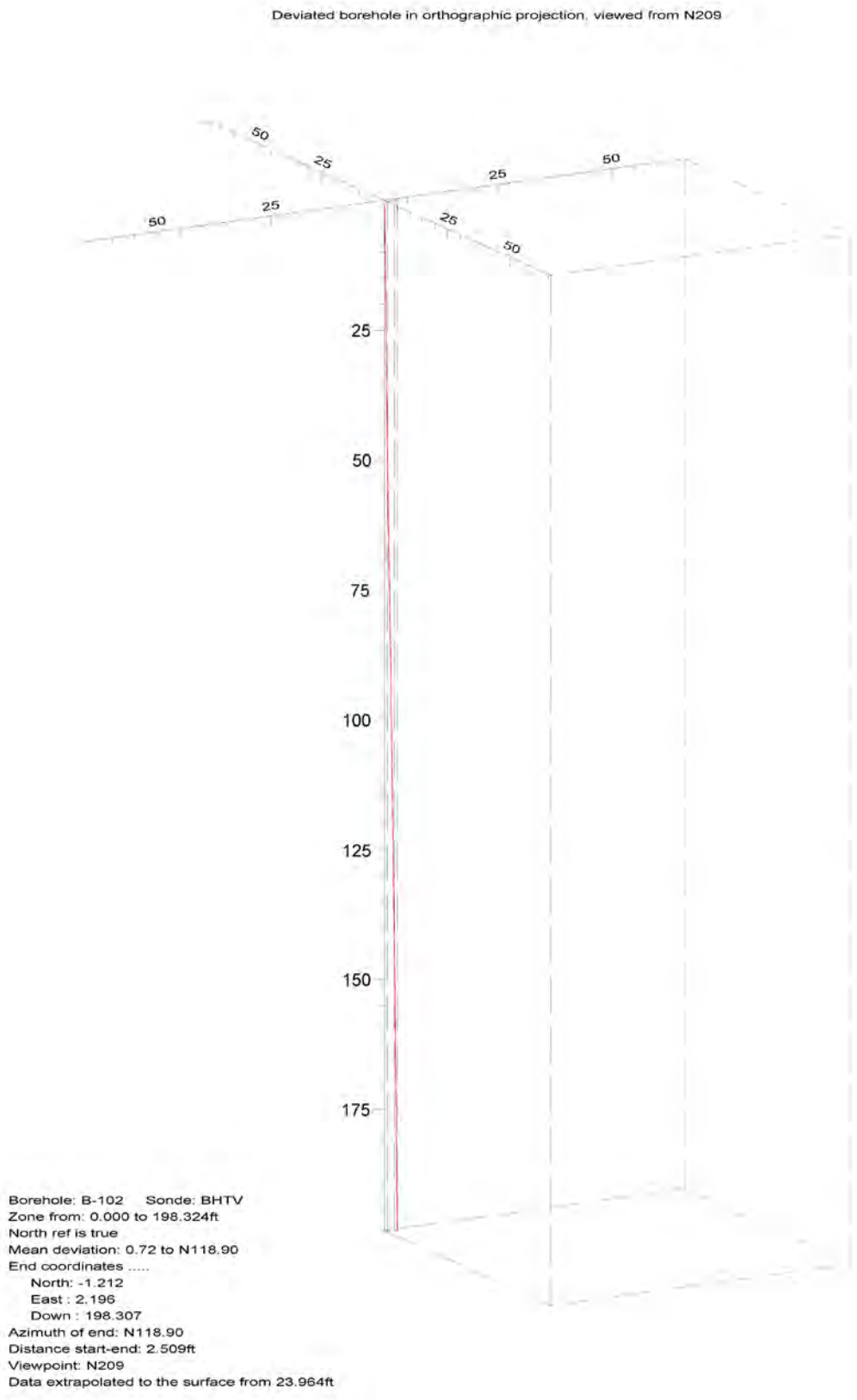


Figure 11. Boring B-102, Acoustic Deviation Projection

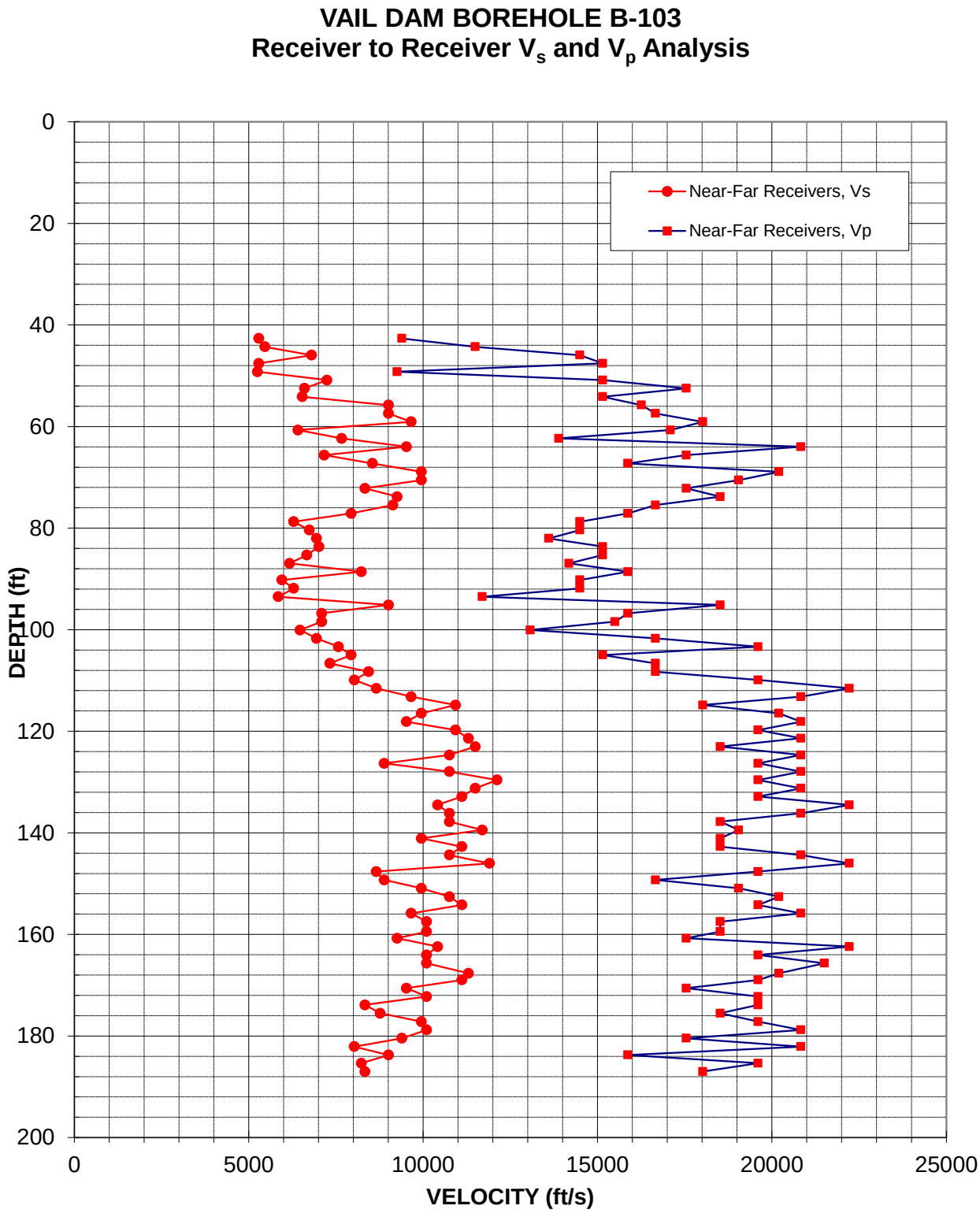


Figure 12: Boring B-103 Suspension R1-R2 P- and S_H-wave velocities

Table 7. Boring B-103 Suspension R1-R2 depths and P- and S_H-wave velocities

Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio Based on Receiver-to-Receiver Travel Time Data - Borehole B-103

American Units				Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio	Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V_s	V_p			V_s	V_p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
42.7	5290	9390	0.27	13.0	1610	2860	0.27
44.3	5460	11490	0.35	13.5	1670	3500	0.35
45.9	6800	14490	0.36	14.0	2070	4420	0.36
47.6	5290	15150	0.43	14.5	1610	4620	0.43
49.2	5250	9260	0.26	15.0	1600	2820	0.26
50.9	7250	15150	0.35	15.5	2210	4620	0.35
52.5	6600	17540	0.42	16.0	2010	5350	0.42
54.1	6540	15150	0.39	16.5	1990	4620	0.39
55.8	9010	16260	0.28	17.0	2750	4960	0.28
57.4	9010	16670	0.29	17.5	2750	5080	0.29
59.1	9660	18020	0.30	18.0	2940	5490	0.30
60.7	6410	17090	0.42	18.5	1950	5210	0.42
62.3	7660	13890	0.28	19.0	2340	4230	0.28
64.0	9520	20830	0.37	19.5	2900	6350	0.37
65.6	7170	17540	0.40	20.0	2180	5350	0.40
67.3	8550	15870	0.30	20.5	2610	4840	0.30
68.9	9950	20200	0.34	21.0	3030	6160	0.34
70.5	9950	19050	0.31	21.5	3030	5810	0.31
72.2	8330	17540	0.35	22.0	2540	5350	0.35
73.8	9260	18520	0.33	22.5	2820	5640	0.33
75.5	9130	16670	0.29	23.0	2780	5080	0.29
77.1	7940	15870	0.33	23.5	2420	4840	0.33
78.7	6290	14490	0.38	24.0	1920	4420	0.38
80.4	6730	14490	0.36	24.5	2050	4420	0.36
82.0	6940	13610	0.32	25.0	2120	4150	0.32
83.7	7020	15150	0.36	25.5	2140	4620	0.36
85.3	6670	15150	0.38	26.0	2030	4620	0.38
86.9	6170	14180	0.38	26.5	1880	4320	0.38
88.6	8230	15870	0.32	27.0	2510	4840	0.32
90.2	5950	14490	0.40	27.5	1810	4420	0.40
91.9	6290	14490	0.38	28.0	1920	4420	0.38
93.5	5850	11700	0.33	28.5	1780	3560	0.33
95.1	9010	18520	0.34	29.0	2750	5640	0.34
96.8	7090	15870	0.38	29.5	2160	4840	0.38
98.4	7090	15500	0.37	30.0	2160	4730	0.37
100.1	6470	13070	0.34	30.5	1970	3980	0.34
101.7	6940	16670	0.39	31.0	2120	5080	0.39
103.4	7580	19610	0.41	31.5	2310	5980	0.41

Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio Based on Receiver-to-Receiver Travel Time Data - Borehole B-103

American Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V_s	V_p	
(ft)	(ft/s)	(ft/s)	
105.0	7940	15150	0.31
106.6	7330	16670	0.38
108.3	8440	16670	0.33
109.9	8030	19610	0.40
111.6	8660	22220	0.41
113.2	9660	20830	0.36
114.8	10930	18020	0.21
116.5	9950	20200	0.34
118.1	9520	20830	0.37
119.8	10930	19610	0.27
121.4	11300	20830	0.29
123.0	11490	18520	0.19
124.7	10750	20830	0.32
126.3	8890	19610	0.37
128.0	10750	20830	0.32
129.6	12120	19610	0.19
131.2	11490	20830	0.28
132.9	11110	19610	0.26
134.5	10420	22220	0.36
136.2	10750	20830	0.32
137.8	10750	18520	0.25
139.4	11700	19050	0.20
141.1	9950	18520	0.30
142.7	11110	18520	0.22
144.4	10750	20830	0.32
146.0	11900	22220	0.30
147.6	8660	19610	0.38
149.3	8890	16670	0.30
150.9	9950	19050	0.31
152.6	10750	20200	0.30
154.2	11110	19610	0.26
155.8	9660	20830	0.36
157.5	10100	18520	0.29
159.5	10100	18520	0.29
160.8	9260	17540	0.31
162.4	10420	22220	0.36
164.0	10100	19610	0.32
165.7	10100	21510	0.36
167.7	11300	20200	0.27

Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V_s	V_p	
(m)	(m/s)	(m/s)	
32.0	2420	4620	0.31
32.5	2230	5080	0.38
33.0	2570	5080	0.33
33.5	2450	5980	0.40
34.0	2640	6770	0.41
34.5	2940	6350	0.36
35.0	3330	5490	0.21
35.5	3030	6160	0.34
36.0	2900	6350	0.37
36.5	3330	5980	0.27
37.0	3440	6350	0.29
37.5	3500	5640	0.19
38.0	3280	6350	0.32
38.5	2710	5980	0.37
39.0	3280	6350	0.32
39.5	3690	5980	0.19
40.0	3500	6350	0.28
40.5	3390	5980	0.26
41.0	3180	6770	0.36
41.5	3280	6350	0.32
42.0	3280	5640	0.25
42.5	3560	5810	0.20
43.0	3030	5640	0.30
43.5	3390	5640	0.22
44.0	3280	6350	0.32
44.5	3630	6770	0.30
45.0	2640	5980	0.38
45.5	2710	5080	0.30
46.0	3030	5810	0.31
46.5	3280	6160	0.30
47.0	3390	5980	0.26
47.5	2940	6350	0.36
48.0	3080	5640	0.29
48.6	3080	5640	0.29
49.0	2820	5350	0.31
49.5	3180	6770	0.36
50.0	3080	5980	0.32
50.5	3080	6550	0.36
51.1	3440	6160	0.27

Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole B-103

American Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V_s	V_p	
(ft)	(ft/s)	(ft/s)	
169.0	11110	19610	0.26
170.6	9520	17540	0.29
172.2	10100	19610	0.32
173.9	8330	19610	0.39
175.5	8770	18520	0.36
177.2	9950	19610	0.33
178.8	10100	20830	0.35
180.5	9390	17540	0.30
182.1	8030	20830	0.41
183.7	9010	15870	0.26
185.4	8230	19610	0.39
187.0	8330	18020	0.36

Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V_s	V_p	
(m)	(m/s)	(m/s)	
51.5	3390	5980	0.26
52.0	2900	5350	0.29
52.5	3080	5980	0.32
53.0	2540	5980	0.39
53.5	2670	5640	0.36
54.0	3030	5980	0.33
54.5	3080	6350	0.35
55.0	2860	5350	0.30
55.5	2450	6350	0.41
56.0	2750	4840	0.26
56.5	2510	5980	0.39
57.0	2540	5490	0.36

Table 8. Boring B-103, Acoustic Televiewer Feature depth, dip azimuth, dip and description

Depth (feet)	Dip azimuth	Dip	Structure description
42.4	N322	57	Fracture Planar Hairline-fracture
43.1	N125	14	Fracture Planar Hairline-fracture
44.3	N080	47	Fracture Planar Hairline-fracture
44.9	N123	26	Fracture Planar Hairline-fracture
45.5	N250	41	Fracture Planar Hairline-fracture
45.8	N303	79	Fracture Discontinuous Hairline-fracture
46.0	N197	39	Fracture Planar Hairline-fracture
46.1	N186	20	Fracture Planar Open-fracture
46.3	N286	69	Fracture Discontinuous Open-fracture
46.6	N179	18	Fracture Planar Hairline-fracture
47.0	N280	74	Fracture Planar Hairline-fracture
47.1	N308	39	Fracture Planar Hairline-fracture
47.4	N082	53	Fracture Planar Hairline-fracture
49.3	N285	37	Fracture Irregular Hairline-fracture
49.6	N219	49	Fracture Planar Hairline-fracture
52.2	N206	33	Fracture Planar Hairline-fracture
52.6	N285	76	Planar Laminated-structure
54.8	N003	13	Fracture Planar Hairline-fracture
55.9	N257	67	Fracture Planar Hairline-fracture
57.7	N130	9	Fracture Planar Hairline-fracture
60.9	N196	19	Fracture Planar Hairline-fracture
61.0	N173	18	Fracture Planar Hairline-fracture
61.5	N206	27	Fracture Planar Hairline-fracture
62.4	N151	19	Fracture Planar Hairline-fracture
62.5	N258	72	Fracture Planar Hairline-fracture
63.1	N264	75	Fracture Planar Hairline-fracture
64.6	N268	73	Fracture Planar Hairline-fracture
65.5	N249	42	Fracture Planar Hairline-fracture
65.6	N128	19	Fracture Planar Hairline-fracture
65.9	N215	42	Fracture Planar Hairline-fracture
67.5	N096	38	Fracture Planar Hairline-fracture
68.5	N257	51	Fracture Planar Hairline-fracture
68.6	N001	70	Fracture Planar Hairline-fracture
69.3	N021	37	Fracture Discontinuous Open-fracture
70.9	N189	84	Fracture Planar Hairline-fracture
71.2	N098	20	Fracture Planar Hairline-fracture
71.2	N322	85	Fracture Irregular Hairline-fracture
71.5	N318	80	Fracture Irregular Hairline-fracture

Depth (feet)	Dip azimuth	Dip	Structure description
72.3	N183	16	Fracture Planar Hairline-fracture
73.6	N260	80	Fracture Planar Hairline-fracture
73.6	N223	73	Fracture Planar Hairline-fracture
73.9	N015	43	Fracture Planar Hairline-fracture
74.2	N241	76	Fracture Planar Hairline-fracture
74.4	N168	37	Fracture Planar Hairline-fracture
74.7	N183	47	Fracture Planar Hairline-fracture
75.1	N012	57	Fracture Planar Hairline-fracture
75.5	N138	10	Fracture Planar Hairline-fracture
75.8	N152	21	Fracture Planar Hairline-fracture
76.0	N046	69	Fracture Planar Hairline-fracture
76.1	N189	26	Fracture Planar Hairline-fracture
76.3	N177	23	Fracture Planar Hairline-fracture
77.0	N333	71	Fracture Planar Hairline-fracture
77.4	N150	20	Fracture Planar Hairline-fracture
78.1	N354	80	Fracture Planar Hairline-fracture
78.3	N173	24	Fracture Planar Hairline-fracture
79.2	N161	26	Fracture Planar Hairline-fracture
79.3	N199	47	Fracture Planar Hairline-fracture
79.4	N003	83	Fracture Planar Hairline-fracture
79.6	N008	33	Fracture Planar Hairline-fracture
79.8	N180	36	Fracture Planar Hairline-fracture
80.2	N304	17	Fracture Planar Hairline-fracture
80.7	N036	84	Fracture Planar Hairline-fracture
81.2	N183	44	Fracture Planar Hairline-fracture
81.4	N342	81	Fracture Irregular Hairline-fracture
81.8	N171	47	Fracture Irregular Hairline-fracture
82.6	N184	88	Fracture Planar Hairline-fracture
82.7	N240	83	Fracture Planar Hairline-fracture
83.1	N190	38	Fracture Planar Hairline-fracture
83.3	N002	81	Fracture Planar Hairline-fracture
83.7	N072	68	Fracture Planar Hairline-fracture
83.9	N177	40	Fracture Planar Hairline-fracture
84.4	N180	44	Fracture Planar Open-fracture
84.7	N119	42	Fracture Planar Open-fracture
84.9	N115	59	Fracture Planar Hairline-fracture
85.4	N266	81	Fracture Planar Hairline-fracture
85.5	N124	82	Fracture Planar Hairline-fracture
86.0	N284	81	Fracture Planar Hairline-fracture

Depth (feet)	Dip azimuth	Dip	Structure description
87.3	N254	66	Fracture Planar Hairline-fracture
87.4	N258	81	Fracture Planar Hairline-fracture
88.0	N262	65	Fracture Planar Hairline-fracture
88.2	N318	12	Fracture Planar Hairline-fracture
88.7	N261	76	Fracture Planar Hairline-fracture
89.3	N054	83	Fracture Planar Hairline-fracture
89.8	N050	32	Fracture Planar Hairline-fracture
90.0	N002	87	Fracture Planar Hairline-fracture
90.4	N279	16	Fracture Planar Hairline-fracture
90.4	N281	60	Fracture Planar Hairline-fracture
91.2	N277	41	Fracture Planar Hairline-fracture
91.4	N084	68	Fracture Planar Hairline-fracture
91.5	N196	79	Fracture Planar Hairline-fracture
91.6	N286	41	Fracture Planar Hairline-fracture
92.2	N286	38	Fracture Planar Hairline-fracture
92.4	N097	86	Fracture Planar Hairline-fracture
92.6	N304	19	Fracture Planar Hairline-fracture
93.8	N023	67	Fracture Planar Hairline-fracture
94.0	N194	80	Fracture Planar Hairline-fracture
94.5	N097	82	Fracture Planar Hairline-fracture
94.9	N351	83	Fracture Planar Hairline-fracture
96.4	N285	68	Fracture Planar Hairline-fracture
96.4	N111	39	Fracture Planar Hairline-fracture
96.8	N031	55	Fracture Planar Hairline-fracture
97.3	N079	70	Fracture Planar Hairline-fracture
97.8	N044	53	Fracture Planar Hairline-fracture
98.0	N159	77	Fracture Planar Hairline-fracture
98.2	N026	60	Fracture Planar Hairline-fracture
99.0	N281	64	Fracture Planar Hairline-fracture
99.9	N297	81	Fracture Discontinuous Open-fracture
100.3	N284	79	Fracture Discontinuous Open-fracture
101.8	N325	79	Fracture Discontinuous Open-fracture
102.8	N263	65	Fracture Discontinuous Open-fracture
104.2	N040	62	Fracture Planar Hairline-fracture
105.1	N173	38	Fracture Planar Hairline-fracture
105.5	N354	82	Fracture Planar Hairline-fracture
105.9	N316	63	Fracture Planar Hairline-fracture
105.9	N349	79	Fracture Planar Hairline-fracture
107.4	N358	83	Fracture Planar Hairline-fracture

Depth (feet)	Dip azimuth	Dip	Structure description
108.2	N142	39	Fracture Planar Hairline-fracture
109.0	N339	79	Fracture Planar Hairline-fracture
109.3	N348	80	Fracture Planar Hairline-fracture
109.5	N080	48	Fracture Planar Hairline-fracture
111.3	N161	47	Fracture Planar Hairline-fracture
112.1	N090	23	Fracture Planar Hairline-fracture
112.7	N251	27	Fracture Planar Hairline-fracture
114.8	N007	30	Fracture Planar Hairline-fracture
117.0	N182	7	Fracture Planar Hairline-fracture
117.6	N122	28	Fracture Planar Hairline-fracture
118.1	N119	16	Fracture Planar Hairline-fracture
119.3	N166	48	Fracture Planar Hairline-fracture
120.3	N171	13	Fracture Planar Hairline-fracture
124.0	N097	44	Fracture Planar Hairline-fracture
125.4	N118	20	Fracture Planar Hairline-fracture
125.8	N126	20	Fracture Planar Hairline-fracture
127.5	N189	26	Fracture Planar Hairline-fracture
128.2	N053	33	Fracture Planar Hairline-fracture
130.3	N040	37	Fracture Planar Hairline-fracture
131.6	N042	35	Fracture Planar Hairline-fracture
131.6	N244	59	Fracture Planar Hairline-fracture
132.9	N026	55	Fracture Planar Hairline-fracture
133.3	N112	22	Fracture Planar Hairline-fracture
133.6	N259	72	Planar Laminated-structure
133.9	N244	71	Planar Laminated-structure
134.8	N266	74	Planar Laminated-structure
135.7	N140	75	Fracture Discontinuous Hairline-fracture
135.9	N177	23	Fracture Planar Hairline-fracture
136.2	N322	22	Fracture Planar Hairline-fracture
137.1	N039	18	Fracture Planar Hairline-fracture
138.1	N045	38	Fracture Planar Hairline-fracture
139.6	N243	79	Fracture Planar Hairline-fracture
141.0	N258	81	Fracture Discontinuous Hairline-fracture
141.6	N265	64	Fracture Planar Hairline-fracture
142.5	N038	31	Fracture Planar Hairline-fracture
143.0	N029	53	Fracture Planar Hairline-fracture
143.4	N326	42	Fracture Planar Hairline-fracture
143.6	N216	76	Fracture Discontinuous Hairline-fracture
143.6	N220	84	Fracture Discontinuous Hairline-fracture

Depth (feet)	Dip azimuth	Dip	Structure description
144.6	N274	84	Planar Laminated-structure
144.6	N222	72	Fracture Planar Hairline-fracture
144.7	N242	50	Fracture Planar Hairline-fracture
145.6	N259	79	Planar Laminated-structure
147.2	N118	66	Fracture Planar Hairline-fracture
148.2	N002	9	Fracture Planar Hairline-fracture
150.7	N201	60	Fracture Planar Hairline-fracture
155.6	N038	24	Fracture Planar Hairline-fracture
157.1	N007	23	Fracture Planar Hairline-fracture
157.8	N145	15	Planar Laminated-structure
159.2	N036	23	Fracture Planar Hairline-fracture
159.9	N222	51	Fracture Planar Hairline-fracture
162.4	N150	29	Fracture Planar Hairline-fracture
166.4	N086	18	Fracture Planar Hairline-fracture
167.9	N206	59	Fracture Planar Hairline-fracture
168.0	N205	71	Fracture Planar Hairline-fracture
169.0	N193	63	Fracture Planar Hairline-fracture
169.5	N072	23	Fracture Planar Hairline-fracture
169.8	N193	69	Fracture Planar Hairline-fracture
170.1	N043	22	Fracture Planar Hairline-fracture
172.3	N262	77	Fracture Irregular Hairline-fracture
173.6	N178	43	Fracture Planar Hairline-fracture
173.6	N288	56	Fracture Planar Hairline-fracture
174.0	N159	29	Fracture Planar Hairline-fracture
174.6	N180	71	Fracture Planar Hairline-fracture
175.0	N046	29	Fracture Planar Hairline-fracture
175.8	N346	64	Fracture Planar Hairline-fracture
178.2	N275	66	Fracture Planar Hairline-fracture
179.5	N027	60	Fracture Planar Hairline-fracture
179.6	N188	53	Fracture Planar Hairline-fracture
181.3	N207	69	Fracture Planar Hairline-fracture
181.7	N261	74	Planar Lithological-banding
182.9	N071	22	Fracture Planar Hairline-fracture
183.9	N137	48	Fracture Planar Hairline-fracture
185.4	N289	71	Planar Laminated-structure
186.7	N262	74	Fracture Planar Open-fracture
186.8	N022	78	Fracture Discontinuous Hairline-fracture
188.1	N136	45	Fracture Planar Hairline-fracture
190.9	N314	61	Fracture Planar Hairline-fracture

Depth (feet)	Dip azimuth	Dip	Structure description
194.8	N161	30	Fracture Planar Hairline-fracture
195.8	N153	51	Fracture Discontinuous Hairline-fracture
196.1	N141	41	Fracture Planar Hairline-fracture
197.8	N239	84	Fracture Planar Hairline-fracture
198.1	N334	82	Fracture Planar Hairline-fracture
199.4	N104	57	Fracture Planar Hairline-fracture
199.7	N137	41	Fracture Planar Hairline-fracture
199.7	N241	69	Fracture Planar Hairline-fracture
200.0	N200	61	Fracture Planar Hairline-fracture

GEOVision geophysical services

DIP DATA INTERPRETATION
RGLDIP vsn 6.2
FRACTURE ANALYSIS STEREOGRAMS

AECOM

Borehole: B-103

VAIL DAM

top of borehole.....
East:_
North:
Elev:_

North ref: true
Depth units are feet

Zone from 200.000 to 41.916ft
Mean dip format: dip-azimuth and dip

Interpretation 1

Dip data sets .....
BHTV dips

B-103
Zone 0. 41.916 - 200.000ft
Deviation 0.60 N141.50

dipdata sets.....
BHTV dips

	mean dip	n	f
N161 25	N161 25	51	0.36
N043 29	N043 29	11	(0.08)
N269 73	N269 73	30	0.62
N352 79	N352 79	14	(0.46)

intersections

	N161 25	N043 29	N269 73	N352 79
N161 25		15 N105	23 N186	05 N081
N043 29	15 N105		20 N353	25 N077
N269 73	23 N186	20 N353		71 N296
N352 79	05 N081	25 N077	71 N296	

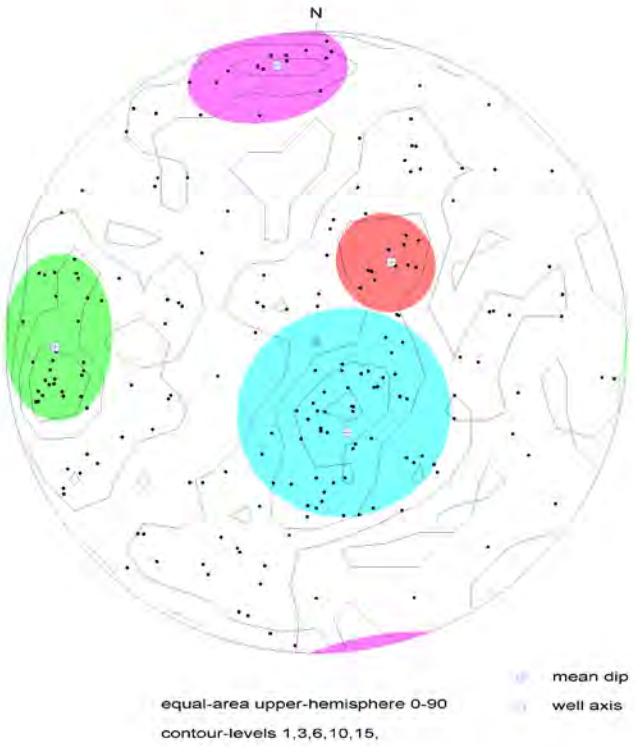


Figure 13. Boring B-103, Acoustic Stereonet Diagram

GEOVision geophysical services

DIP DATA INTERPRETATION
RGLDIP vsn 6.2
DIP-AZIMUTH, FRACTURE ROSE-DIAGRAM

AECOM

Borehole: B-103

VAIL DAM

top of borehole.....
East:_
North:
Alt: _

North ref. is true
Depth units are feet

Zone from 200.000 to 41.916ft

Interpretation 1

Dip data sets .....
BHTV dips

B-103
41.916 - 200.000ft
Dip-azimuth, fracture rose-diagram

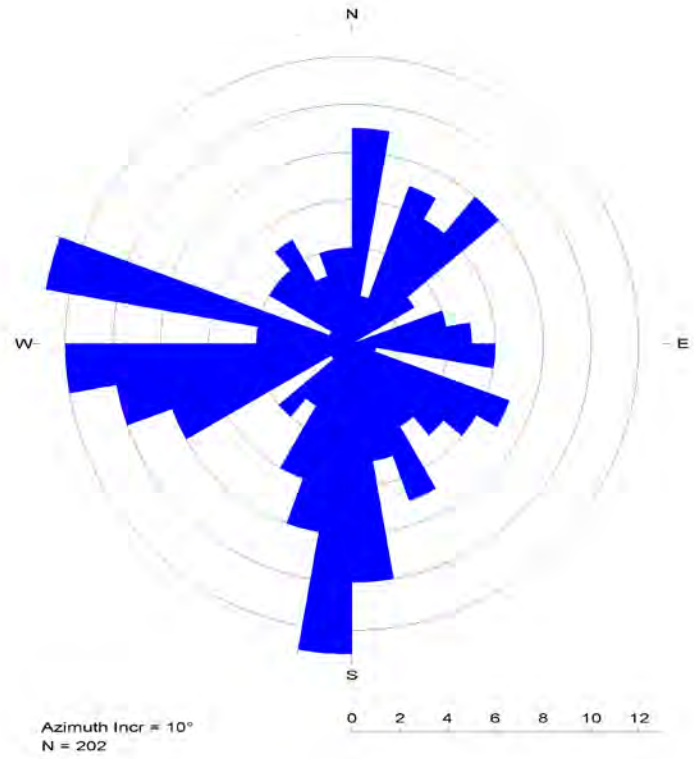


Figure 14. Boring B-103, Acoustic Rose Diagram

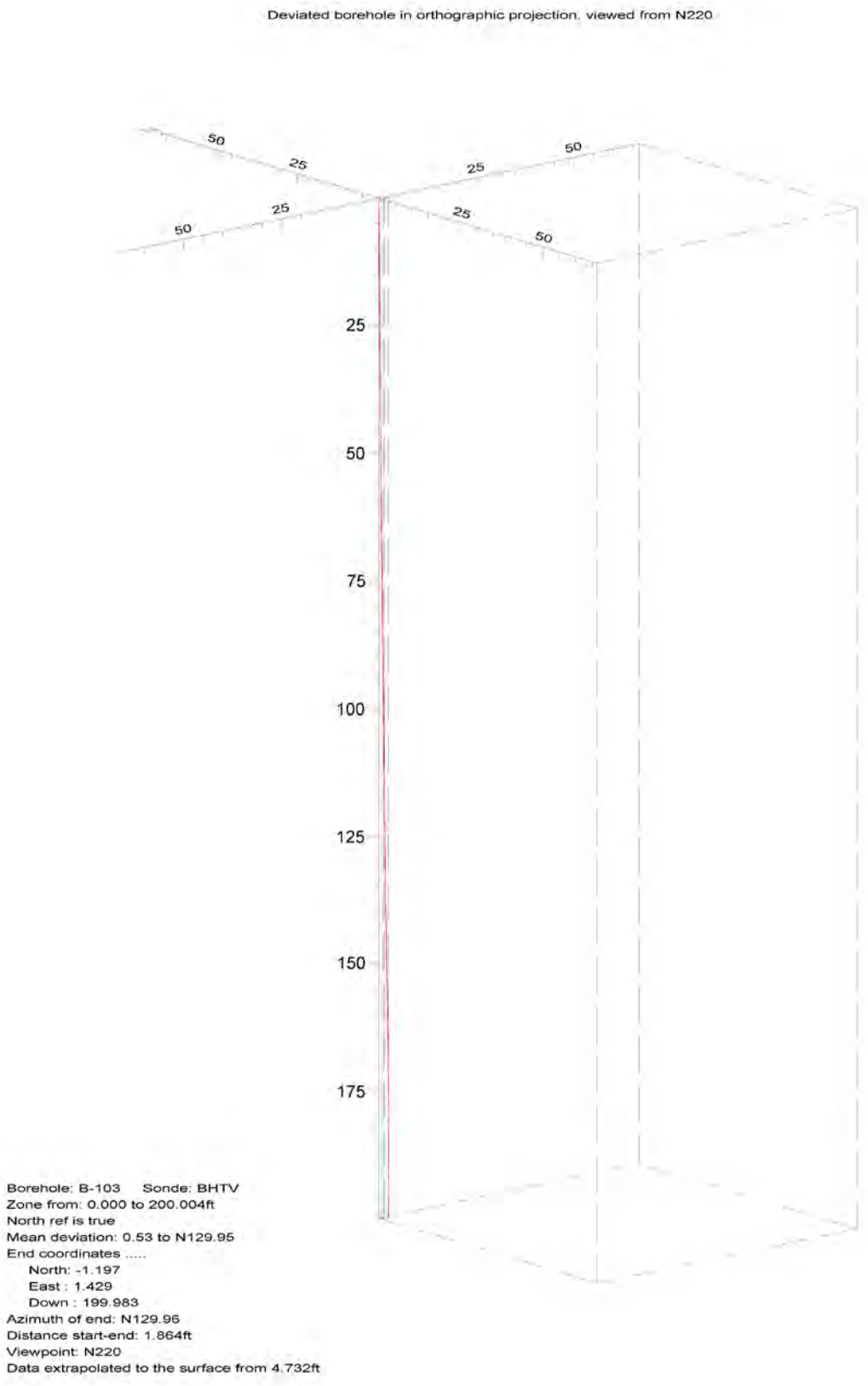


Figure 15. Boring B-103, Acoustic Deviation Projection

Table 9. Boring B-104, Acoustic Televiewer Feature depth, dip azimuth, dip and description

Depth (feet)	Dip azimuth	Dip	Structure description
10.4	N231	67	Fracture Planar Hairline-fracture
12.6	N236	76	Fracture Planar Open-fracture
13.3	N230	74	Fracture Planar Hairline-fracture
13.7	N032	22	Fracture Planar Hairline-fracture
14.3	N236	62	Fracture Planar Hairline-fracture
15.7	N254	80	Planar Laminated-structure
17.6	N250	63	Fracture Planar Hairline-fracture
18.2	N007	34	Fracture Planar Hairline-fracture
18.5	N007	25	Fracture Planar Hairline-fracture
18.5	N057	35	Fracture Planar Hairline-fracture
20.8	N072	79	Planar Laminated-structure
21.4	N027	33	Fracture Planar Hairline-fracture
21.9	N059	49	Fracture Planar Hairline-fracture
22.2	N301	87	Fracture Planar Hairline-fracture
22.9	N180	56	Fracture Planar Hairline-fracture
23.4	N198	23	Fracture Planar Hairline-fracture
26.0	N342	23	Fracture Planar Hairline-fracture
27.2	N008	30	Fracture Planar Hairline-fracture
28.5	N357	33	Fracture Planar Hairline-fracture
30.6	N134	80	Fracture Planar Hairline-fracture
31.0	N024	46	Fracture Planar Hairline-fracture
31.5	N047	53	Fracture Planar Hairline-fracture
31.6	N021	13	Fracture Planar Hairline-fracture
34.3	N063	68	Fracture Planar Hairline-fracture
34.8	N347	31	Fracture Planar Hairline-fracture
35.4	N341	27	Fracture Planar Hairline-fracture
35.4	N239	72	Fracture Planar Hairline-fracture
35.5	N057	49	Fracture Planar Hairline-fracture
38.3	N190	26	Planar Laminated-structure
40.4	N084	78	Planar Laminated-structure
41.3	N357	59	Fracture Planar Hairline-fracture
41.8	N072	62	Planar Laminated-structure
42.5	N059	56	Planar Laminated-structure
44.5	N069	76	Planar Laminated-structure
47.5	N184	70	Fracture Planar Hairline-fracture
48.5	N002	43	Fracture Planar Hairline-fracture
49.2	N013	59	Planar Laminated-structure
49.4	N125	67	Fracture Planar Hairline-fracture

Depth (feet)	Dip azimuth	Dip	Structure description
50.2	N001	23	Fracture Planar Hairline-fracture
51.2	N316	79	Fracture Irregular Hairline-fracture
51.5	N132	86	Fracture Irregular Hairline-fracture
52.7	N287	23	Fracture Planar Hairline-fracture
54.3	N052	79	Planar Laminated-structure
54.7	N288	64	Fracture Discontinuous Hairline-fracture
55.7	N315	26	Fracture Planar Hairline-fracture
56.0	N150	45	Fracture Discontinuous Hairline-fracture
57.7	N265	60	Fracture Planar Hairline-fracture
58.8	N067	72	Planar Laminated-structure
59.5	N100	21	Fracture Planar Hairline-fracture
60.7	N152	54	Fracture Planar Hairline-fracture
61.2	N043	55	Fracture Planar Hairline-fracture
61.4	N052	73	Irregular Laminated-structure
62.2	N042	65	Irregular Laminated-structure
63.6	N343	68	Fracture Planar Hairline-fracture
65.0	N200	82	Fracture Irregular Hairline-fracture
65.2	N007	40	Fracture Planar Hairline-fracture
65.6	N023	34	Fracture Planar Hairline-fracture
67.2	N263	71	Irregular Laminated-structure
67.9	N053	45	Fracture Planar Hairline-fracture
70.1	N167	30	Fracture Planar Hairline-fracture
71.2	N043	49	Fracture Planar Hairline-fracture
71.9	N351	28	Fracture Planar Hairline-fracture
73.7	N065	68	Fracture Planar Hairline-fracture
73.9	N249	77	Fracture Planar Hairline-fracture
74.1	N352	35	Fracture Planar Hairline-fracture
75.6	N063	80	Planar Laminated-structure
76.2	N019	51	Fracture Planar Hairline-fracture
76.4	N071	80	Planar Laminated-structure
77.9	N295	30	Fracture Planar Hairline-fracture
78.5	N024	42	Fracture Planar Hairline-fracture
80.2	N262	72	Fracture Planar Hairline-fracture
80.4	N127	36	Fracture Planar Hairline-fracture
81.2	N316	39	Fracture Planar Hairline-fracture
81.6	N347	38	Fracture Planar Hairline-fracture
81.8	N063	77	Fracture Discontinuous Hairline-fracture
83.7	N021	41	Fracture Planar Hairline-fracture
85.8	N223	29	Fracture Planar Hairline-fracture

Depth (feet)	Dip azimuth	Dip	Structure description
86.6	N001	56	Fracture Planar Hairline-fracture
86.6	N141	39	Fracture Planar Hairline-fracture
87.0	N355	43	Fracture Planar Hairline-fracture
87.8	N322	66	Fracture Planar Hairline-fracture
88.7	N050	73	Fracture Irregular Hairline-fracture
89.7	N295	48	Fracture Planar Hairline-fracture
90.3	N085	64	Fracture Irregular Hairline-fracture
91.7	N081	54	Fracture Irregular Hairline-fracture
92.5	N255	69	Fracture Discontinuous Hairline-fracture
93.3	N245	87	Fracture Irregular Hairline-fracture
93.5	N234	69	Fracture Discontinuous Hairline-fracture
95.1	N309	37	Fracture Discontinuous Hairline-fracture
96.7	N247	19	Fracture Planar Hairline-fracture
98.0	N220	34	Planar Laminated-structure
98.1	N209	25	Fracture Planar Hairline-fracture
98.6	N239	73	Fracture Planar Hairline-fracture
99.8	N047	60	Fracture Planar Hairline-fracture
101.0	N001	34	Fracture Planar Hairline-fracture
101.7	N017	31	Fracture Planar Hairline-fracture
102.7	N171	25	Fracture Planar Hairline-fracture
103.0	N174	28	Fracture Planar Hairline-fracture
104.3	N233	15	Fracture Planar Hairline-fracture
105.8	N257	61	Fracture Discontinuous Hairline-fracture
106.5	N246	69	Planar Laminated-structure
107.0	N271	48	Planar Laminated-structure
107.1	N247	84	Fracture Discontinuous Hairline-fracture
108.0	N251	58	Fracture Planar Hairline-fracture
108.7	N255	73	Fracture Discontinuous Hairline-fracture
108.9	N244	83	Planar Laminated-structure
110.3	N190	32	Fracture Planar Hairline-fracture
110.9	N129	67	Fracture Planar Hairline-fracture
111.5	N131	70	Fracture Planar Hairline-fracture
111.9	N292	58	Fracture Planar Hairline-fracture
112.4	N251	47	Fracture Planar Hairline-fracture
112.6	N252	72	Fracture Planar Hairline-fracture
112.8	N284	65	Fracture Planar Hairline-fracture
113.2	N320	30	Fracture Planar Hairline-fracture
113.3	N140	66	Fracture Planar Hairline-fracture
113.6	N331	29	Fracture Planar Hairline-fracture

Depth (feet)	Dip azimuth	Dip	Structure description
114.1	N240	18	Fracture Planar Hairline-fracture
114.5	N264	72	Fracture Planar Hairline-fracture
115.9	N204	21	Fracture Planar Hairline-fracture
116.2	N137	82	Fracture Discontinuous Hairline-fracture
117.8	N264	22	Fracture Planar Hairline-fracture
120.0	N045	31	Fracture Discontinuous Hairline-fracture
121.0	N349	61	Fracture Discontinuous Hairline-fracture
121.0	N132	82	Fracture Discontinuous Hairline-fracture
122.3	N111	71	Fracture Discontinuous Hairline-fracture
123.4	N174	82	Fracture Discontinuous Hairline-fracture
125.2	N138	13	Fracture Irregular Hairline-fracture
125.9	N180	85	Fracture Discontinuous Hairline-fracture
127.0	N068	35	Fracture Irregular Hairline-fracture
127.6	N357	84	Fracture Irregular Hairline-fracture
129.4	N356	85	Fracture Irregular Hairline-fracture
129.9	N147	47	Fracture Discontinuous Hairline-fracture
132.8	N170	77	Fracture Planar Hairline-fracture
133.3	N239	79	Fracture Planar Hairline-fracture
135.7	N190	25	Fracture Planar Hairline-fracture
137.7	N212	27	Fracture Discontinuous Hairline-fracture
139.7	N262	77	Fracture Discontinuous Hairline-fracture
139.7	N131	17	Fracture Discontinuous Hairline-fracture
139.8	N177	61	Fracture Discontinuous Hairline-fracture
140.9	N245	73	Planar Laminated-structure
141.0	N137	25	Fracture Discontinuous Hairline-fracture
142.0	N158	54	Fracture Discontinuous Hairline-fracture
142.5	N308	12	Fracture Planar Hairline-fracture
142.8	N244	85	Fracture Discontinuous Hairline-fracture
142.8	N239	72	Planar Laminated-structure
144.9	N255	69	Fracture Discontinuous Hairline-fracture
146.4	N257	86	Fracture Discontinuous Hairline-fracture
146.5	N071	59	Fracture Discontinuous Hairline-fracture
147.0	N071	84	Fracture Discontinuous Hairline-fracture

GEOVision geophysical services

DIP DATA INTERPRETATION
RGLDIP vsn 6.2
FRACTURE ANALYSIS STEREOGRAMS

AECOM

Borehole: B-104

VAIL DAM

top of borehole.....
East:_
North:
Elev:_

North ref: true
Depth units are feet

Zone from 147.508 to 9.919ft
Mean dip format: dip-azimuth and dip

Interpretation 1

Dip data sets .....
BHTV dips

B-104
Zone 0. 9.919 - 147.498ft
Deviation 0.20 N297.90

dipdata sets.....
BHTV dips

	mean dip	n	f
N003 32	N003 32	22	0.19
N064 77	N064 77	12	(0.39)
N248 73	N248 73	28	0.68
N208 24	N208 24	11	(0.09)

intersections

	N003 32	N064 77	N248 73	N208 24
N003 32		30 N342	27 N329	06 N283
N064 77	30 N342		07 N336	14 N151
N248 73	27 N329	07 N336		18 N164
N208 24	06 N283	14 N151	18 N164	

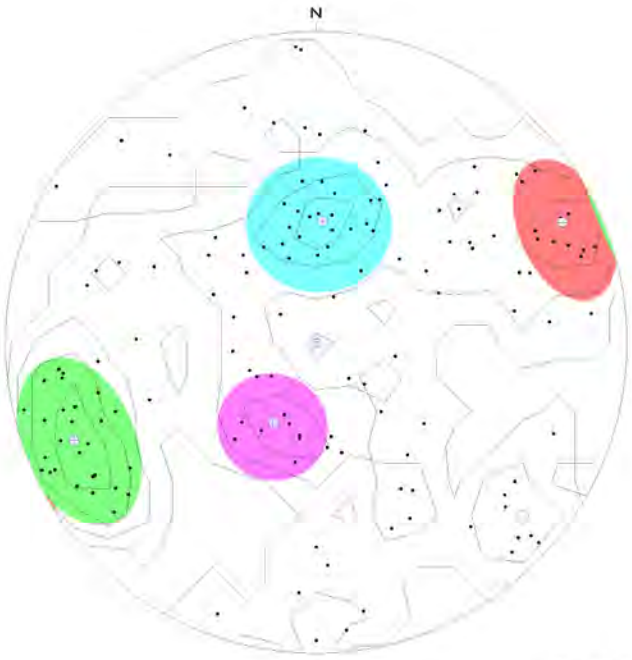


Figure 16. Boring B-104, Acoustic Stereonet Diagram

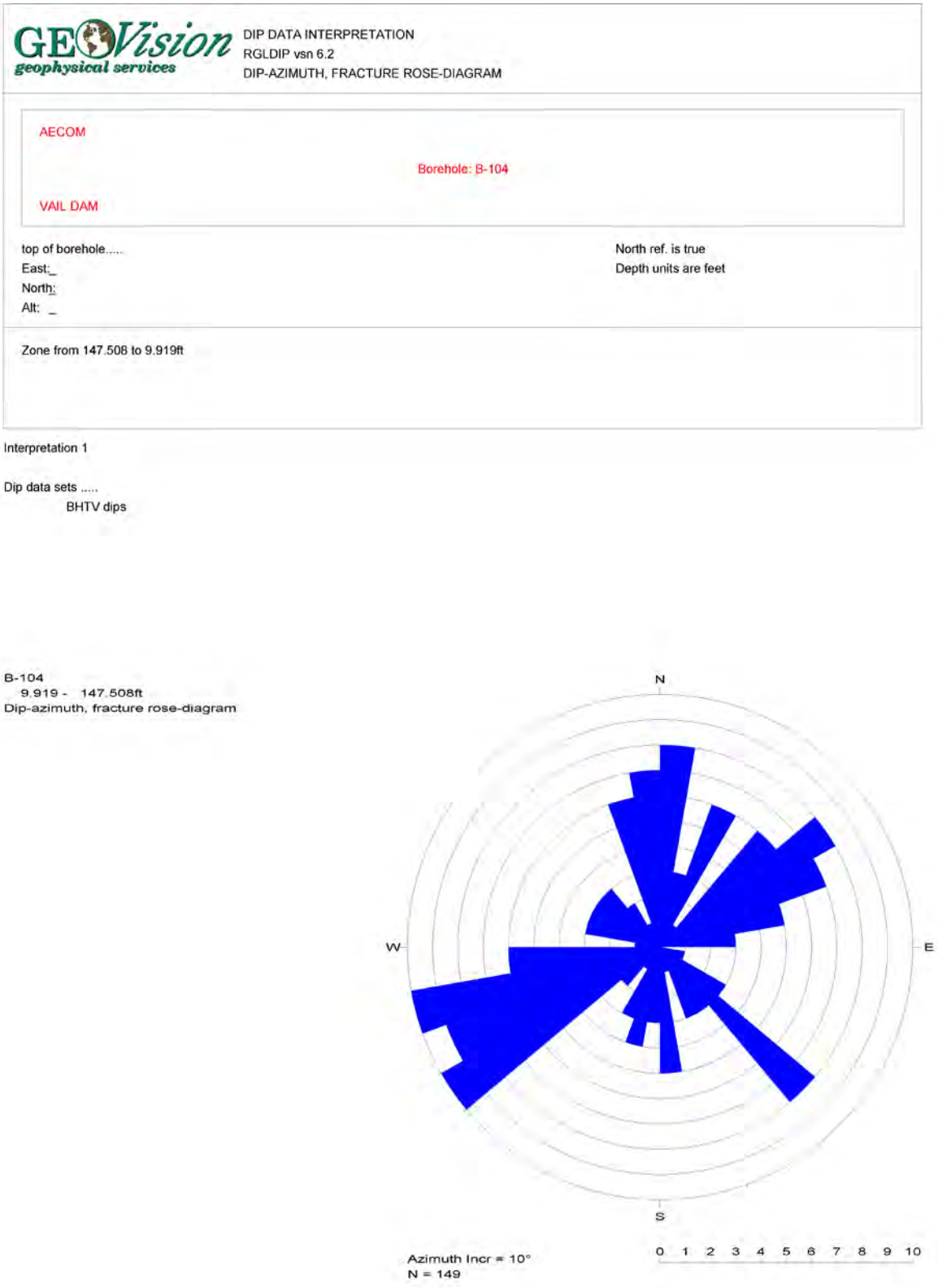


Figure 17. Boring B-104, Acoustic Rose Diagram

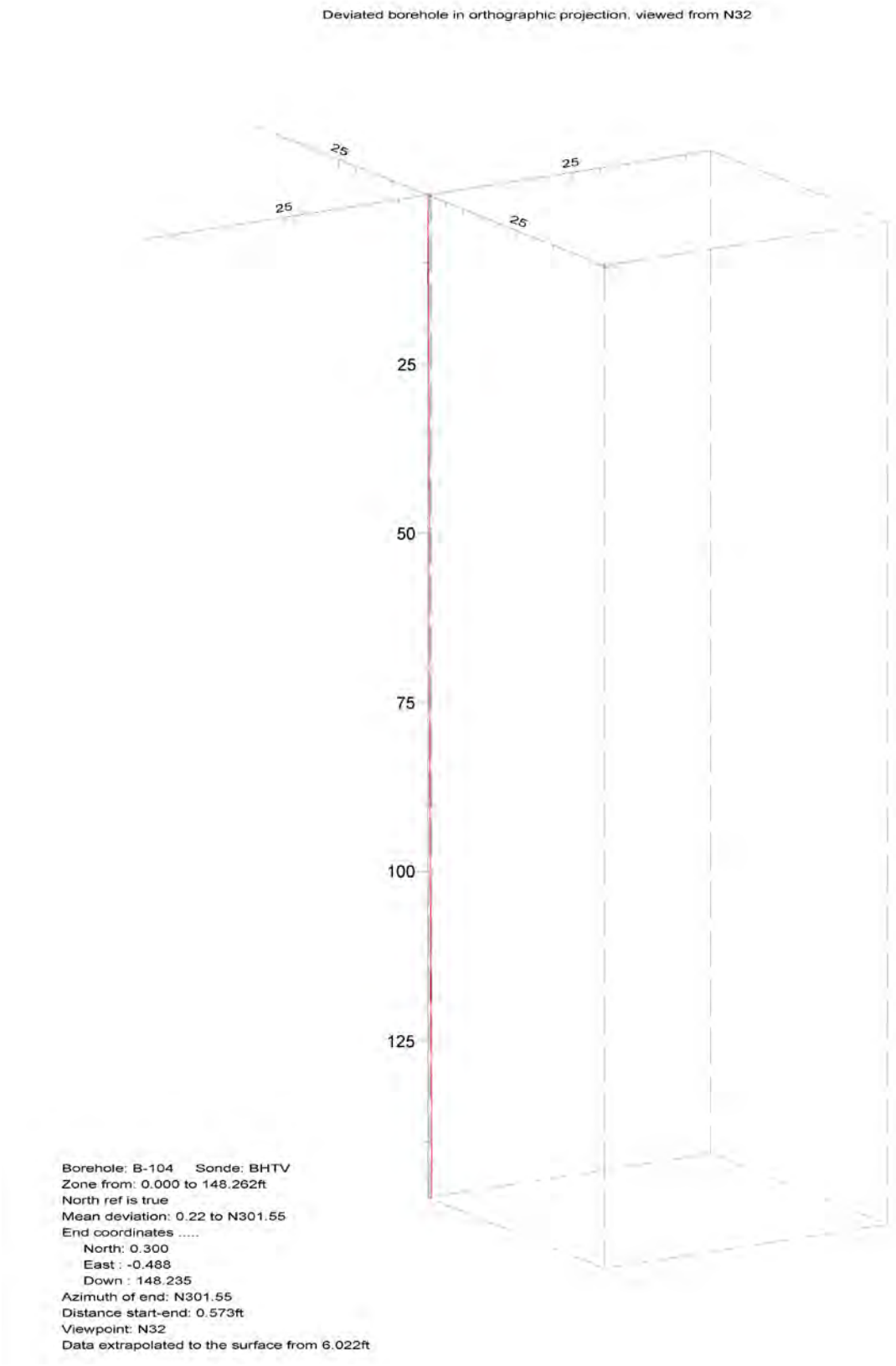


Figure 18. Boring B-104, Acoustic Deviation Projection

Table 10. Boring B-105, Acoustic Televiewer Feature depth, dip azimuth, dip and description

Depth (feet)	Dip azimuth	Dip	Structure description
43.4	N357	39	Planar Laminated-structure
44.0	N280	69	Fracture Discontinuous Hairline-fracture
45.0	N243	73	Fracture Planar Hairline-fracture
45.2	N251	83	Fracture Discontinuous Hairline-fracture
46.6	N093	15	Fracture Planar Hairline-fracture
46.6	N350	64	Fracture Planar Hairline-fracture
46.6	N261	72	Fracture Discontinuous Hairline-fracture
47.5	N000	65	Fracture Discontinuous Hairline-fracture
49.4	N354	63	Fracture Planar Hairline-fracture
51.1	N269	79	Fracture Discontinuous Hairline-fracture
55.3	N343	69	Fracture Discontinuous Hairline-fracture
55.8	N177	72	Fracture Planar Hairline-fracture
56.1	N253	83	Fracture Discontinuous Hairline-fracture
60.1	N037	28	Fracture Planar Hairline-fracture
60.9	N023	20	Fracture Planar Open-fracture
64.9	N072	33	Fracture Planar Hairline-fracture
68.1	N224	44	Fracture Planar Hairline-fracture
71.9	N105	29	Fracture Planar Hairline-fracture
77.3	N354	60	Fracture Planar Hairline-fracture
79.0	N127	24	Fracture Planar Hairline-fracture
80.1	N073	13	Fracture Planar Hairline-fracture
80.9	N105	15	Fracture Planar Hairline-fracture
87.6	N026	16	Fracture Planar Hairline-fracture
91.8	N008	28	Fracture Planar Hairline-fracture
92.0	N312	37	Fracture Planar Hairline-fracture
93.6	N357	27	Fracture Planar Hairline-fracture
94.0	N269	28	Fracture Planar Hairline-fracture
94.4	N073	49	Fracture Irregular Hairline-fracture
94.5	N043	43	Fracture Planar Hairline-fracture
95.4	N015	46	Fracture Planar Hairline-fracture
95.7	N343	72	Fracture Discontinuous Hairline-fracture
96.2	N338	76	Fracture Discontinuous Hairline-fracture
96.5	N346	42	Fracture Planar Hairline-fracture
97.7	N328	36	Fracture Planar Hairline-fracture
98.1	N096	70	Fracture Discontinuous Hairline-fracture
98.3	N091	75	Fracture Discontinuous Hairline-fracture
98.3	N036	47	Fracture Discontinuous Hairline-fracture
99.9	N096	83	Fracture Discontinuous Hairline-fracture

Depth (feet)	Dip azimuth	Dip	Structure description
99.9	N247	70	Fracture Planar Hairline-fracture

GEOVision geophysical services

DIP DATA INTERPRETATION
RGLDIP vsn 6.2
FRACTURE ANALYSIS STEREOGRAMS

AECOM

Borehole: B-105

VAIL DAM

top of borehole.....
East:_
North:
Elev:_

North ref: true
Depth units are feet

Zone from 100.060 to 42.938ft
Mean dip format: dip-azimuth and dip

Interpretation 1

Dip data sets .....
BHTV dips

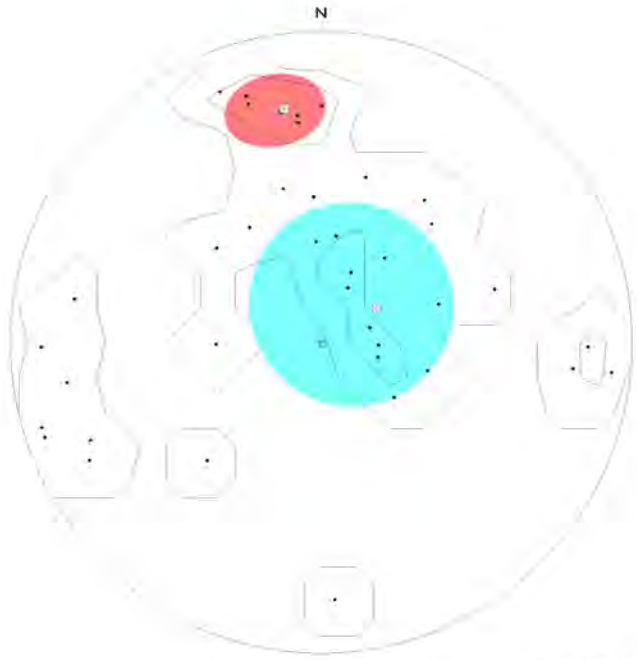
B-105
Zone 0. 42.938 - 100.060ft
Deviation 0.50 N315.10

dipdata sets.....
BHTV dips

	mean dip	n	f
N058 17	N058 17	11	0.20
N351 65	N351 65	6	(0.26)

intersections

	N058 17	N351 65
N058 17		16 N073
N351 65	16 N073	



equal-area upper-hemisphere 0-90
contour-levels 1,3,

Figure 19. Boring B-105, Acoustic Stereonet Diagram

GEOVision geophysical services

DIP DATA INTERPRETATION
RGLDIP vsn 6.2
DIP-AZIMUTH, FRACTURE ROSE-DIAGRAM

AECOM

Borehole: B-105

VAIL DAM

top of borehole.....
East:_
North:
Alt: _

North ref. is true
Depth units are feet

Zone from 100.060 to 42.938ft

Interpretation 1

Dip data sets .....
BHTV dips

B-105
42.938 - 100.060ft
Dip-azimuth, fracture rose-diagram

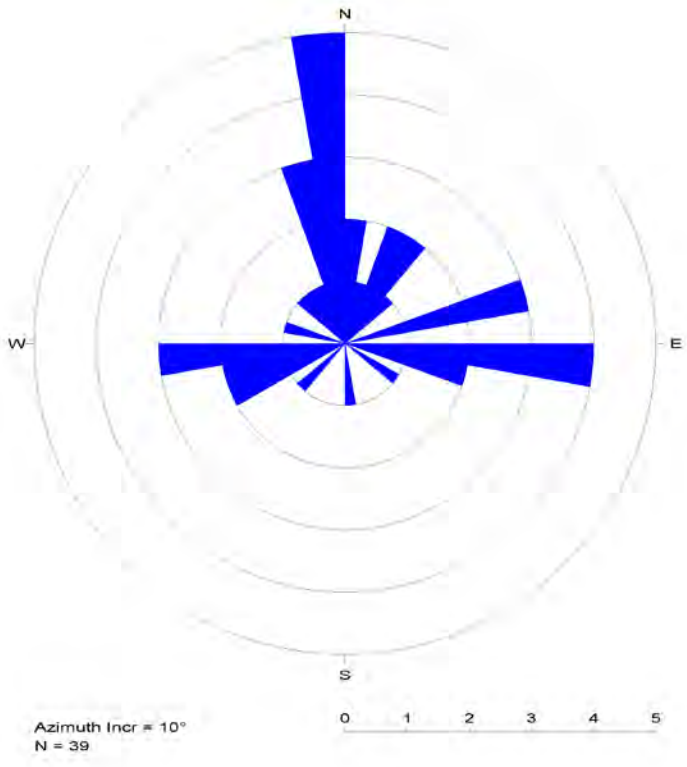


Figure 20. Boring B-105, Acoustic Rose Diagram

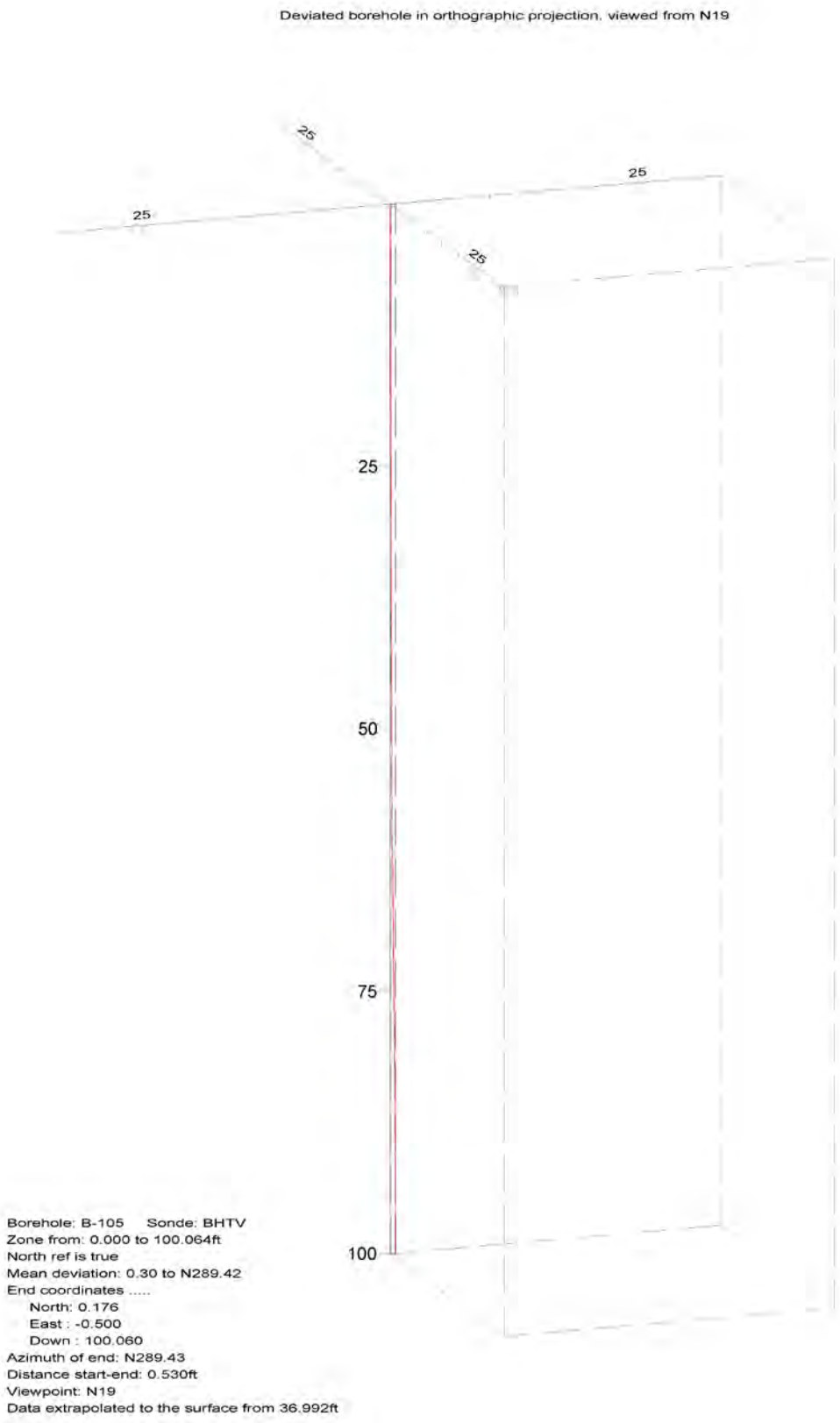


Figure 21. Boring B-105, Acoustic Deviation Projection

Table 11. Boring B-105, Optical Televiewer Feature depth, dip azimuth, dip and description

Depth (feet)	Dip azimuth	Dip	Structure description
5.9	N309	24	Fracture Planar Hairline-fracture
6.8	N240	82	Planar Laminated-structure
7.2	N021	82	Fracture Planar Hairline-fracture
8.2	N259	49	Fracture Planar Hairline-fracture
9.7	N340	65	Fracture Planar Open-fracture
10.1	N222	57	Fracture Planar Hairline-fracture
10.5	N217	35	Fracture Planar Hairline-fracture
12.7	N278	26	Fracture Planar Hairline-fracture
12.8	N291	38	Fracture Irregular Hairline-fracture
12.9	N281	18	Fracture Planar Hairline-fracture
14.4	N293	28	Fracture Planar Hairline-fracture
15.7	N302	16	Fracture Planar Open-fracture
16.1	N277	21	Fracture Planar Hairline-fracture
17.0	N302	41	Fracture Planar Hairline-fracture
20.7	N254	16	Fracture Irregular Open-fracture
20.7	N343	28	Fracture Irregular Open-fracture
23.3	N239	32	Fracture Planar Hairline-fracture
27.1	N088	59	Fracture Planar Hairline-fracture
28.2	N022	81	Planar Laminated-structure
28.8	N277	52	Fracture Planar Hairline-fracture
31.9	N067	77	Planar Laminated-structure
32.8	N221	40	Fracture Planar Hairline-fracture
33.1	N254	46	Fracture Planar Hairline-fracture
34.0	N353	20	Fracture Planar Open-fracture
34.7	N336	29	Fracture Planar Hairline-fracture
34.8	N357	29	Fracture Planar Open-fracture
35.5	N265	71	Planar Laminated-structure
35.9	N350	23	Fracture Planar Open-fracture
36.4	N320	26	Fracture Planar Hairline-fracture
38.0	N171	72	Planar Laminated-structure
39.6	N294	76	Planar Laminated-structure
43.2	N277	82	Planar Laminated-structure
45.0	N237	75	Fracture Planar Hairline-fracture
46.5	N353	30	Fracture Discontinuous Hairline-fracture
46.6	N341	62	Fracture Planar Hairline-fracture
46.8	N251	60	Fracture Discontinuous Hairline-fracture
48.6	N272	76	Planar Laminated-structure
49.5	N342	63	Fracture Planar Hairline-fracture

GEOVision geophysical services

DIP DATA INTERPRETATION
RGLDIP vsn 6.2
FRACTURE ANALYSIS STEREOGRAMS

AECOM

Borehole: B-105

VAIL DAM

top of borehole.....
East:
North:
Elev:

North ref: true
Depth units are feet

Zone from 49.973 to 5.423ft
Mean dip format: dip-azimuth and dip

Interpretation 1

Dip data sets .....
OPTV dips

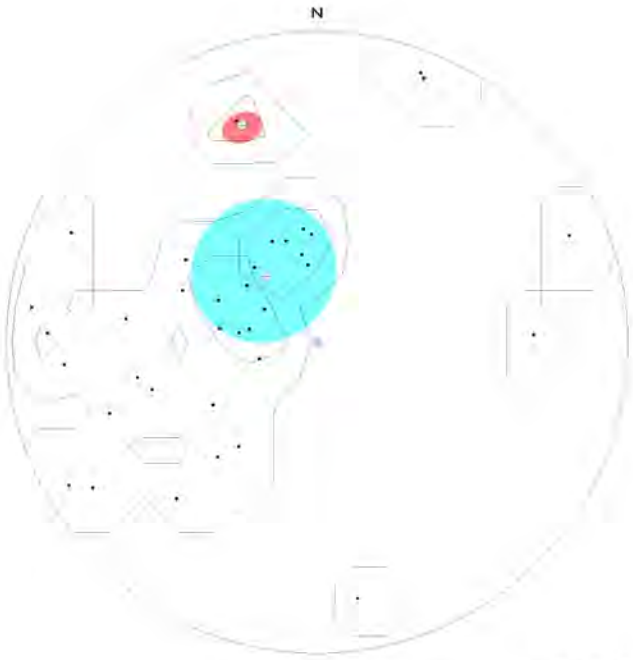
B-105
Zone 0. 5.423 - 49.973ft
Deviation 0.20 N319.70

dipdata sets.....
OPTV dips

	mean dip	n	f
N322 22	N322 22	13	0.31
N341 63	N341 63	3	(0.15)

intersections

	N322 22	N341 63
N322 22		09 N256
N341 63	09 N256	



mean dip
well axis

equal-area upper-hemisphere 0-90
contour-levels 1,3,

Figure 22. Boring B-105, Optical Stereonet Diagram

GEOVision geophysical services

DIP DATA INTERPRETATION
RGLDIP vsn 6.2
DIP-AZIMUTH, FRACTURE ROSE-DIAGRAM

AECOM

Borehole: B-105

VAIL DAM

top of borehole.....
East:
North:
Alt:

North ref. is true
Depth units are feet

Zone from 49.973 to 5.423ft

Interpretation 1

Dip data sets .....
OPTV dips

B-105
5.423 - 49.973ft
Dip-azimuth, fracture rose-diagram

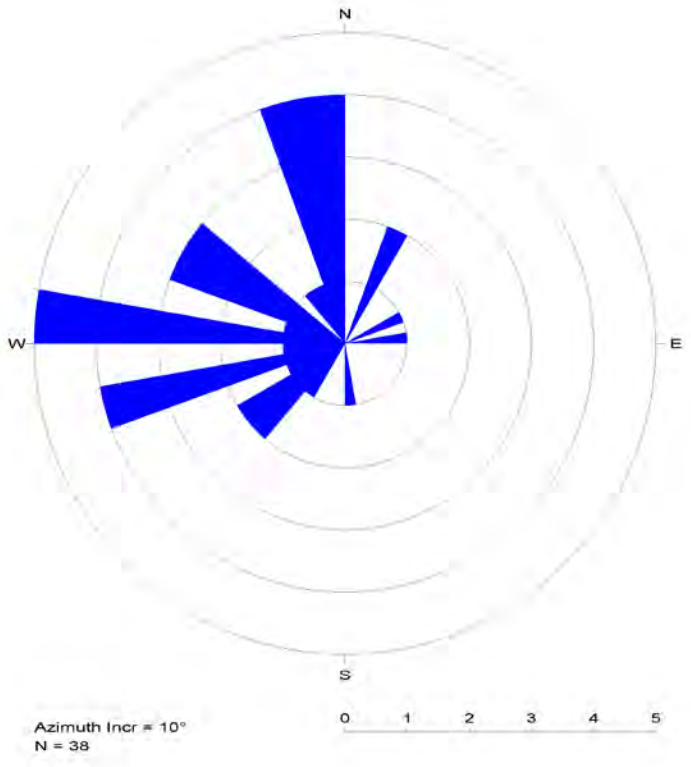


Figure 23. Boring B-105, Optical Rose Diagram

Table 12. Boring B-106 Upper Section, Acoustic Televiewer Feature depth, dip azimuth, dip and description

Depth (feet)	Dip azimuth	Dip	Structure description
31.8	N199	65	Fracture Planar Open-fracture
32.2	N188	67	Fracture Planar Hairline-fracture
32.8	N033	33	Fracture Planar Hairline-fracture
34.2	N179	45	Fracture Planar Hairline-fracture
34.7	N358	61	Fracture Planar Hairline-fracture
34.9	N192	52	Fracture Planar Hairline-fracture
35.6	N052	68	Fracture Planar Hairline-fracture
36.6	N035	72	Fracture Planar Hairline-fracture
36.8	N168	51	Fracture Planar Hairline-fracture
37.1	N200	49	Fracture Planar Hairline-fracture
37.8	N183	67	Fracture Planar Hairline-fracture
41.3	N252	30	Fracture Planar Hairline-fracture
42.4	N360	60	Fracture Discontinuous Hairline-fracture
42.6	N353	36	Fracture Discontinuous Hairline-fracture
43.1	N199	55	Fracture Discontinuous Hairline-fracture
43.1	N010	42	Fracture Planar Hairline-fracture
43.2	N028	30	Fracture Planar Hairline-fracture
43.8	N268	26	Fracture Planar Hairline-fracture
45.0	N030	37	Fracture Planar Hairline-fracture
45.4	N033	42	Fracture Planar Hairline-fracture
45.7	N053	54	Fracture Planar Hairline-fracture
45.9	N191	66	Fracture Planar Hairline-fracture
46.0	N045	42	Fracture Planar Hairline-fracture
47.4	N076	76	Planar Laminated-structure
48.2	N039	72	Fracture Planar Hairline-fracture
49.4	N287	78	Fracture Planar Open-fracture
50.2	N358	82	Fracture Planar Hairline-fracture
51.4	N260	74	Fracture Planar Open-fracture
51.5	N077	36	Fracture Planar Hairline-fracture
51.7	N203	57	Fracture Planar Hairline-fracture
52.1	N337	85	Fracture Planar Hairline-fracture
52.2	N126	33	Fracture Planar Hairline-fracture
53.8	N254	87	Fracture Planar Hairline-fracture
54.2	N186	48	Fracture Planar Open-fracture
54.8	N277	70	Fracture Discontinuous Open-fracture
55.3	N253	79	Fracture Discontinuous Open-fracture
55.5	N178	70	Fracture Planar Hairline-fracture
55.8	N101	17	Fracture Planar Hairline-fracture

Depth (feet)	Dip azimuth	Dip	Structure description
56.4	N126	20	Fracture Planar Hairline-fracture
56.4	N244	64	Fracture Planar Hairline-fracture
56.7	N126	25	Fracture Planar Hairline-fracture
57.2	N060	18	Fracture Planar Hairline-fracture
57.2	N121	17	Fracture Planar Hairline-fracture
57.6	N054	78	Fracture Planar Hairline-fracture
57.6	N219	14	Fracture Planar Hairline-fracture
58.1	N012	29	Fracture Planar Open-fracture
58.3	N054	41	Fracture Planar Hairline-fracture
58.5	N007	36	Fracture Planar Open-fracture
58.7	N260	85	Fracture Planar Hairline-fracture
58.8	N253	84	Fracture Planar Hairline-fracture
58.9	N061	47	Fracture Planar Hairline-fracture
59.7	N048	70	Fracture Planar Hairline-fracture
59.8	N318	85	Fracture Discontinuous Hairline-fracture
60.4	N044	14	Fracture Planar Hairline-fracture
60.5	N148	77	Fracture Planar Hairline-fracture
60.6	N106	24	Fracture Planar Hairline-fracture
60.8	N340	33	Fracture Irregular Hairline-fracture
61.3	N175	78	Fracture Planar Hairline-fracture
61.4	N033	20	Fracture Planar Hairline-fracture
62.2	N318	24	Fracture Planar Hairline-fracture

GEOVision geophysical services

DIP DATA INTERPRETATION
RGLDIP vsn 6.2
FRACTURE ANALYSIS STEREOGRAMS

AECOM

Borehole: B-106 UPPER SECTION

VAIL DAM

top of borehole.....
East:_
North:
Elev:_

North ref: true
Depth units are feet

Zone from 62.656 to 31.286ft
Mean dip format: dip-azimuth and dip

Interpretation 1

Dip data sets .....
BHTV dips

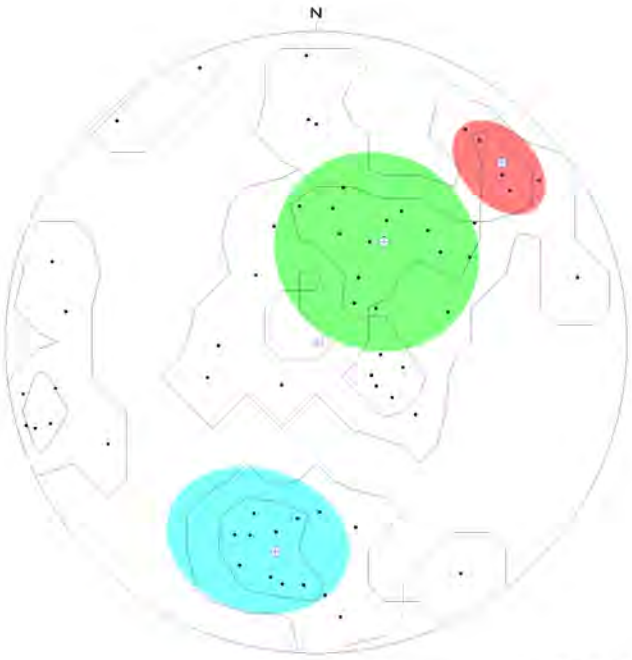
B-106 UPPER SECTION
Zone 0. 31.286 - 62.656ft
Deviation 0.90 N244.20

dipdata sets.....
BHTV dips

	mean dip	n	f
N191 58	N191 58	11	0.67
N046 72	N046 72	5	0.49
N034 32	N034 32	15	0.56

intersections

	N191 58	N046 72	N034 32
N191 58		32 N124	10 N107
N046 72	32 N124		09 N319
N034 32	10 N107	09 N319	



equal-area upper-hemisphere 0-90
contour-levels 1,3,

Figure 24. Boring B-106 Upper Section, Acoustic Stereonet Diagram

GEOVision geophysical services

DIP DATA INTERPRETATION
RGLDIP vsn 6.2
DIP-AZIMUTH, FRACTURE ROSE-DIAGRAM

AECOM

Borehole: B-106 UPPER SECTION

VAIL DAM

top of borehole.....
East:_
North:
Alt: _

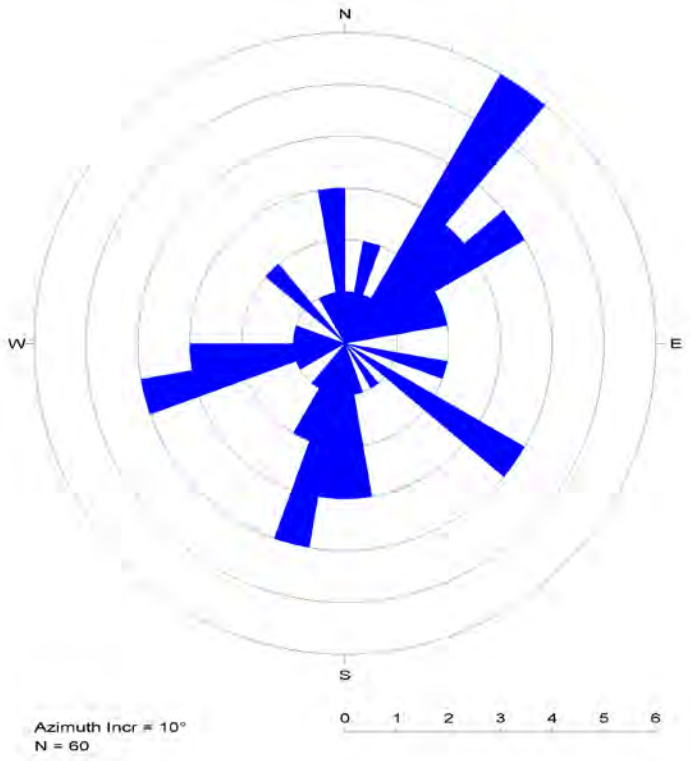
North ref. is true
Depth units are feet

Zone from 62.656 to 31.286ft

Interpretation 1

Dip data sets .....
BHTV dips

B-106 UPPER SECTION
31.286 - 62.656ft
Dip-azimuth, fracture rose-diagram



Azimuth Incr = 10°
N = 60

Figure 25. Boring B-106 Upper Section, Acoustic Rose Diagram

Table 13. Boring B-106 Middle Section, Acoustic Televiewer Feature depth, dip azimuth, dip and description

Depth (feet)	Dip azimuth	Dip	Structure description
58.3	N048	42	Fracture Planar Hairline-fracture
58.5	N003	29	Fracture Planar Open-fracture
59.2	N007	70	Fracture Planar Hairline-fracture
59.9	N022	77	Fracture Planar Hairline-fracture
60.4	N025	14	Fracture Planar Hairline-fracture
60.5	N149	75	Fracture Planar Hairline-fracture
60.6	N109	25	Fracture Planar Hairline-fracture
60.9	N341	28	Fracture Planar Hairline-fracture
61.2	N182	78	Fracture Planar Hairline-fracture
61.4	N026	24	Fracture Planar Hairline-fracture
62.0	N119	26	Fracture Planar Hairline-fracture
62.2	N319	25	Fracture Planar Hairline-fracture
62.8	N132	39	Fracture Planar Hairline-fracture
63.0	N116	37	Fracture Planar Hairline-fracture
63.8	N314	51	Fracture Planar Open-fracture
63.8	N278	65	Fracture Planar Hairline-fracture
64.3	N090	27	Fracture Planar Hairline-fracture
65.2	N140	17	Fracture Planar Open-fracture
65.7	N220	32	Fracture Planar Hairline-fracture
66.3	N079	35	Fracture Planar Hairline-fracture
67.3	N079	23	Fracture Planar Hairline-fracture
68.8	N351	59	Fracture Planar Hairline-fracture
69.3	N323	84	Fracture Discontinuous Hairline-fracture
69.3	N203	33	Fracture Planar Hairline-fracture
70.1	N248	47	Fracture Planar Hairline-fracture
71.1	N030	71	Fracture Planar Hairline-fracture
71.5	N352	30	Fracture Planar Hairline-fracture
72.6	N170	44	Fracture Planar Hairline-fracture
72.9	N156	55	Fracture Planar Hairline-fracture
73.1	N339	27	Fracture Planar Hairline-fracture
73.3	N170	63	Fracture Planar Hairline-fracture
73.5	N007	40	Fracture Planar Hairline-fracture
74.1	N270	72	Fracture Planar Hairline-fracture
74.3	N265	67	Fracture Planar Hairline-fracture
74.8	N262	76	Fracture Discontinuous Open-fracture
75.8	N273	54	Fracture Planar Hairline-fracture
76.0	N265	57	Fracture Planar Hairline-fracture

Depth (feet)	Dip azimuth	Dip	Structure description
76.6	N167	37	Fracture Planar Hairline-fracture
77.6	N280	72	Planar Laminated-structure
79.0	N345	21	Fracture Planar Hairline-fracture
80.4	N178	44	Fracture Planar Hairline-fracture
80.6	N308	85	Fracture Planar Open-fracture
81.5	N194	55	Fracture Planar Hairline-fracture
81.8	N288	71	Fracture Planar Open-fracture
82.7	N342	52	Fracture Planar Hairline-fracture

GEOVision geophysical services

DIP DATA INTERPRETATION
RGLDIP vsn 6.2
FRACTURE ANALYSIS STEREOGRAMS

AECOM

Borehole: B-106 MIDDLE SECTION

VAIL DAM

top of borehole.....
East:_
North:_
Elev:_

North ref: true
Depth units are feet

Zone from 82.880 to 57.751ft
Mean dip format: dip-azimuth and dip

Interpretation 1

Dip data sets .....
BHTV dips

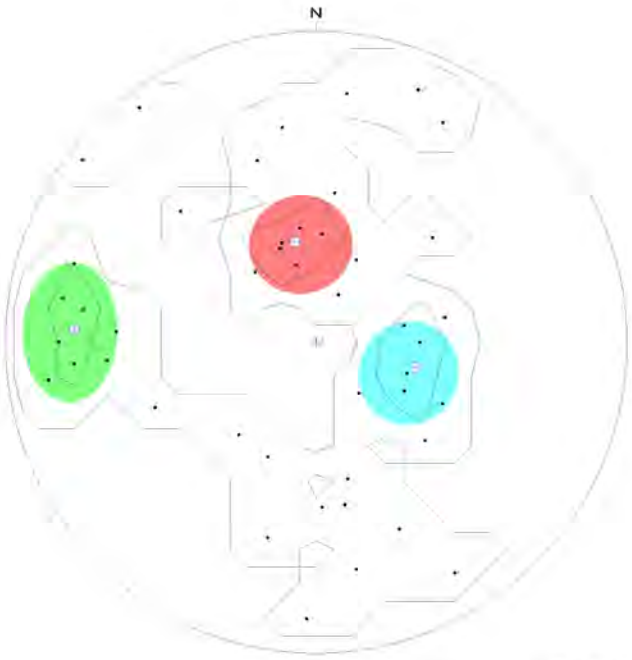
B-106 MIDDLE SECTION
Zone 0. 57.751 - 82.880ft
Deviation 0.90 N228.60

dipdata sets.....
BHTV dips

	mean dip	n	f
N104 27	N104 27	5	0.22
N348 27	N348 27	5	0.22
N273 67	N273 67	8	0.82

intersections

	N104 27	N348 27	N273 67
N104 27		15 N046	05 N185
N348 27	15 N046		27 N351
N273 67	05 N185	27 N351	



mean dip
well axis

equal-area upper-hemisphere 0-90
contour-levels 1,3,

Figure 26. Boring B-106 Middle Section, Acoustic Stereonet Diagram

GEOVision geophysical services

DIP DATA INTERPRETATION
RGLDIP vsn 6.2
DIP-AZIMUTH, FRACTURE ROSE-DIAGRAM

AECOM

Borehole: B-106 MIDDLE SECTION

VAIL DAM

top of borehole.....
East:
North:
Alt:

North ref. is true
Depth units are feet

Zone from 82.880 to 57.751ft

Interpretation 1

Dip data sets .....
BHTV dips

B-106 MIDDLE SECTION
57.751 - 82.880ft
Dip-azimuth, fracture rose-diagram

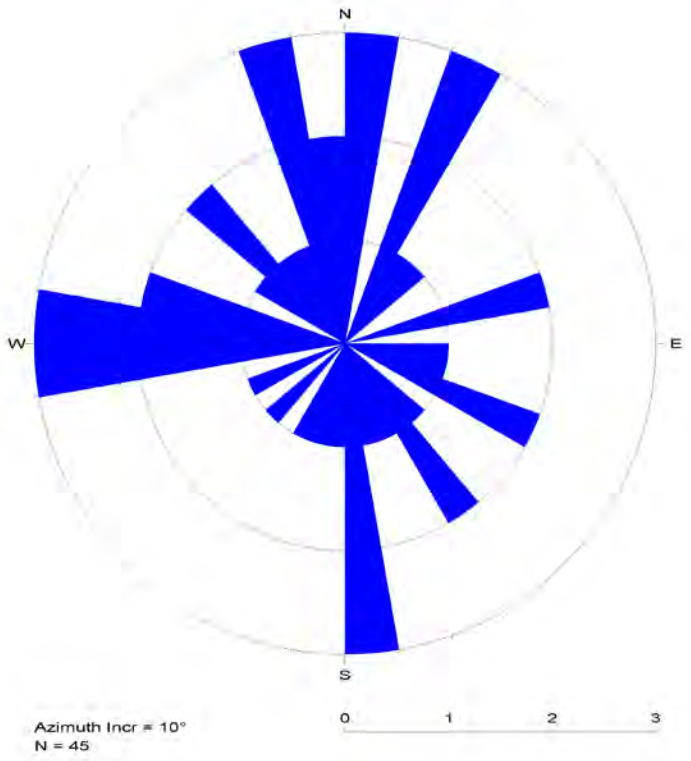


Figure 27. Boring B-106 Middle Section, Acoustic Rose Diagram

Table 14. Boring B-106 Lower Section, Acoustic Televiewer Feature depth, dip azimuth, dip and description

Depth (feet)	Dip azimuth	Dip	Structure description
88.4	N274	61	Fracture Planar Hairline-fracture
89.5	N327	75	Fracture Planar Hairline-fracture
90.8	N325	41	Fracture Planar Hairline-fracture
91.1	N052	40	Fracture Planar Hairline-fracture
91.1	N296	76	Fracture Planar Hairline-fracture
92.1	N081	55	Fracture Planar Hairline-fracture
93.1	N035	32	Fracture Planar Hairline-fracture
96.8	N315	79	Fracture Discontinuous Hairline-fracture
98.1	N137	82	Fracture Discontinuous Hairline-fracture
98.2	N261	68	Planar Laminated-structure

GEOVision geophysical services

DIP DATA INTERPRETATION
RGLDIP vsn 6.2
FRACTURE ANALYSIS STEREOGRAMS

AECOM

Borehole: B-106 LOWER SECTION

VAIL DAM

top of borehole.....
East:_
North:_
Elev:_

North ref: true
Depth units are feet

Zone from 98.698 to 87.928ft
Mean dip format: dip-azimuth and dip

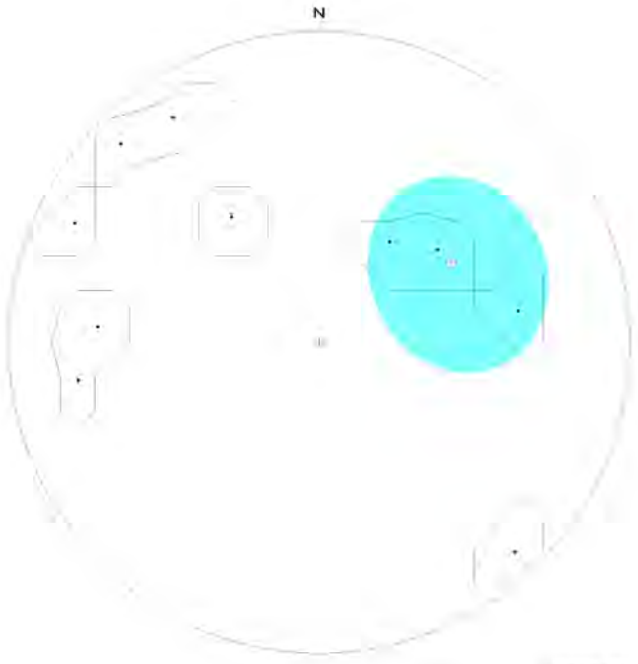
Interpretation 1

Dip data sets .....
BHTV dips

B-106 LOWER SECTION
Zone 0. 87.928 - 98.688ft
Deviation 0.80 N238.20

dipdata sets.....
BHTV dips

	mean dip	n	f
N059 41	N059 41	3	0.36



equal-area upper-hemisphere 0-90
contour-levels 1.

mean dip
well axis

Figure 28. Boring B-106 Lower Section, Acoustic Stereonet Diagram

GEOVision geophysical services

DIP DATA INTERPRETATION
RGLDIP vsn 6.2
DIP-AZIMUTH, FRACTURE ROSE-DIAGRAM

AECOM

Borehole: B-106 LOWER SECTION

VAIL DAM

top of borehole.....
East:_
North:
Alt: _

North ref. is true
Depth units are feet

Zone from 98.698 to 87.928ft

Interpretation 1

Dip data sets .....
BHTV dips

B-106 LOWER SECTION
87.928 - 98.698ft
Dip-azimuth, fracture rose-diagram

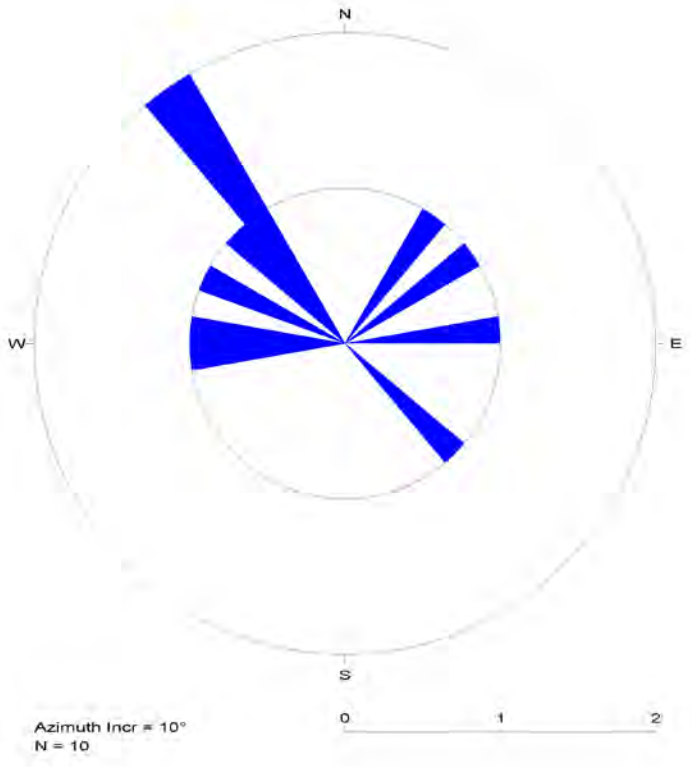


Figure 29. Boring B-106 Lower Section, Acoustic Rose Diagram

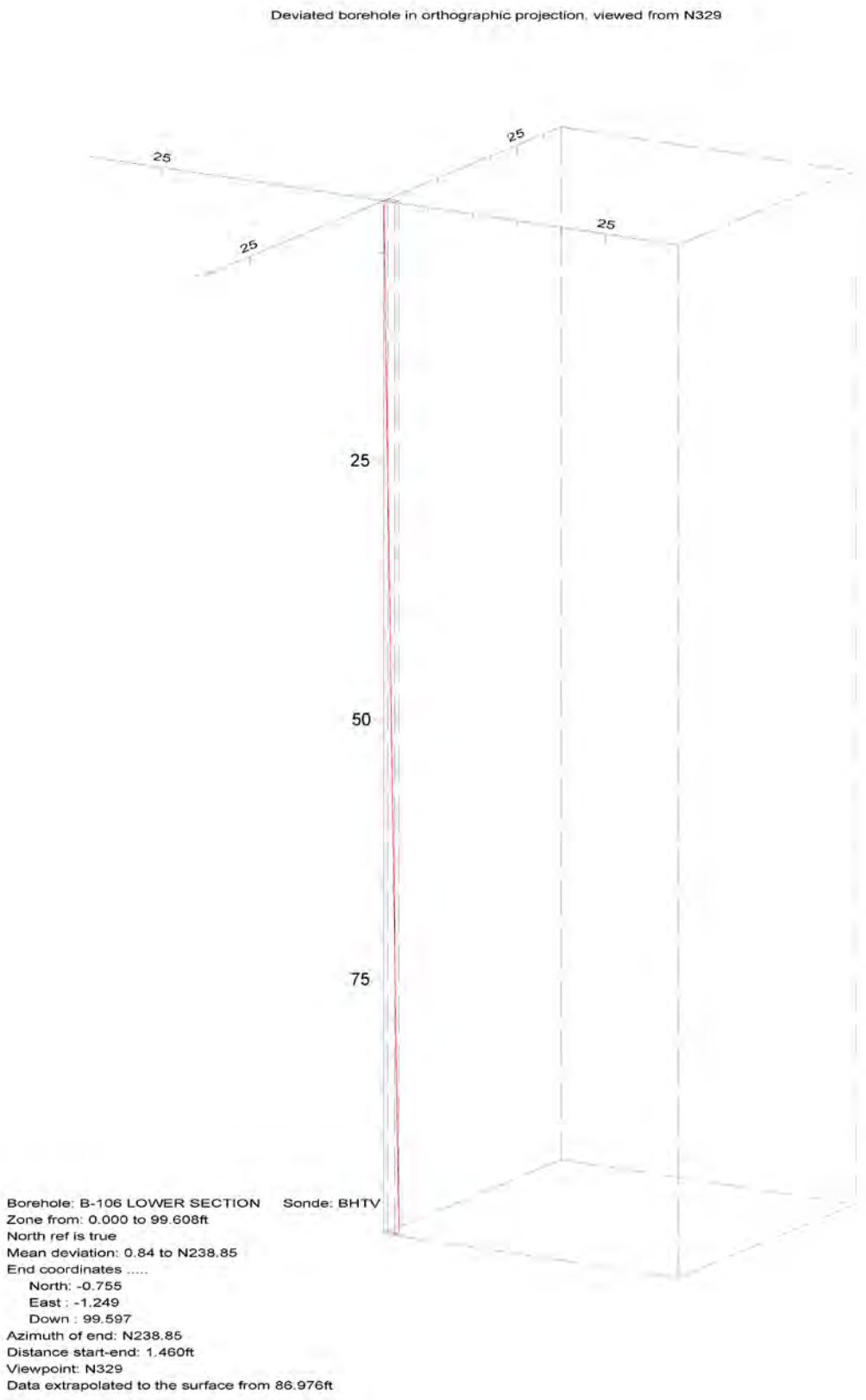


Figure 30. Boring B-106 Lower Section, Acoustic Deviation Projection

APPENDIX A

SUSPENSION VELOCITY MEASUREMENT QUALITY ASSURANCE SUSPENSION SOURCE TO RECEIVER ANALYSIS RESULTS

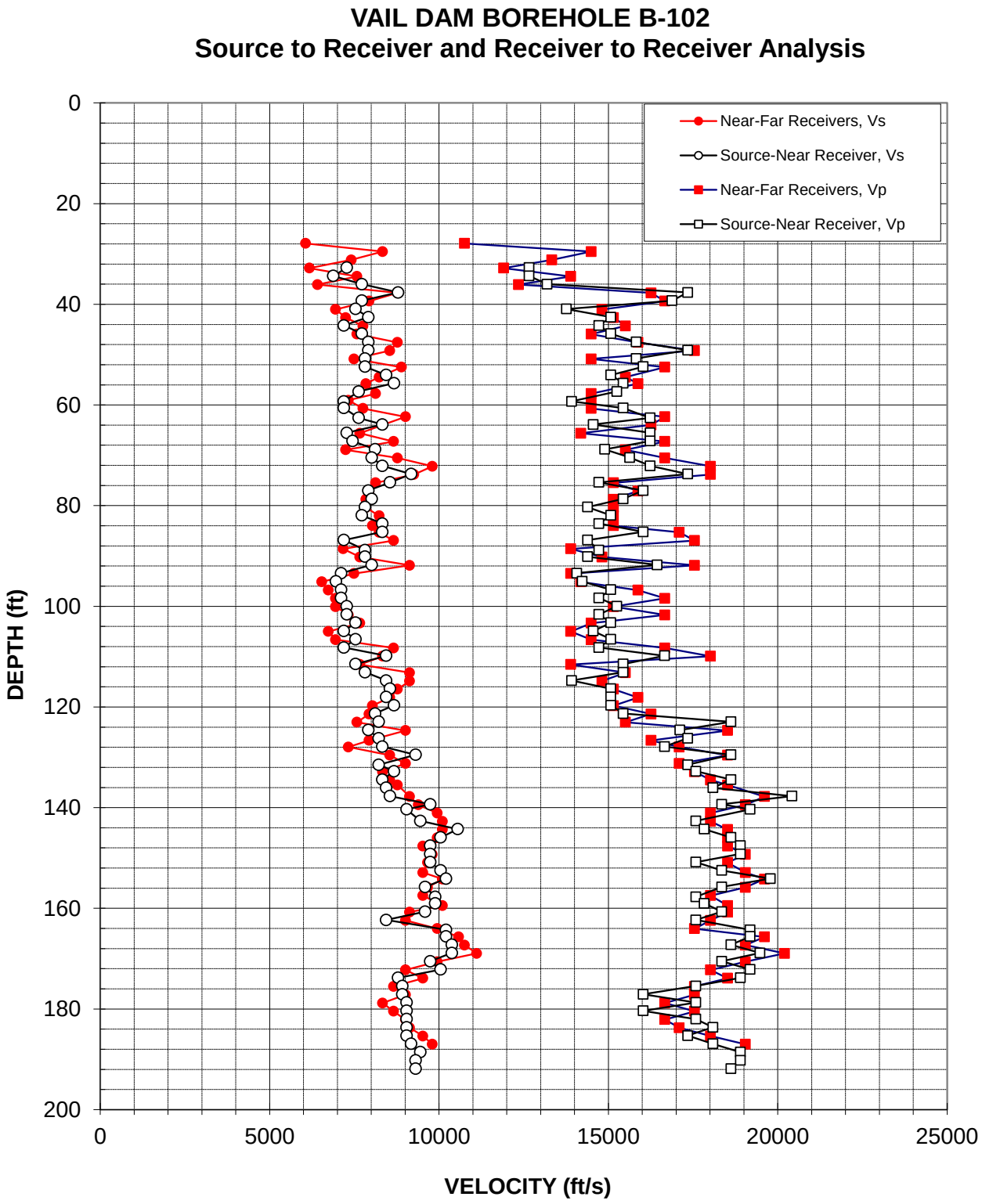


Figure A-1: Boring B-102, Suspension S-R1 P- and S_H-wave velocities

Table A-1. Boring B-102, S - R1 quality assurance analysis P- and S_H-wave data

Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio Based on Source-to-Receiver Travel Time Data - Borehole B-102

American Units				Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio	Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V_s	V_p			V_s	V_p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
32.7	7280	12660	0.25	10.0	2220	3860	0.25
34.4	6880	12660	0.29	10.5	2100	3860	0.29
36.0	7720	13190	0.24	11.0	2350	4020	0.24
37.6	8790	17340	0.33	11.5	2680	5290	0.33
39.3	7720	16880	0.37	12.0	2350	5150	0.37
40.9	7540	13760	0.29	12.5	2300	4190	0.29
42.6	7910	15070	0.31	13.0	2410	4590	0.31
44.2	7190	14720	0.34	13.5	2190	4490	0.34
45.8	7720	15070	0.32	14.0	2350	4590	0.32
47.5	7910	15830	0.33	14.5	2410	4820	0.33
49.1	7910	17340	0.37	15.0	2410	5290	0.37
50.8	7810	15830	0.34	15.5	2380	4820	0.34
52.4	7810	16030	0.34	16.0	2380	4880	0.34
54.0	8440	15070	0.27	16.5	2570	4590	0.27
55.7	8670	15440	0.27	17.0	2640	4710	0.27
57.3	7630	15250	0.33	17.5	2320	4650	0.33
59.3	7190	13910	0.32	18.1	2190	4240	0.32
60.6	7190	15440	0.36	18.5	2190	4710	0.36
62.6	7630	16230	0.36	19.1	2320	4950	0.36
63.9	8330	14550	0.26	19.5	2540	4440	0.26
65.5	7280	16230	0.37	20.0	2220	4950	0.37
67.2	7450	16230	0.37	20.5	2270	4950	0.37
68.8	8120	14890	0.29	21.0	2470	4540	0.29
70.5	8010	15630	0.32	21.5	2440	4760	0.32
72.1	8330	16230	0.32	22.0	2540	4950	0.32
73.7	9170	17340	0.31	22.5	2800	5290	0.31
75.4	8550	14720	0.25	23.0	2610	4490	0.25
77.0	7910	16030	0.34	23.5	2410	4880	0.34
78.7	8010	15440	0.32	24.0	2440	4710	0.32
80.3	7810	14390	0.29	24.5	2380	4380	0.29
81.9	7720	15070	0.32	25.0	2350	4590	0.32
83.6	8330	14720	0.26	25.5	2540	4490	0.26
85.2	8330	16030	0.31	26.0	2540	4880	0.31
86.9	7190	14390	0.33	26.5	2190	4380	0.33
88.8	7810	14720	0.30	27.1	2380	4490	0.30
90.1	7810	14390	0.29	27.5	2380	4380	0.29
91.8	8010	16440	0.34	28.0	2440	5010	0.34
93.4	7110	14070	0.33	28.5	2170	4290	0.33
95.1	6960	14220	0.34	29.0	2120	4340	0.34

Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole B-102

American Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V_s	V_p	
(ft)	(ft/s)	(ft/s)	
96.7	7110	15070	0.36
98.3	7110	14720	0.35
100.0	7280	15250	0.35
101.6	7280	14720	0.34
103.3	7540	15070	0.33
104.9	7190	14550	0.34
106.5	7540	15070	0.33
108.2	7190	14720	0.34
109.8	8440	16660	0.33
111.5	7540	15440	0.34
113.1	7810	15440	0.33
114.7	8440	13910	0.21
116.4	8550	15070	0.26
118.0	8440	15070	0.27
119.7	8670	15070	0.25
121.3	8120	15440	0.31
122.9	8220	18620	0.38
124.6	7910	17110	0.36
126.2	8220	17340	0.36
127.9	8330	16660	0.33
129.5	9310	18620	0.33
131.5	8220	17340	0.36
132.8	8670	17580	0.34
134.4	8330	18620	0.37
136.1	8440	18090	0.36
137.7	8550	20420	0.39
139.3	9740	18350	0.30
140.3	9040	19180	0.36
142.6	9450	17580	0.30
144.3	10550	17830	0.23
145.9	10050	18620	0.29
147.6	9740	18900	0.32
149.2	9740	18900	0.32
150.8	9740	17580	0.28
152.5	10050	18350	0.29
154.1	10210	19780	0.32
155.8	9590	18350	0.31
157.7	9890	17580	0.27
159.0	9890	17830	0.28
160.7	9590	18350	0.31

Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V_s	V_p	
(m)	(m/s)	(m/s)	
29.5	2170	4590	0.36
30.0	2170	4490	0.35
30.5	2220	4650	0.35
31.0	2220	4490	0.34
31.5	2300	4590	0.33
32.0	2190	4440	0.34
32.5	2300	4590	0.33
33.0	2190	4490	0.34
33.5	2570	5080	0.33
34.0	2300	4710	0.34
34.5	2380	4710	0.33
35.0	2570	4240	0.21
35.5	2610	4590	0.26
36.0	2570	4590	0.27
36.5	2640	4590	0.25
37.0	2470	4710	0.31
37.5	2510	5670	0.38
38.0	2410	5210	0.36
38.5	2510	5290	0.36
39.0	2540	5080	0.33
39.5	2840	5670	0.33
40.1	2510	5290	0.36
40.5	2640	5360	0.34
41.0	2540	5670	0.37
41.5	2570	5510	0.36
42.0	2610	6220	0.39
42.5	2970	5590	0.30
42.8	2760	5850	0.36
43.5	2880	5360	0.30
44.0	3220	5430	0.23
44.5	3060	5670	0.29
45.0	2970	5760	0.32
45.5	2970	5760	0.32
46.0	2970	5360	0.28
46.5	3060	5590	0.29
47.0	3110	6030	0.32
47.5	2920	5590	0.31
48.1	3010	5360	0.27
48.5	3010	5430	0.28
49.0	2920	5590	0.31

Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole B-102

American Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V_s	V_p	
(ft)	(ft/s)	(ft/s)	
162.3	8440	17580	0.35
164.3	10210	19180	0.30
165.6	10210	19180	0.30
167.2	10380	18620	0.27
168.9	10380	19480	0.30
170.5	9740	18350	0.30
172.2	10050	19180	0.31
173.8	8790	18900	0.36
175.4	8920	17580	0.33
177.1	8920	16030	0.28
178.7	9040	17580	0.32
180.4	9040	16030	0.27
182.0	9040	17580	0.32
183.6	9040	18090	0.33
185.3	9040	17340	0.31
186.9	9170	18090	0.33
188.6	9450	18900	0.33
190.2	9310	18900	0.34
191.8	9310	18620	0.33

Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V_s	V_p	
(m)	(m/s)	(m/s)	
49.5	2570	5360	0.35
50.1	3110	5850	0.30
50.5	3110	5850	0.30
51.0	3160	5670	0.27
51.5	3160	5940	0.30
52.0	2970	5590	0.30
52.5	3060	5850	0.31
53.0	2680	5760	0.36
53.5	2720	5360	0.33
54.0	2720	4880	0.28
54.5	2760	5360	0.32
55.0	2760	4880	0.27
55.5	2760	5360	0.32
56.0	2760	5510	0.33
56.5	2760	5290	0.31
57.0	2800	5510	0.33
57.5	2880	5760	0.33
58.0	2840	5760	0.34
58.5	2840	5670	0.33

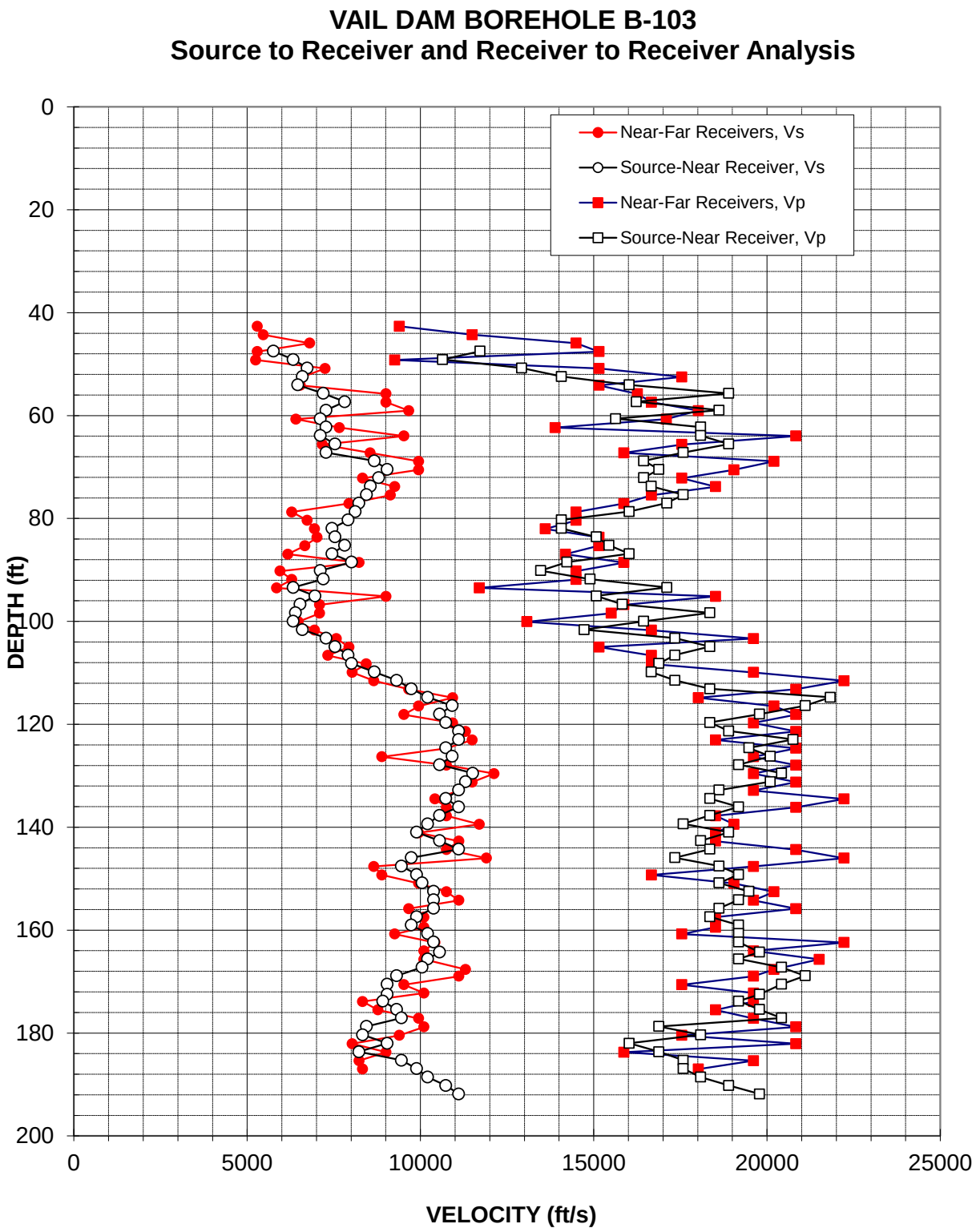


Figure A-2: Boring B-103, Suspension S-R1 P- and S_H-wave velocities

Table A-2. Boring B-103, S - R1 quality assurance analysis P- and S_H-wave data

Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio Based on Source-to-Receiver Travel Time Data - Borehole B-103

American Units				Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio	Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V_s	V_p			V_s	V_p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
47.5	5750	11720	0.34	14.5	1750	3570	0.34
49.1	6330	10640	0.23	15.0	1930	3240	0.23
50.8	6730	12920	0.31	15.5	2050	3940	0.31
52.4	6590	14070	0.36	16.0	2010	4290	0.36
54.0	6460	16030	0.40	16.5	1970	4880	0.40
55.7	7190	18900	0.42	17.0	2190	5760	0.42
57.3	7810	16230	0.35	17.5	2380	4950	0.35
59.0	7280	18620	0.41	18.0	2220	5670	0.41
60.6	7110	15630	0.37	18.5	2170	4760	0.37
62.2	7280	18090	0.40	19.0	2220	5510	0.40
63.9	7110	18090	0.41	19.5	2170	5510	0.41
65.5	7540	18900	0.41	20.0	2300	5760	0.41
67.2	7280	17580	0.40	20.5	2220	5360	0.40
68.8	8670	16440	0.31	21.0	2640	5010	0.31
70.5	9040	16880	0.30	21.5	2760	5150	0.30
72.1	8790	16440	0.30	22.0	2680	5010	0.30
73.7	8550	16660	0.32	22.5	2610	5080	0.32
75.4	8440	17580	0.35	23.0	2570	5360	0.35
77.0	8220	17110	0.35	23.5	2510	5210	0.35
78.7	8120	16030	0.33	24.0	2470	4880	0.33
80.3	7910	14070	0.27	24.5	2410	4290	0.27
81.9	7450	14070	0.31	25.0	2270	4290	0.31
83.6	7540	15070	0.33	25.5	2300	4590	0.33
85.2	7810	15440	0.33	26.0	2380	4710	0.33
86.9	7450	16030	0.36	26.5	2270	4880	0.36
88.5	8010	14220	0.27	27.0	2440	4340	0.27
90.1	7110	13470	0.31	27.5	2170	4110	0.31
91.8	7190	14890	0.35	28.0	2190	4540	0.35
93.4	6330	17110	0.42	28.5	1930	5210	0.42
95.1	6960	15070	0.36	29.0	2120	4590	0.36
96.7	6530	15830	0.40	29.5	1990	4820	0.40
98.3	6390	18350	0.43	30.0	1950	5590	0.43
100.0	6330	16440	0.41	30.5	1930	5010	0.41
101.6	6590	14720	0.37	31.0	2010	4490	0.37
103.3	7280	17340	0.39	31.5	2220	5290	0.39
104.9	7540	18350	0.40	32.0	2300	5590	0.40
106.5	7910	17340	0.37	32.5	2410	5290	0.37

Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio Based on Source-to-Receiver Travel Time Data - Borehole B-103

American Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V_s	V_p	
(ft)	(ft/s)	(ft/s)	
108.2	8010	16880	0.35
109.8	8670	16660	0.31
111.5	9310	17340	0.30
113.1	9740	18350	0.30
114.7	10210	21830	0.36
116.4	10910	21100	0.32
118.0	10550	19780	0.30
119.7	10730	18350	0.24
121.3	11110	18900	0.24
122.9	11110	20750	0.30
124.6	10730	19480	0.28
126.2	10910	20100	0.29
127.9	10550	19180	0.28
129.5	11510	20420	0.27
131.1	11300	20100	0.27
132.8	11110	18620	0.22
134.4	10730	18350	0.24
136.1	11110	19180	0.25
137.7	10550	18350	0.25
139.3	10210	17580	0.25
141.0	9890	18900	0.31
142.6	10550	18090	0.24
144.3	11110	18350	0.21
145.9	9740	17340	0.27
147.6	9450	18620	0.33
149.2	9890	19180	0.32
150.8	10050	18620	0.29
152.5	10380	19480	0.30
154.1	10380	19180	0.29
155.8	10380	18620	0.27
157.4	9890	18350	0.30
159.0	9740	19180	0.33
160.7	10210	19180	0.30
162.3	10380	19180	0.29
164.3	10550	19780	0.30
165.6	10210	19180	0.30
167.2	10050	20420	0.34
168.9	9310	21100	0.38
170.5	9040	20420	0.38

Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V_s	V_p	
(m)	(m/s)	(m/s)	
33.0	2440	5150	0.35
33.5	2640	5080	0.31
34.0	2840	5290	0.30
34.5	2970	5590	0.30
35.0	3110	6650	0.36
35.5	3330	6430	0.32
36.0	3220	6030	0.30
36.5	3270	5590	0.24
37.0	3380	5760	0.24
37.5	3380	6330	0.30
38.0	3270	5940	0.28
38.5	3330	6130	0.29
39.0	3220	5850	0.28
39.5	3510	6220	0.27
40.0	3450	6130	0.27
40.5	3380	5670	0.22
41.0	3270	5590	0.24
41.5	3380	5850	0.25
42.0	3220	5590	0.25
42.5	3110	5360	0.25
43.0	3010	5760	0.31
43.5	3220	5510	0.24
44.0	3380	5590	0.21
44.5	2970	5290	0.27
45.0	2880	5670	0.33
45.5	3010	5850	0.32
46.0	3060	5670	0.29
46.5	3160	5940	0.30
47.0	3160	5850	0.29
47.5	3160	5670	0.27
48.0	3010	5590	0.30
48.5	2970	5850	0.33
49.0	3110	5850	0.30
49.5	3160	5850	0.29
50.1	3220	6030	0.30
50.5	3110	5850	0.30
51.0	3060	6220	0.34
51.5	2840	6430	0.38
52.0	2760	6220	0.38

Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole B-103

American Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V_s	V_p	
(ft)	(ft/s)	(ft/s)	
172.5	9040	19780	0.37
173.8	8920	19180	0.36
175.4	9310	19780	0.36
177.1	9450	20420	0.36
178.7	8440	16880	0.33
180.4	8330	18090	0.37
182.0	9040	16030	0.27
183.6	8220	16880	0.34
185.3	9450	17580	0.30
186.9	9890	17580	0.27
188.6	10210	18090	0.27
190.2	10730	18900	0.26
191.8	11110	19780	0.27

Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V_s	V_p	
(m)	(m/s)	(m/s)	
52.6	2760	6030	0.37
53.0	2720	5850	0.36
53.5	2840	6030	0.36
54.0	2880	6220	0.36
54.5	2570	5150	0.33
55.0	2540	5510	0.37
55.5	2760	4880	0.27
56.0	2510	5150	0.34
56.5	2880	5360	0.30
57.0	3010	5360	0.27
57.5	3110	5510	0.27
58.0	3270	5760	0.26
58.5	3380	6030	0.27

APPENDIX B

ACOUSTIC TELEVIEWER CALIPER LOGS

BHTV DATA PROCESSING
RGLDIP vsn 6.2
ACOUSTIC CALIPER LOG

AECOM

Borehole: B-101

VAIL DAM

top of borehole.....
East: _
North:_
Elev: _

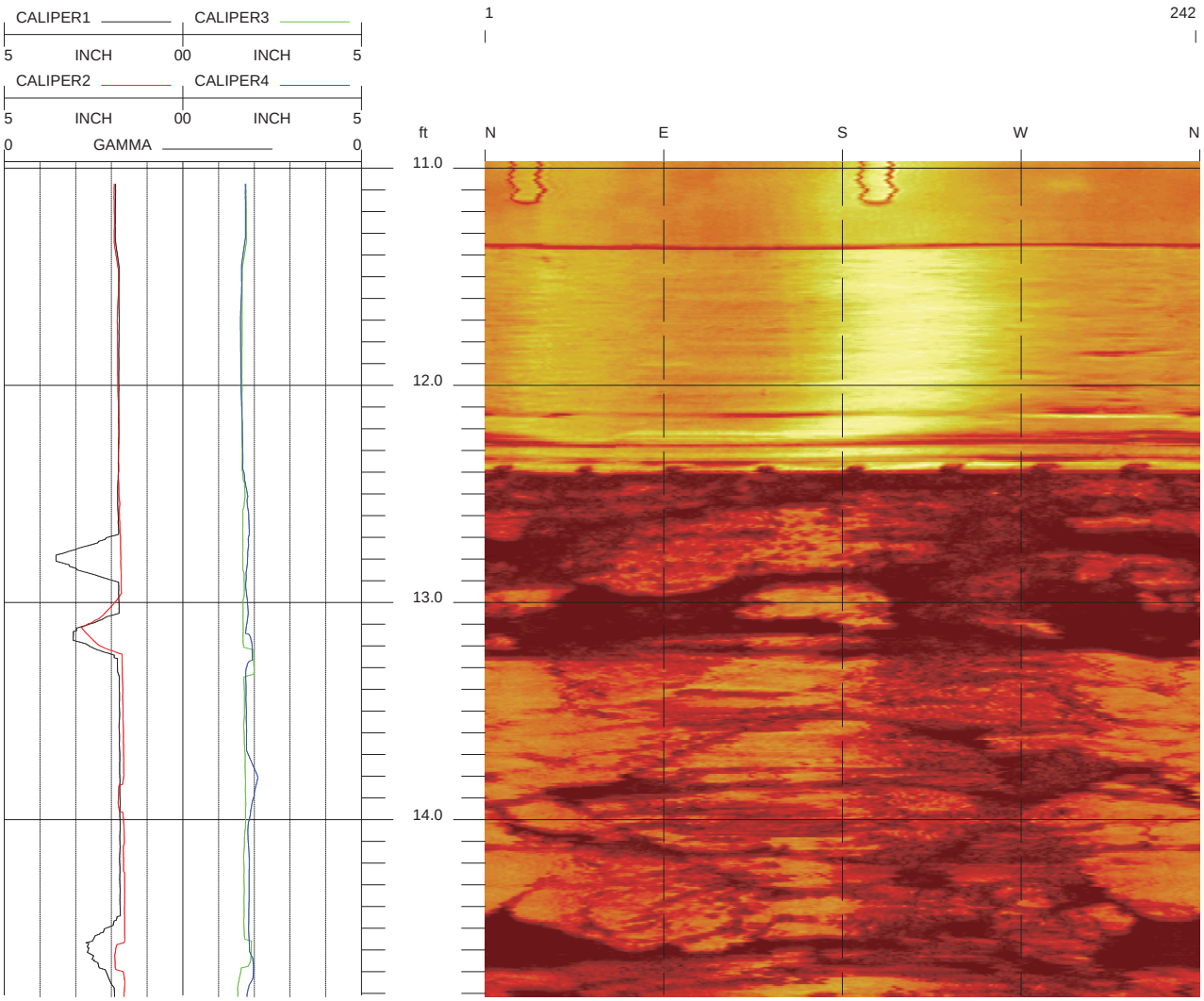
North ref. is true
Depth units are feet
Vertical scale: 1/10

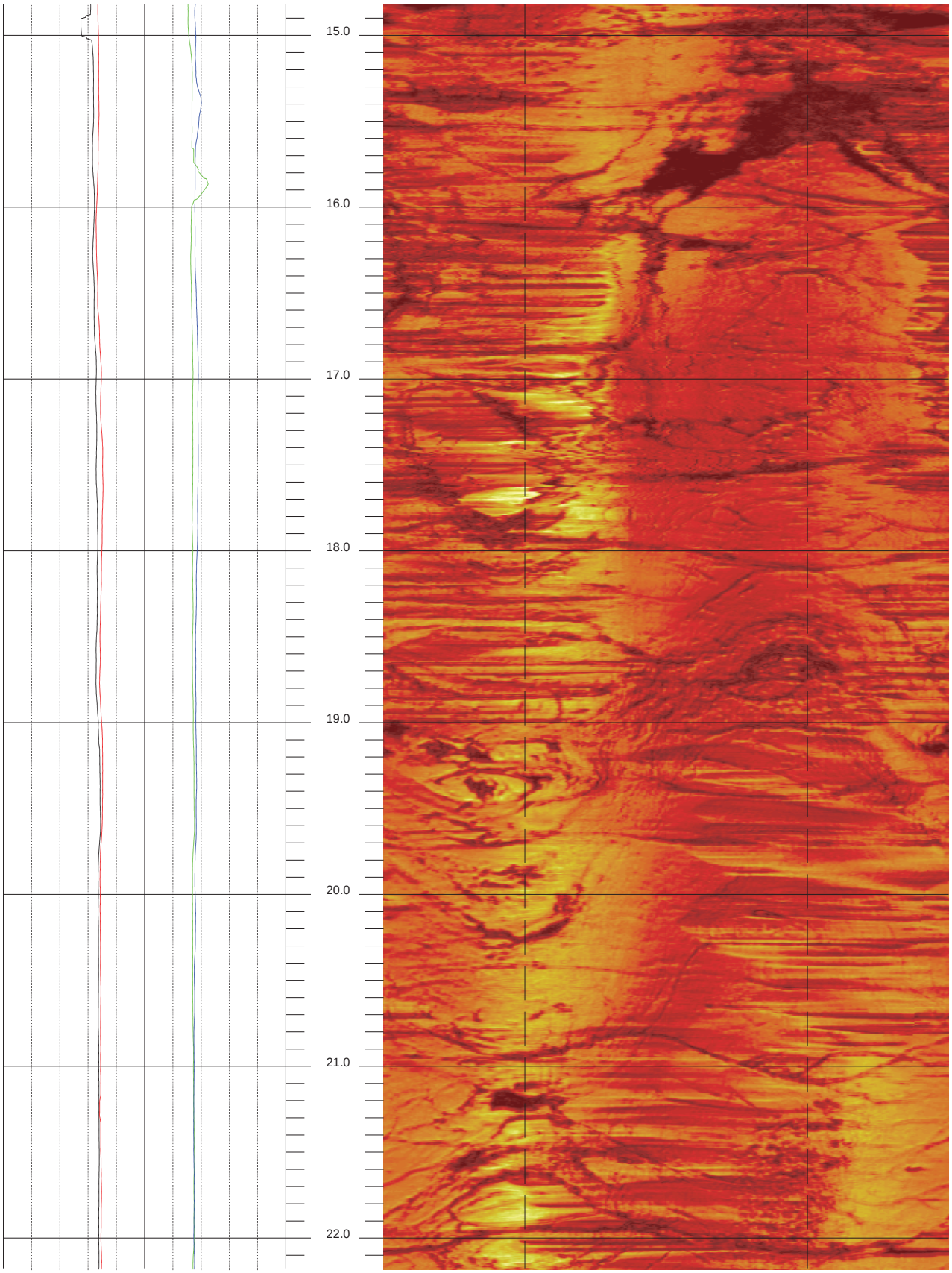
Zone from 149.828 to 10.972ft

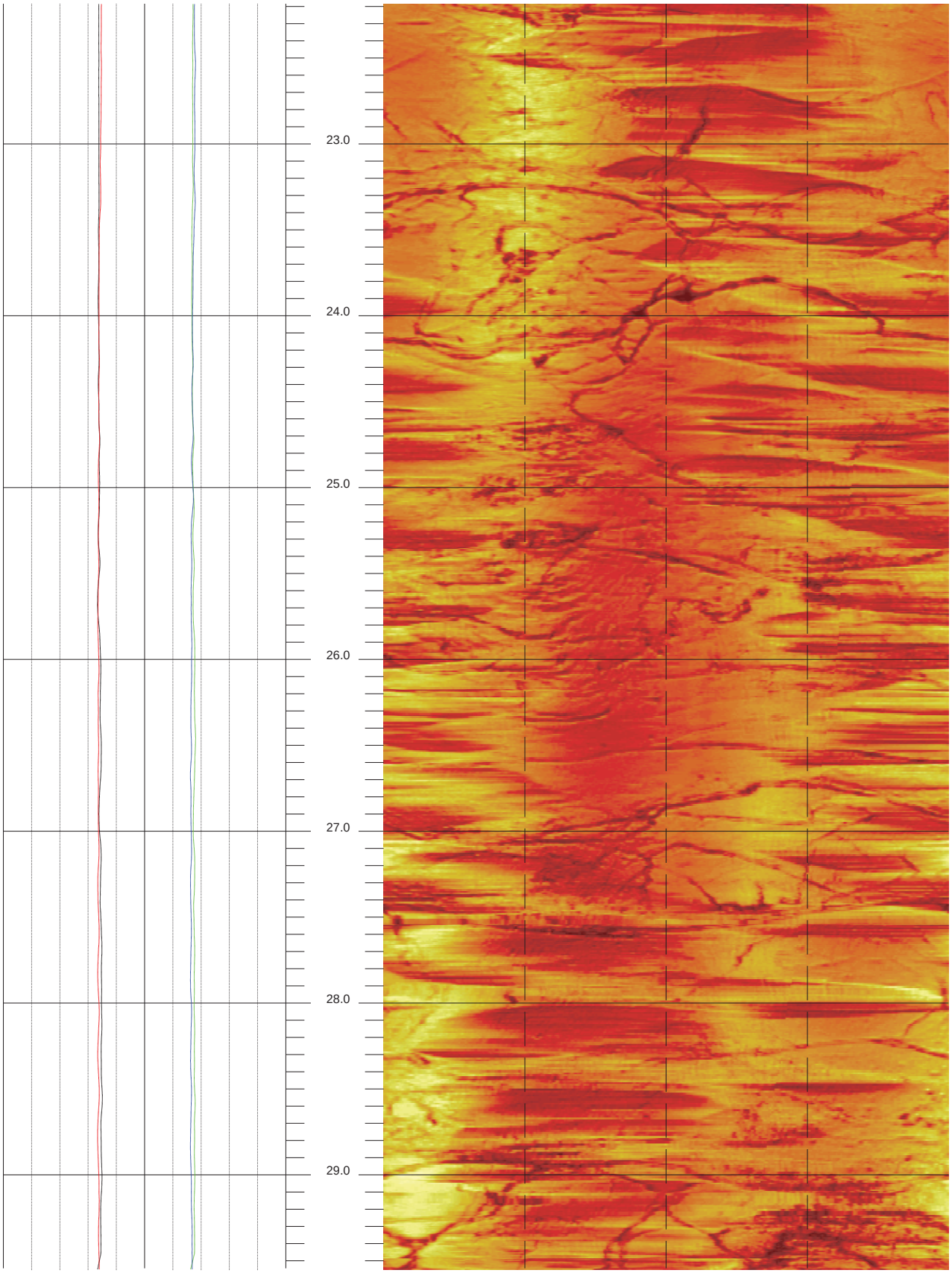
Borehole diam: 3.860inch
Vertical = borehole-axis
Image: Amplitude

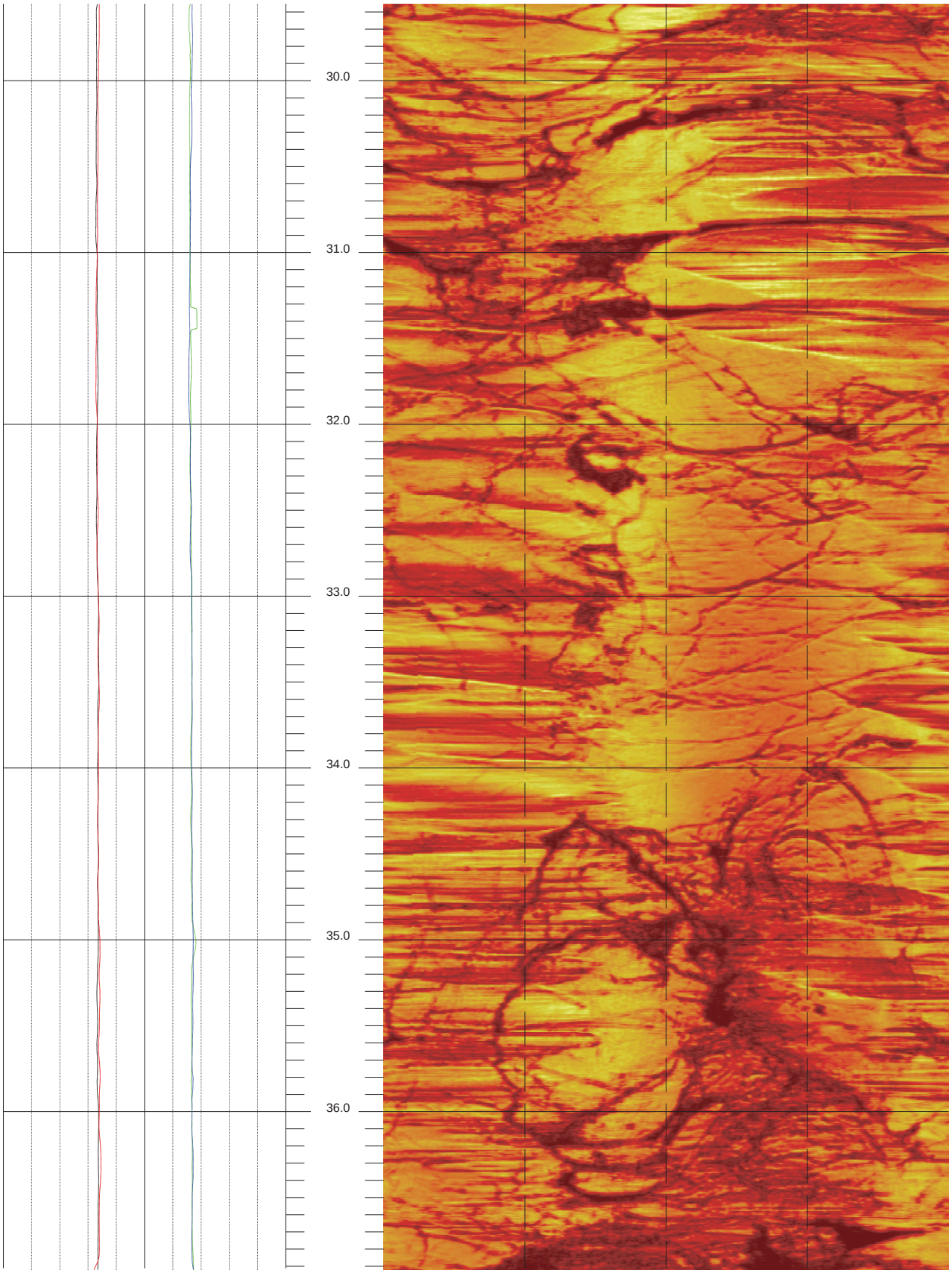
Depth interval 0.004ft, Filter length 0.124ft

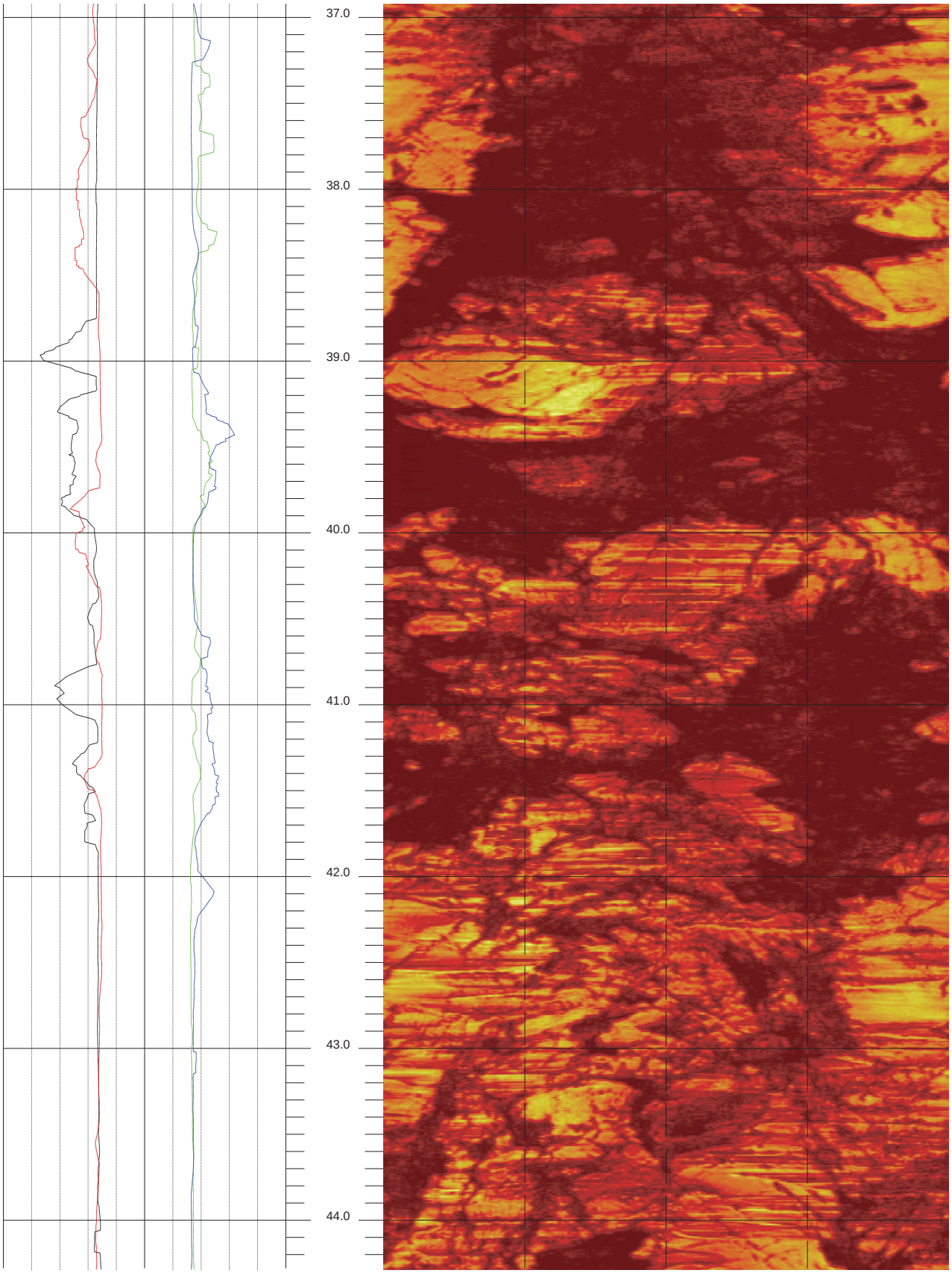
REFLECTANCE

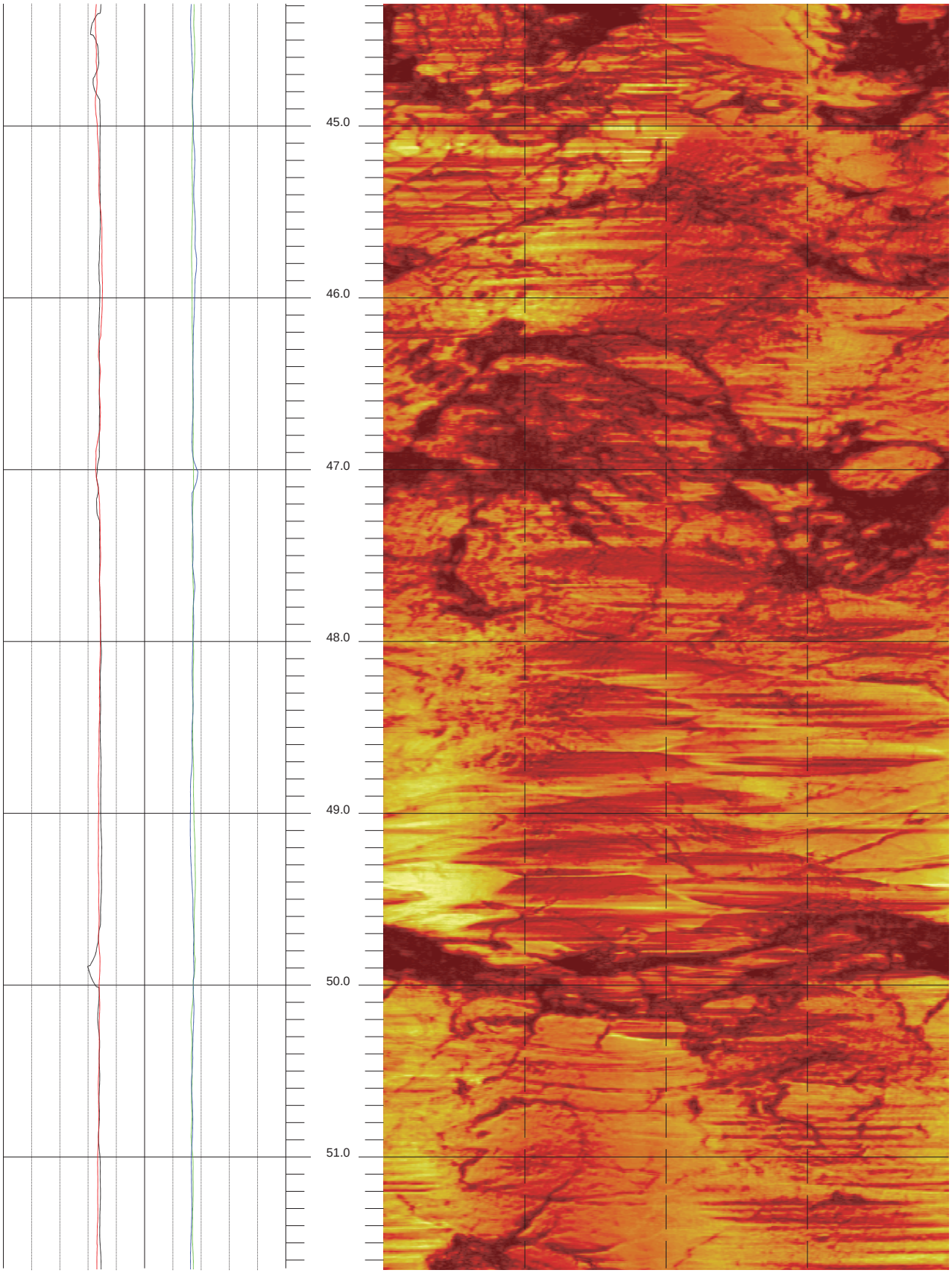


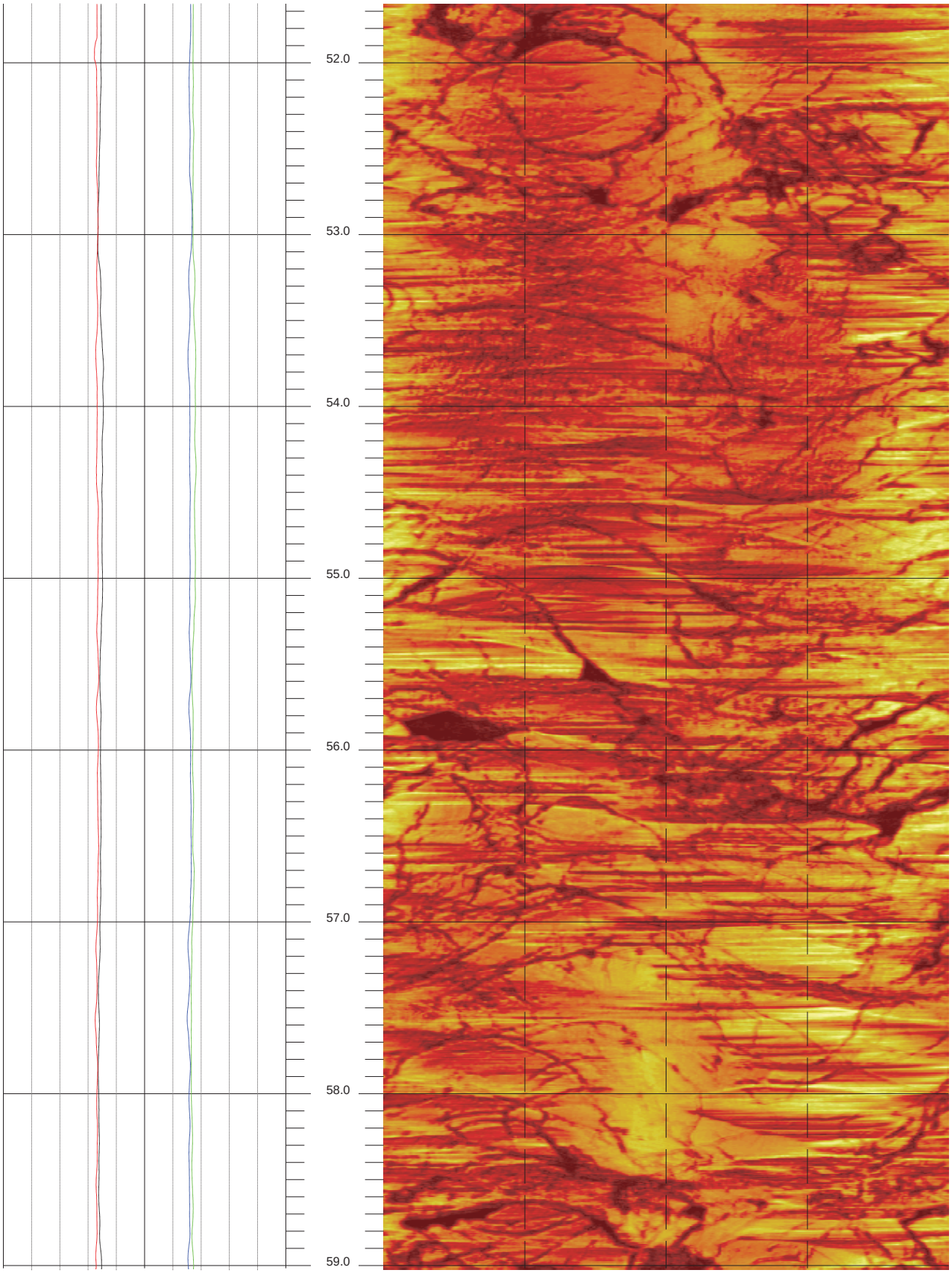

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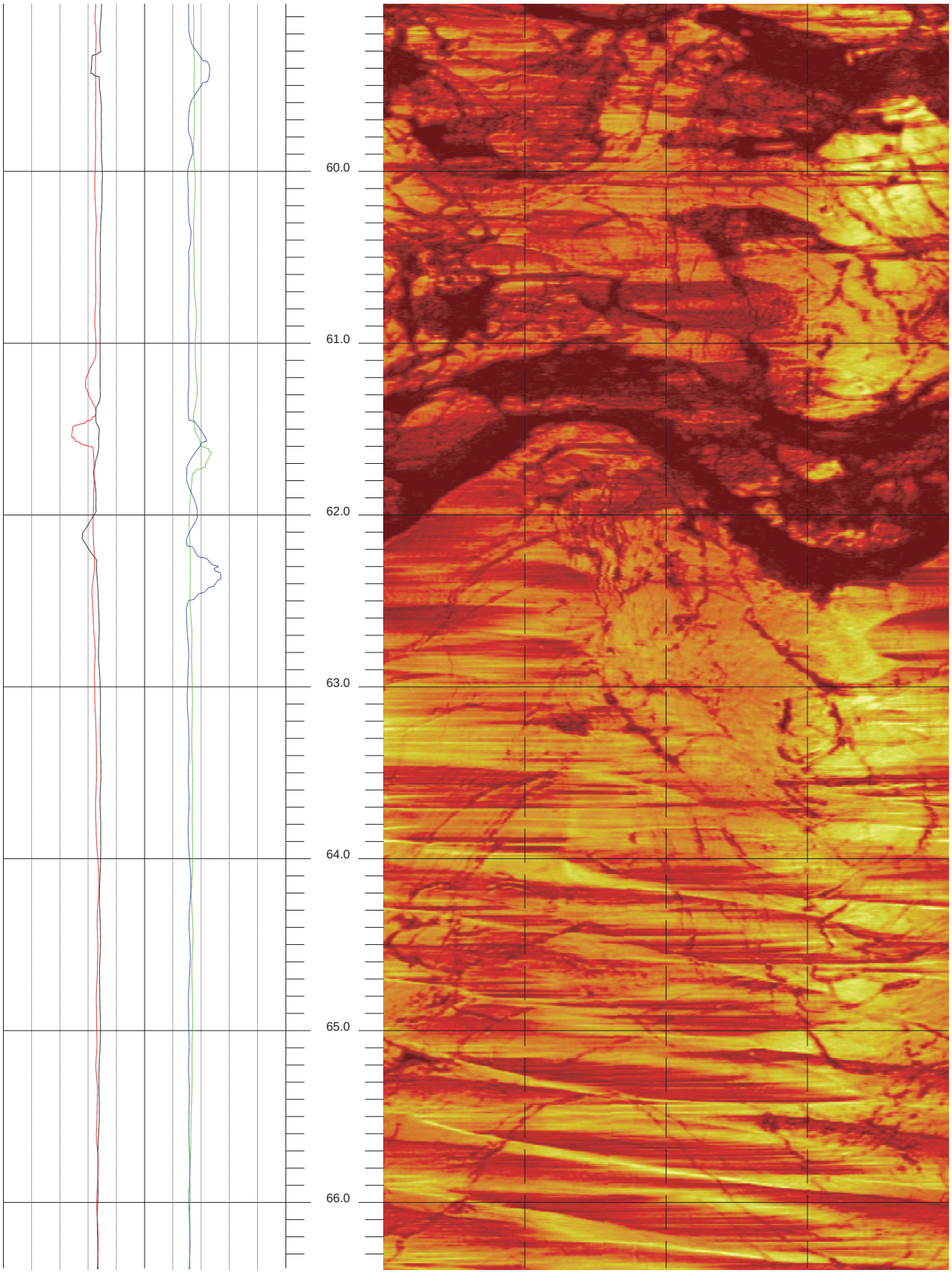

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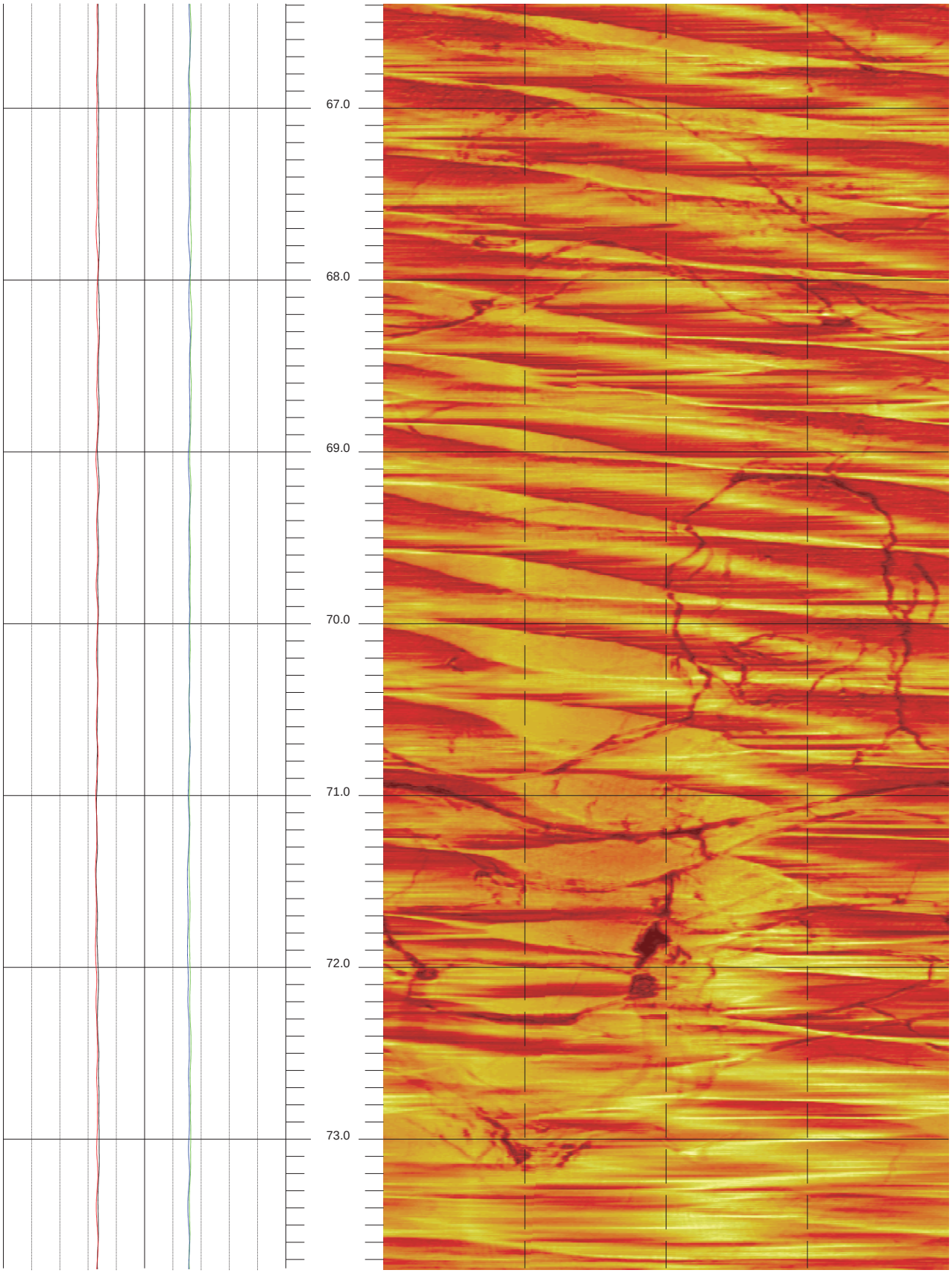

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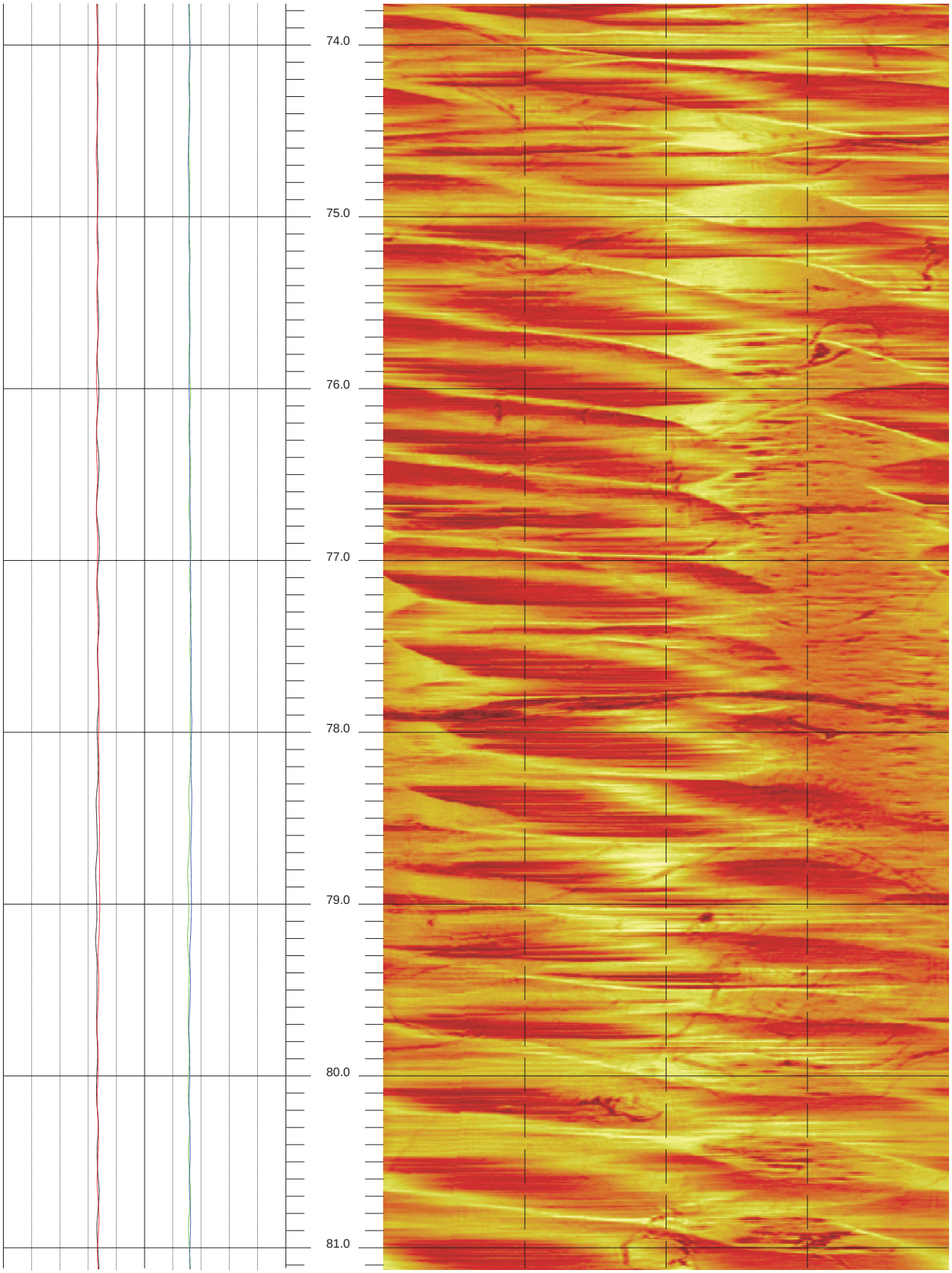

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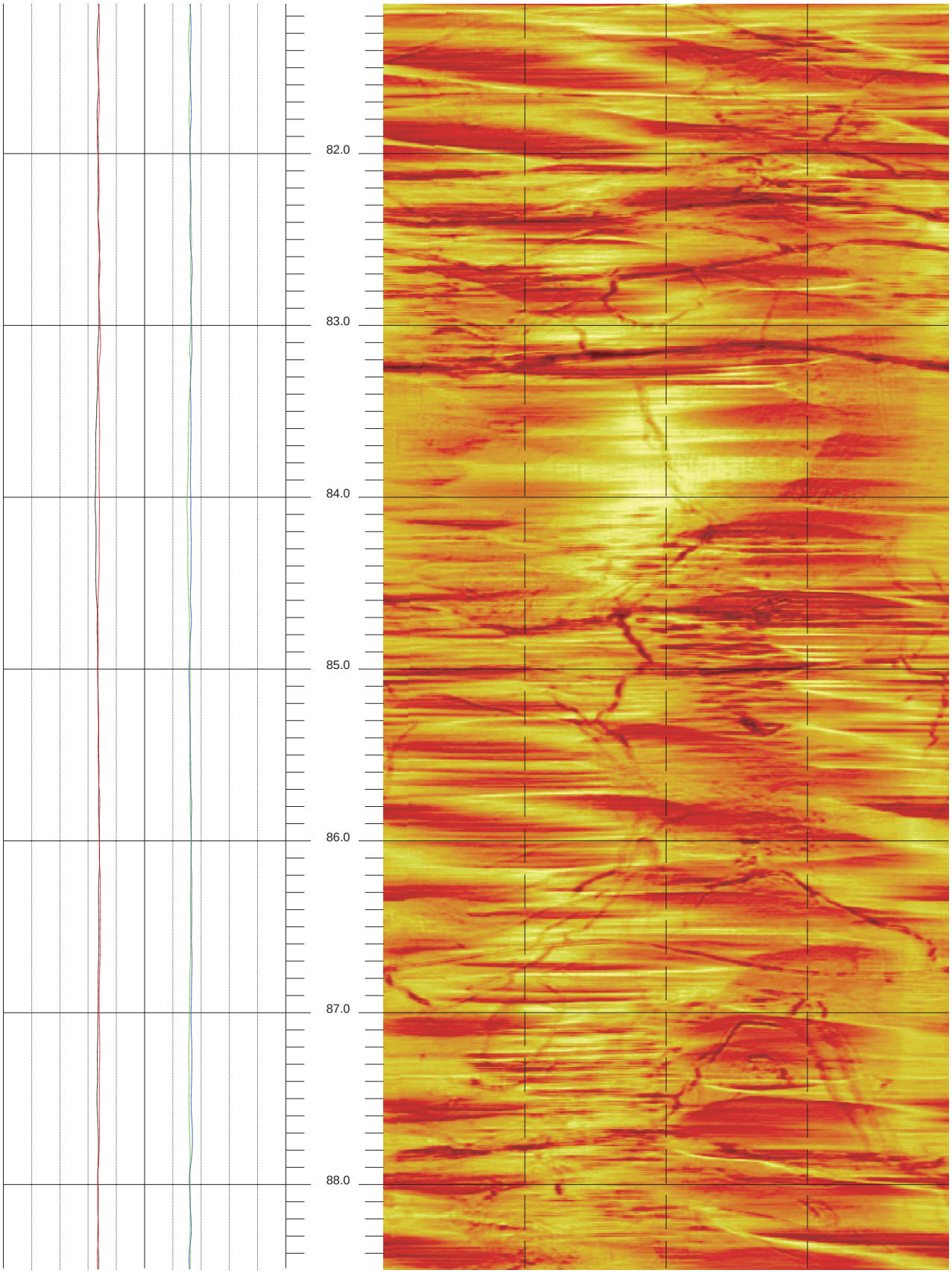

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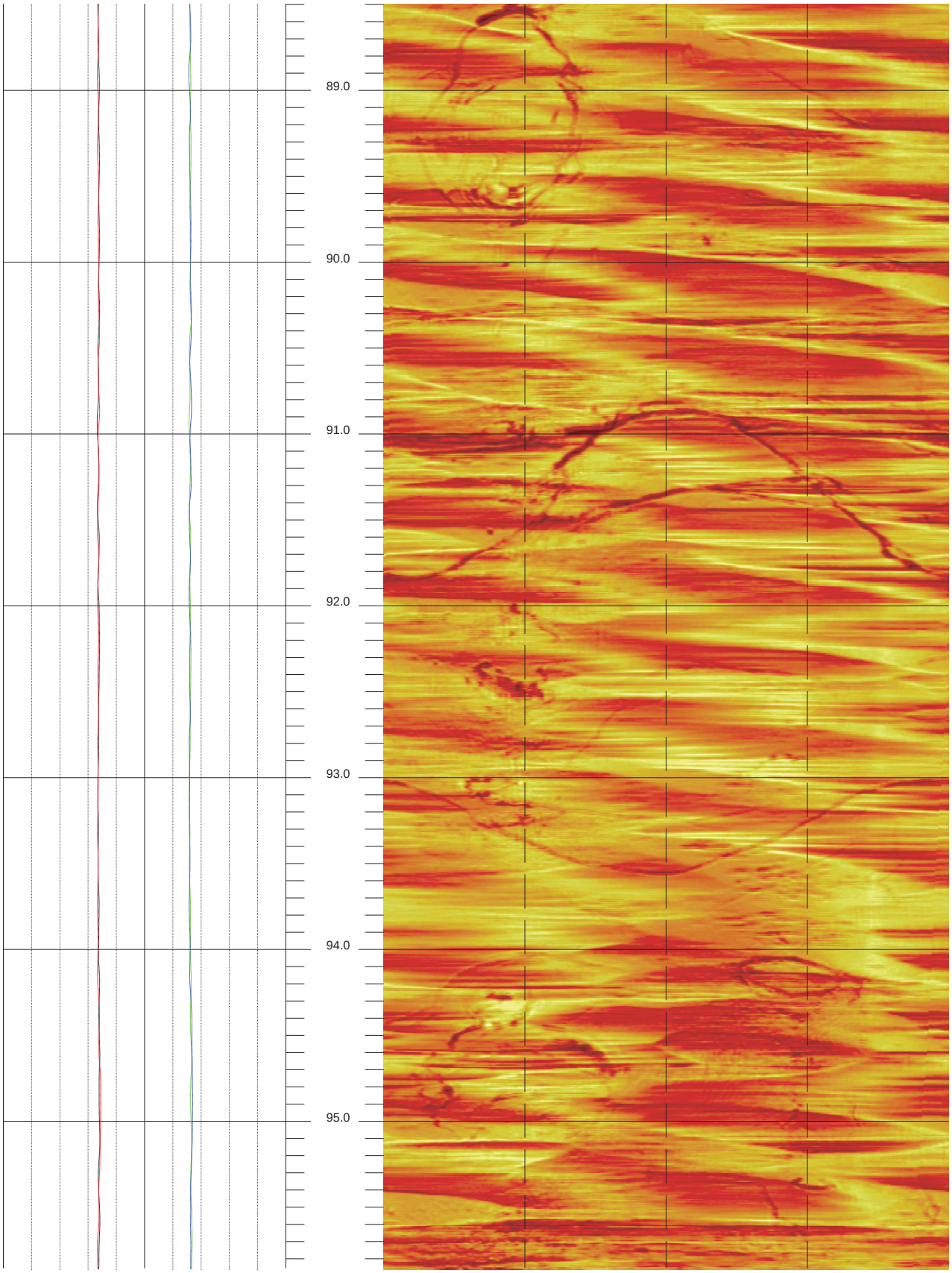

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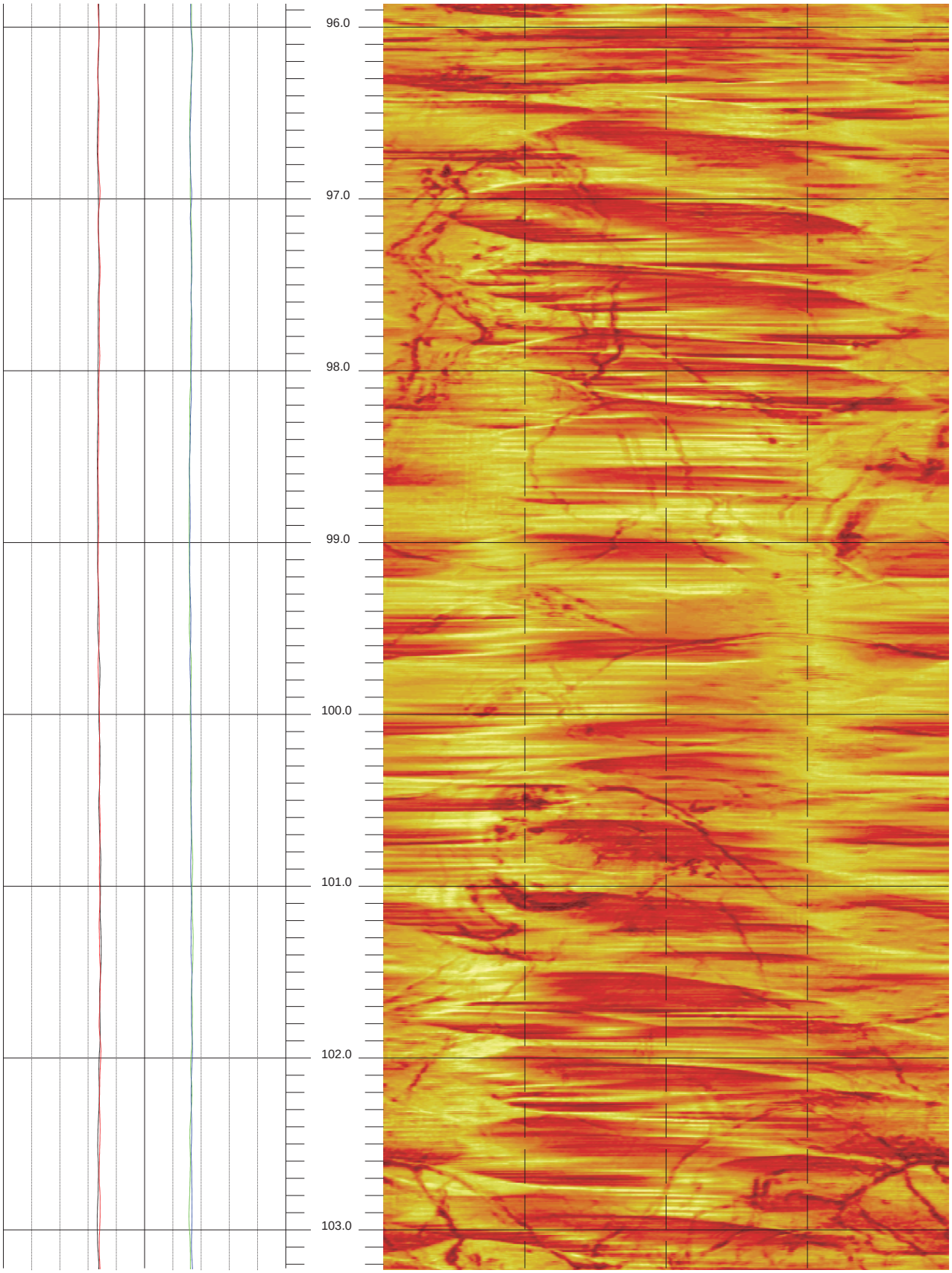

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66.0

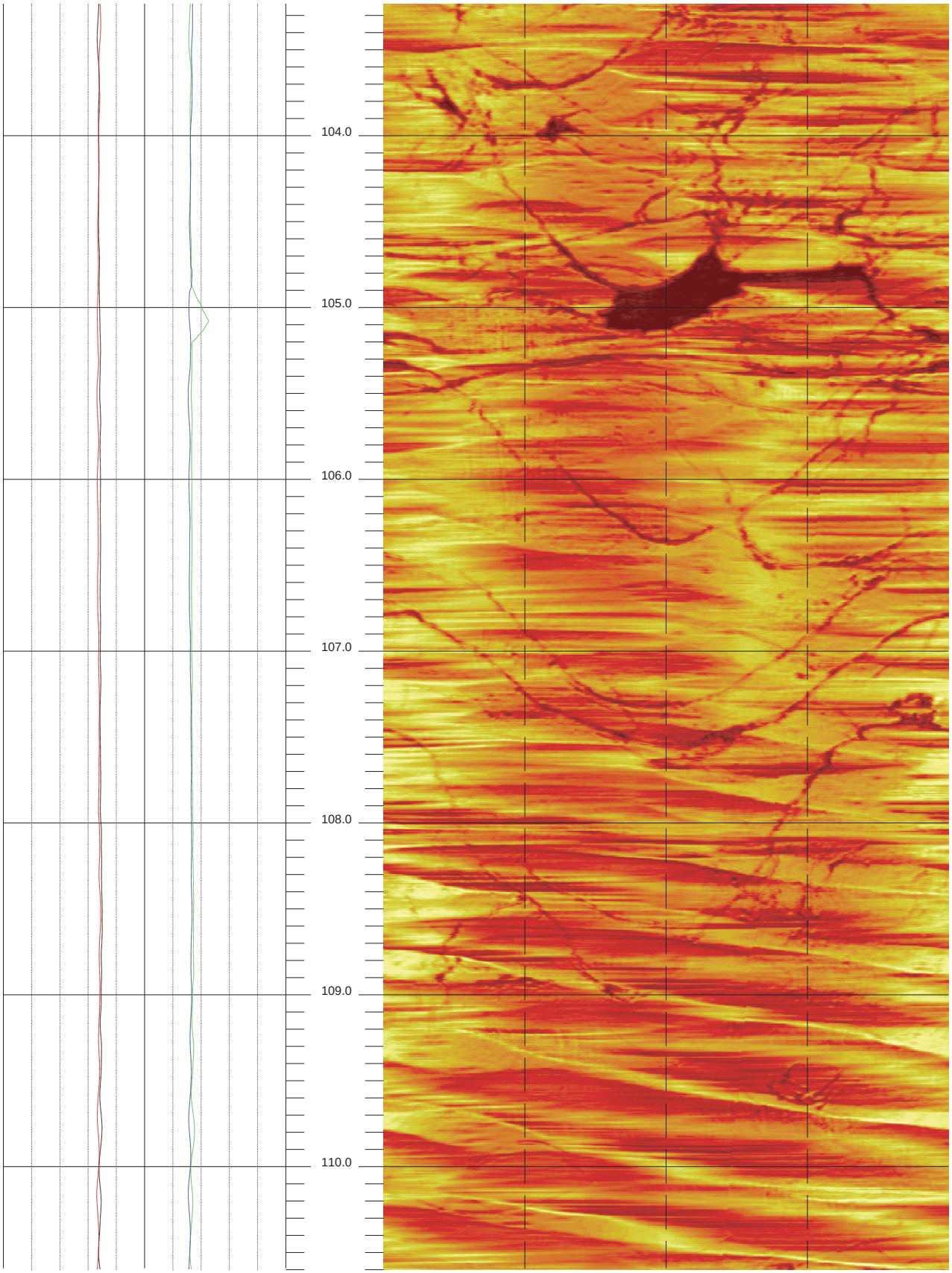

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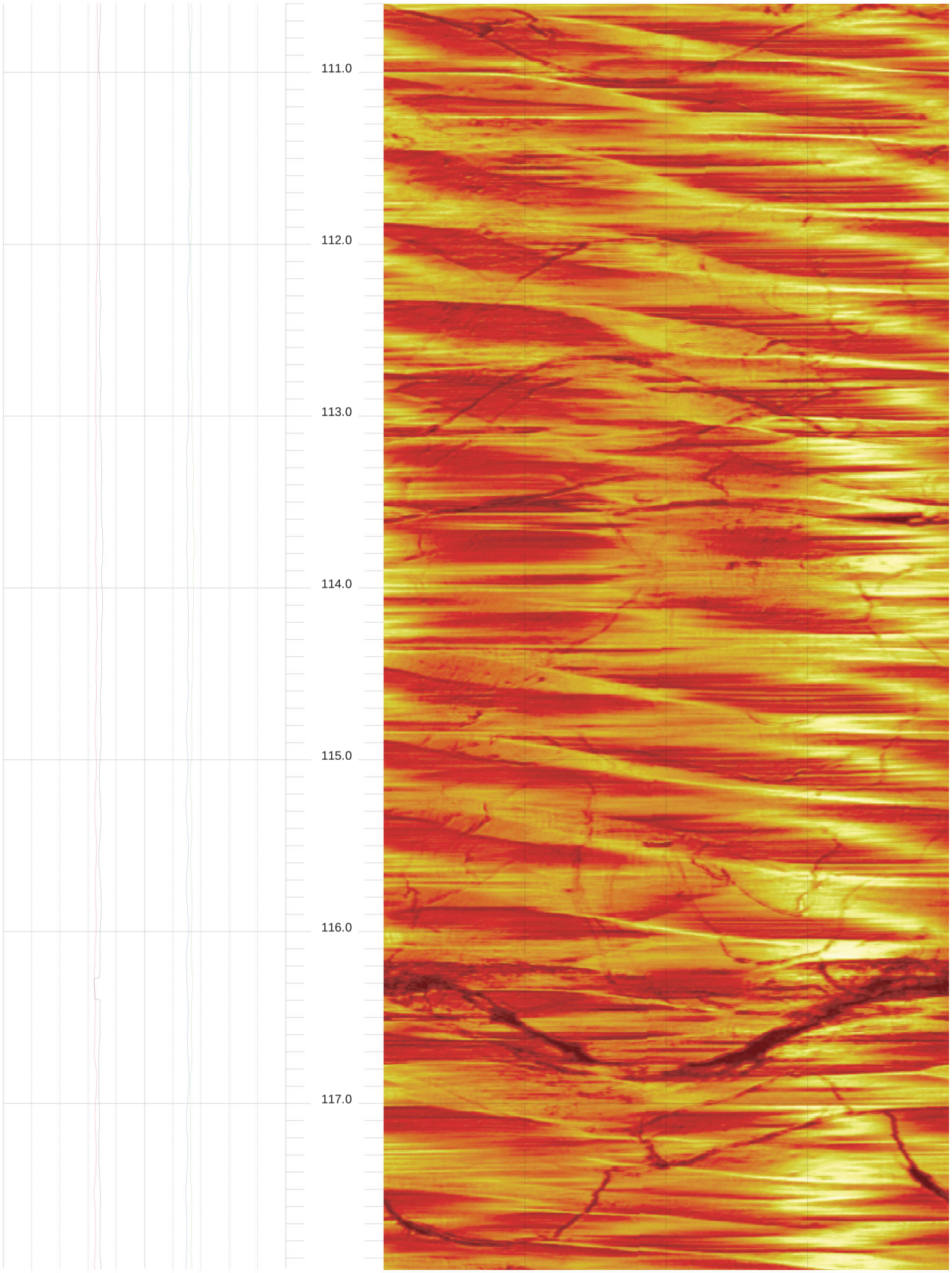

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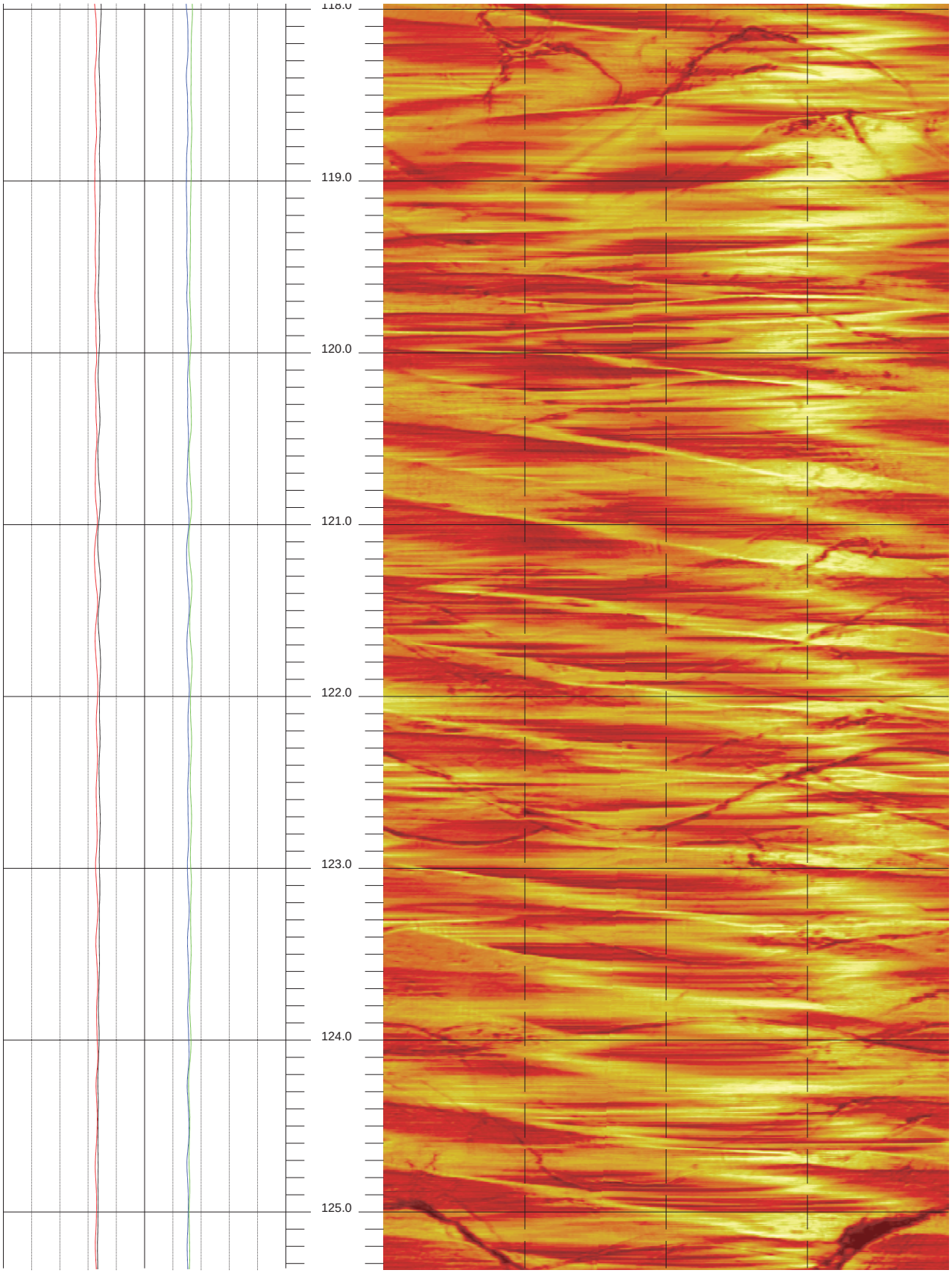

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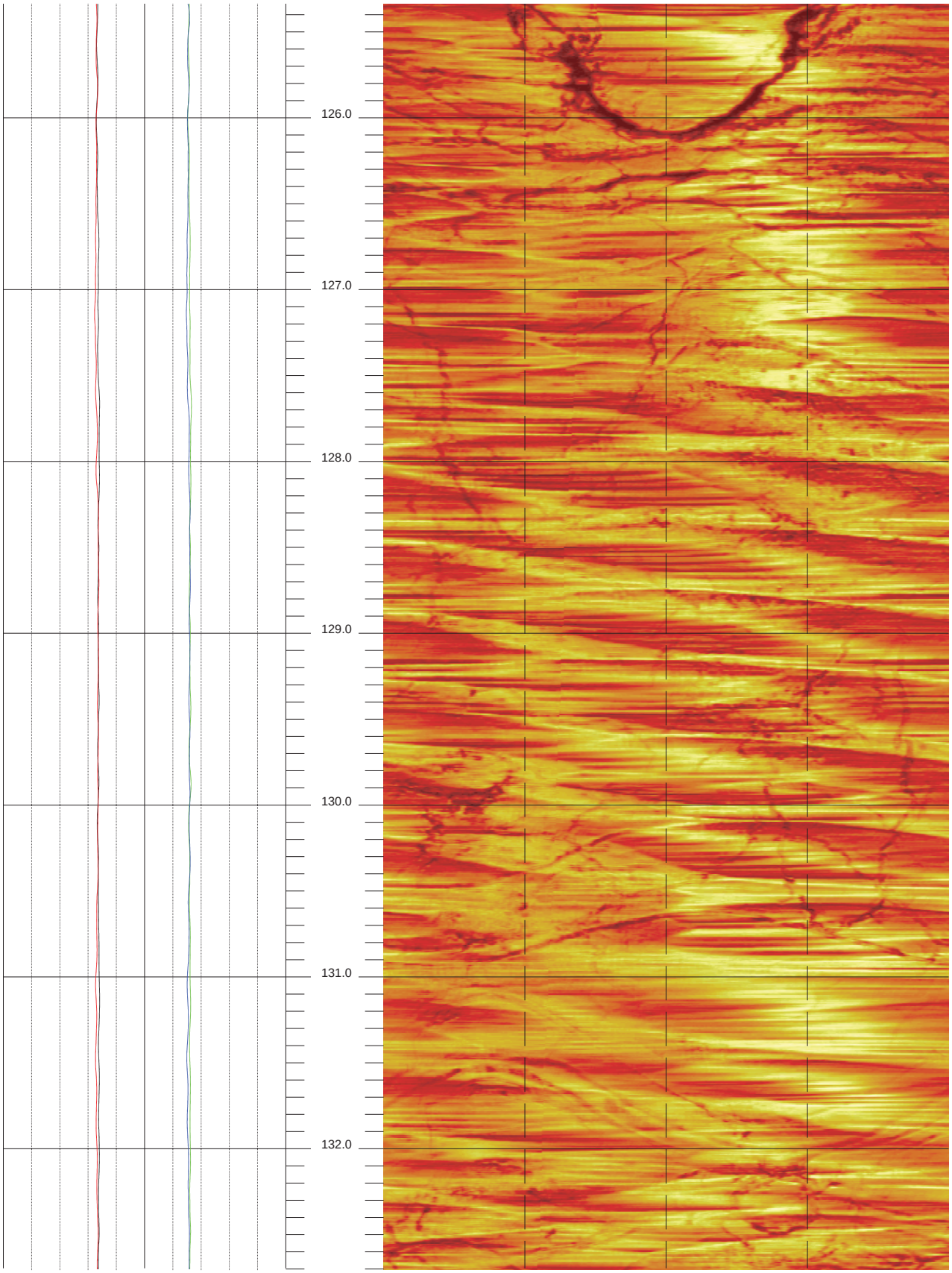

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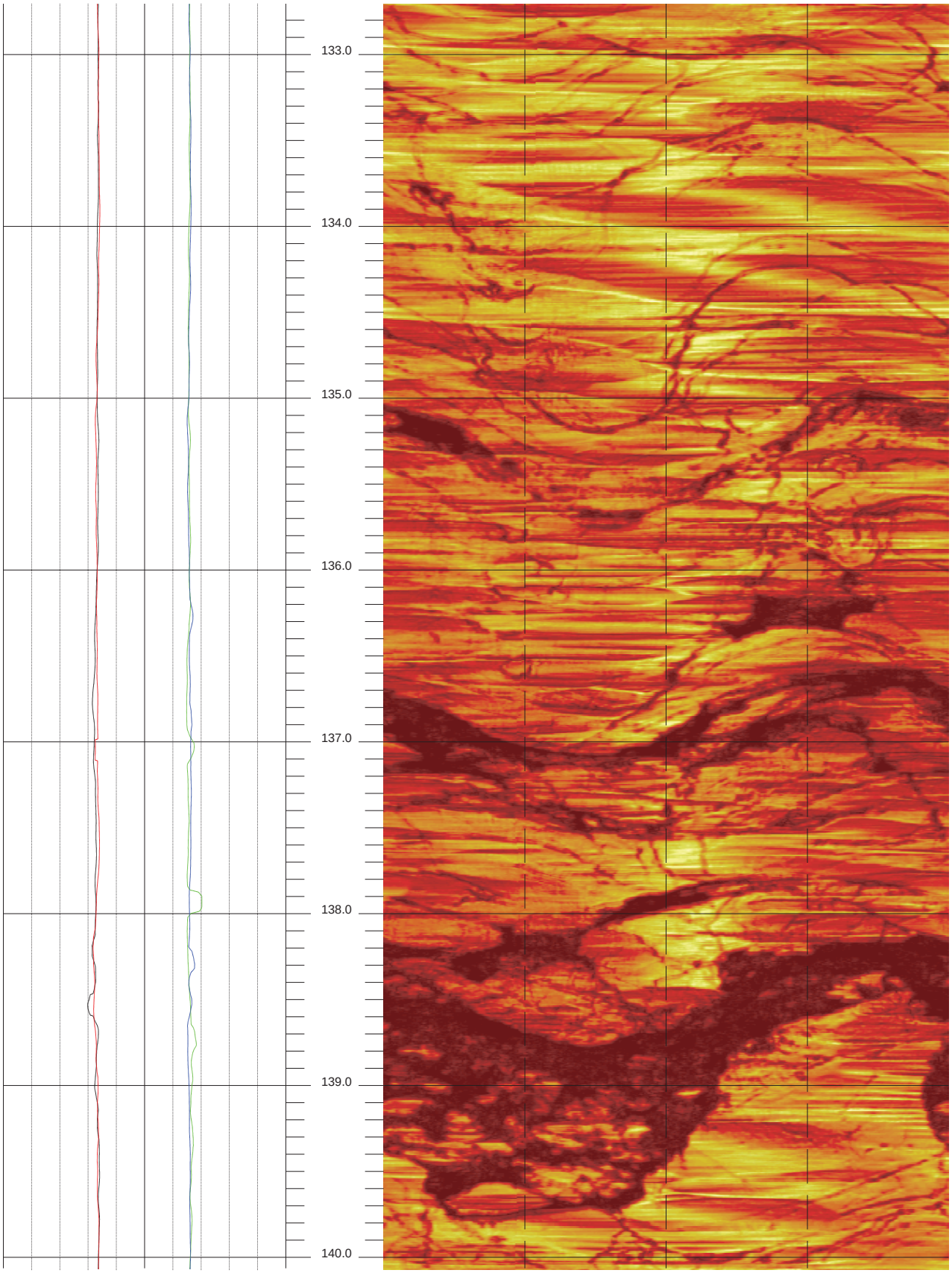

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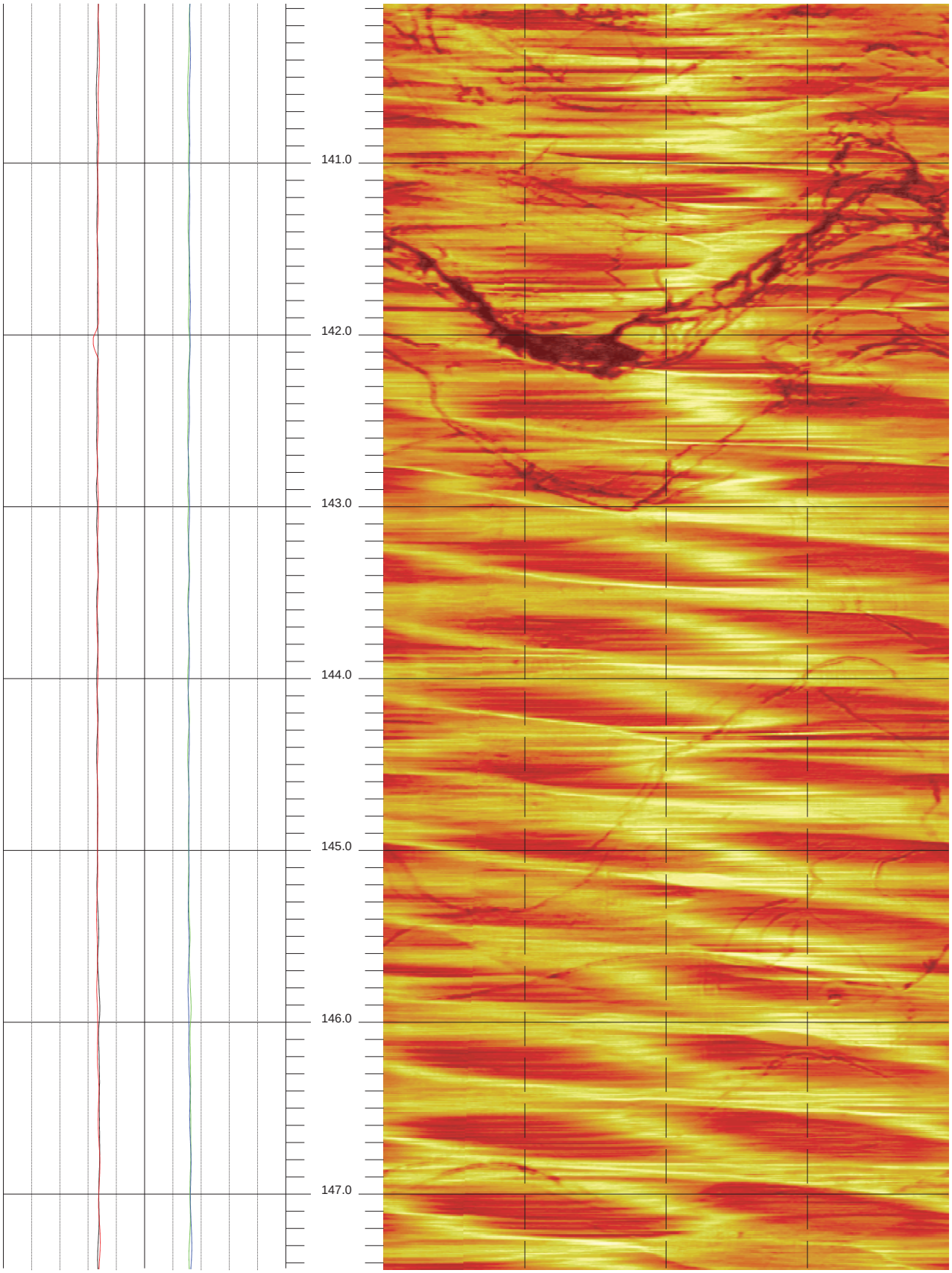

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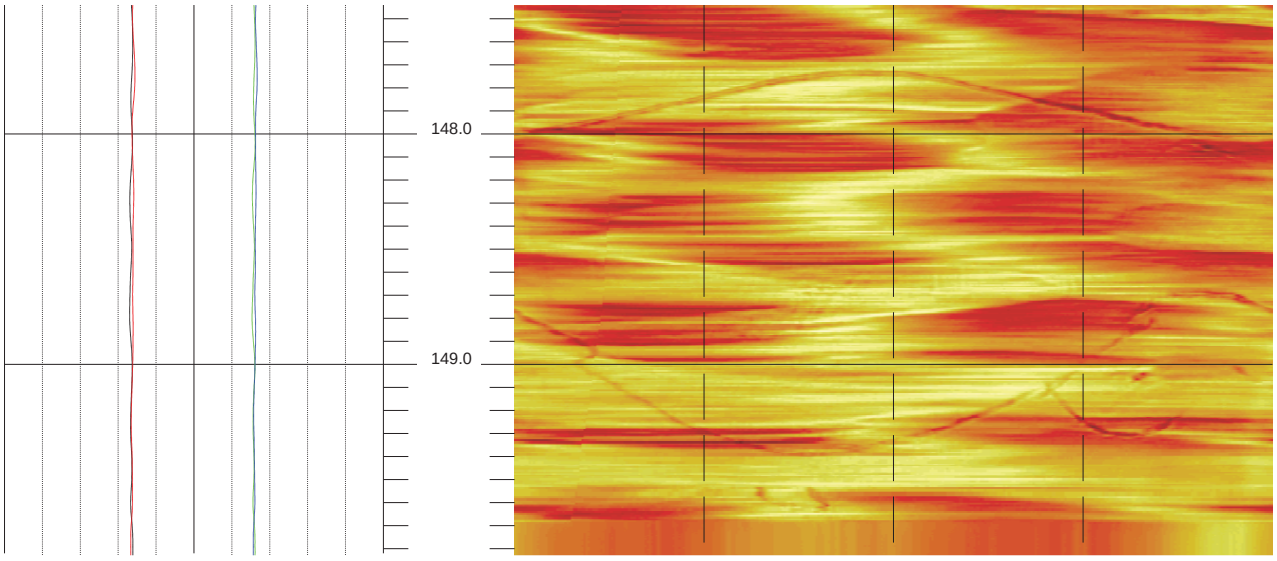

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119.0
120.0
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122.0
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126.0
127.0
128.0
129.0
130.0
131.0
132.0


133.0
134.0
135.0
136.0
137.0
138.0
139.0
140.0


141.0
142.0
143.0
144.0
145.0
146.0
147.0


148.0
149.0

BHTV DATA PROCESSING
RGLDIP vsn 6.2
ACOUSTIC CALIPER LOG

AECOM

Borehole: B-102

VAIL DAM

top of borehole.....
East: _
North:_
Elev: _

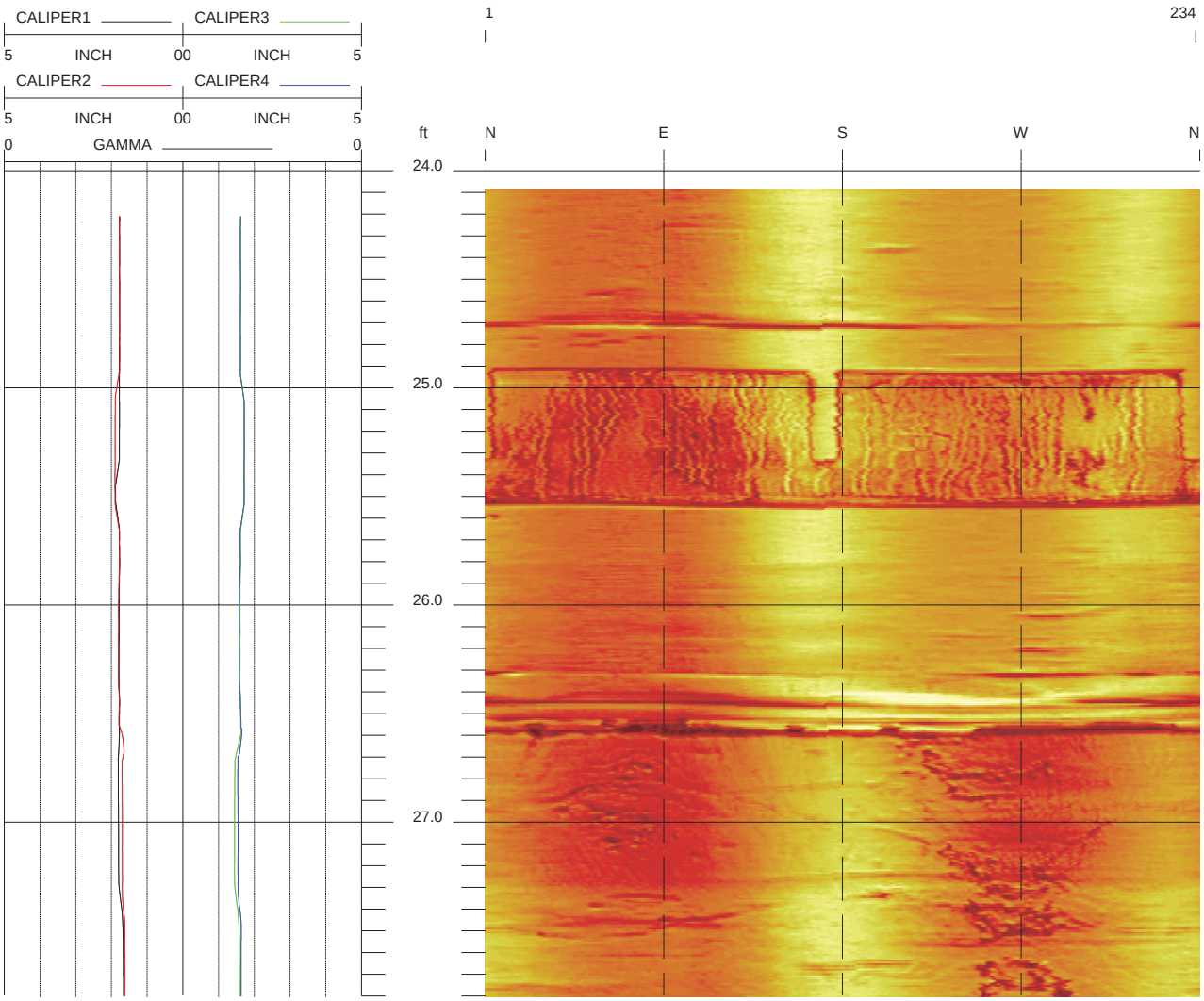
North ref. is true
Depth units are feet
Vertical scale: 1/10

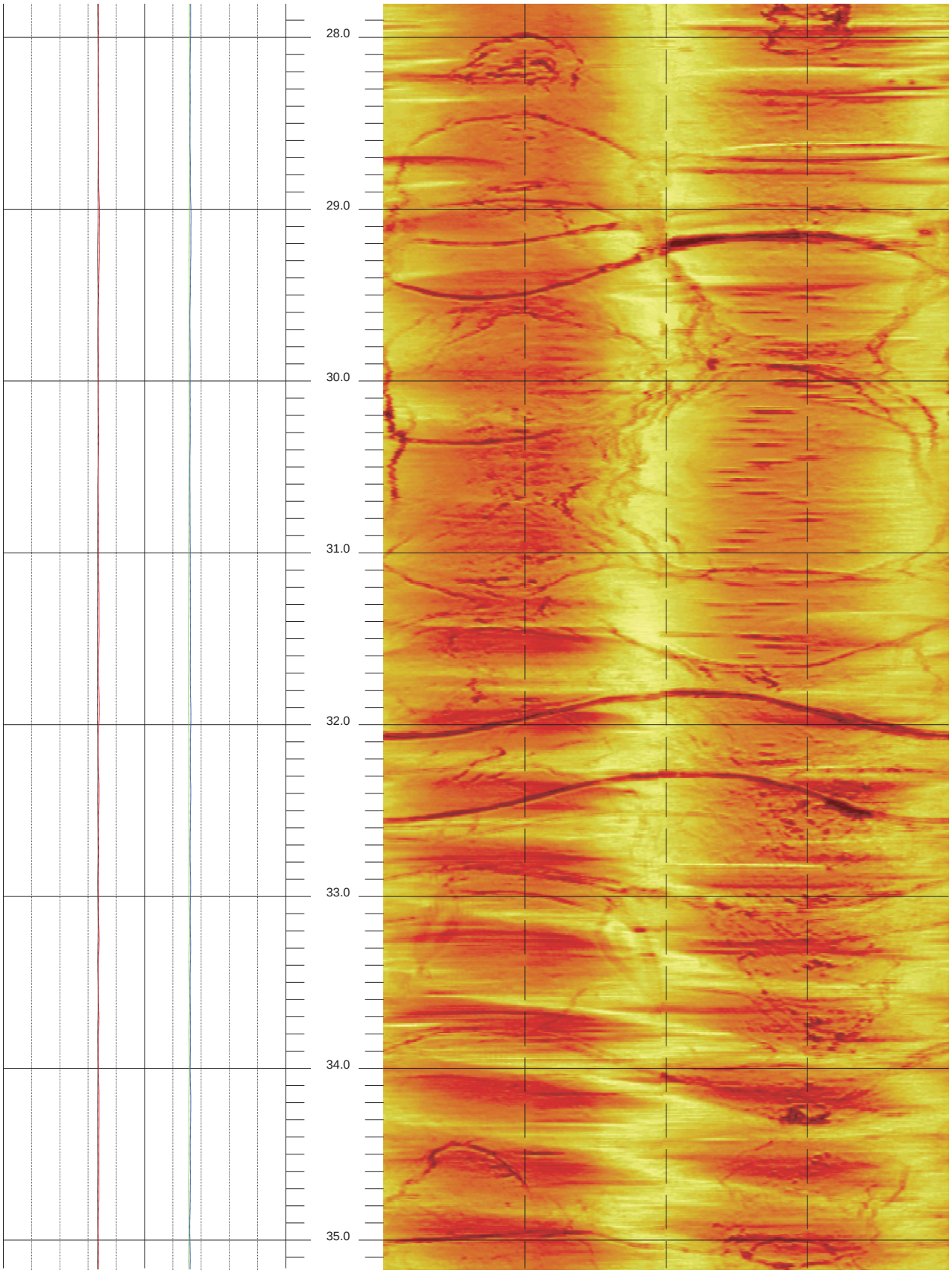
Zone from 198.448 to 23.960ft

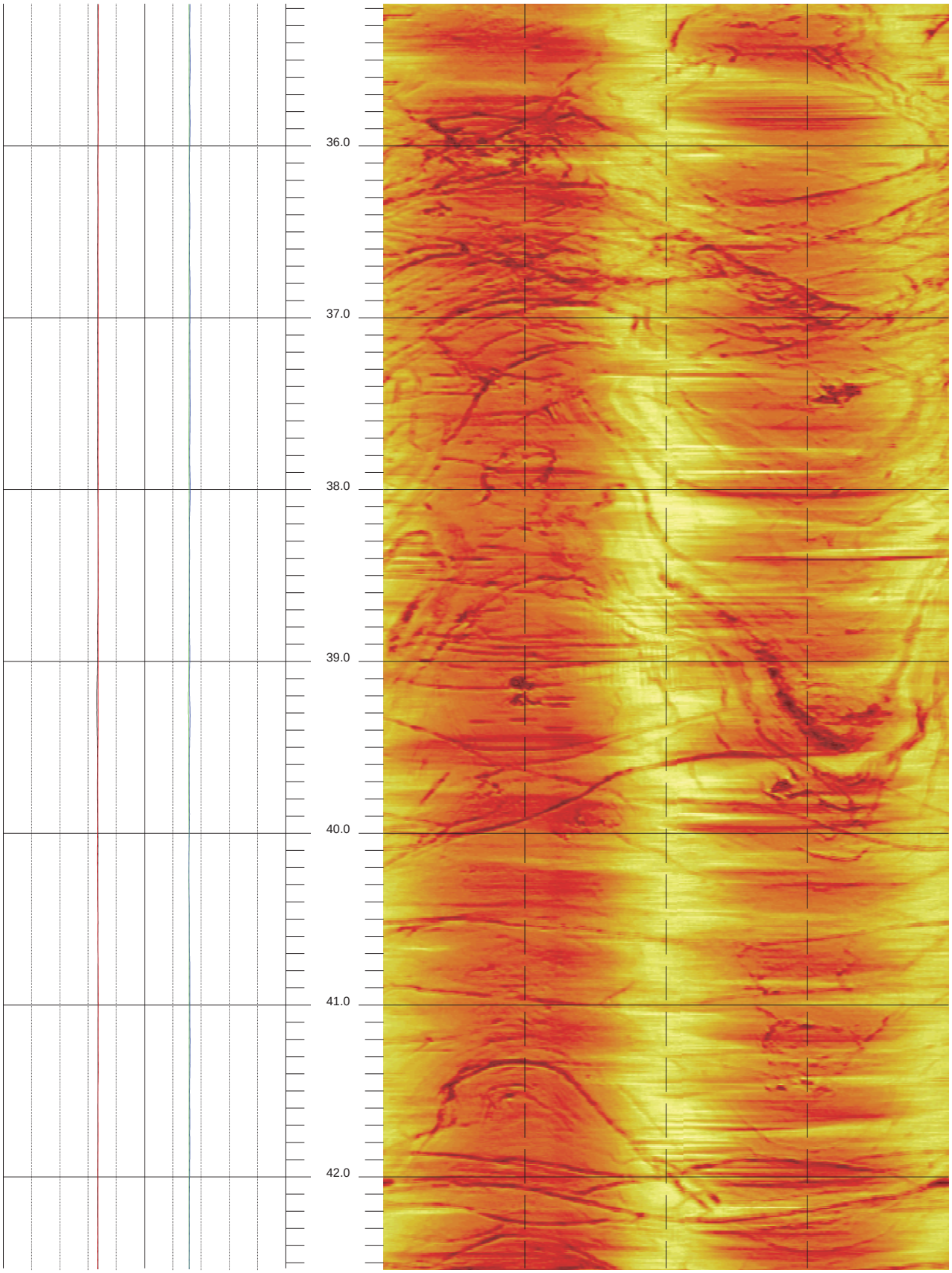
Borehole diam: 3.860inch
Vertical = borehole-axis
Image: Amplitude

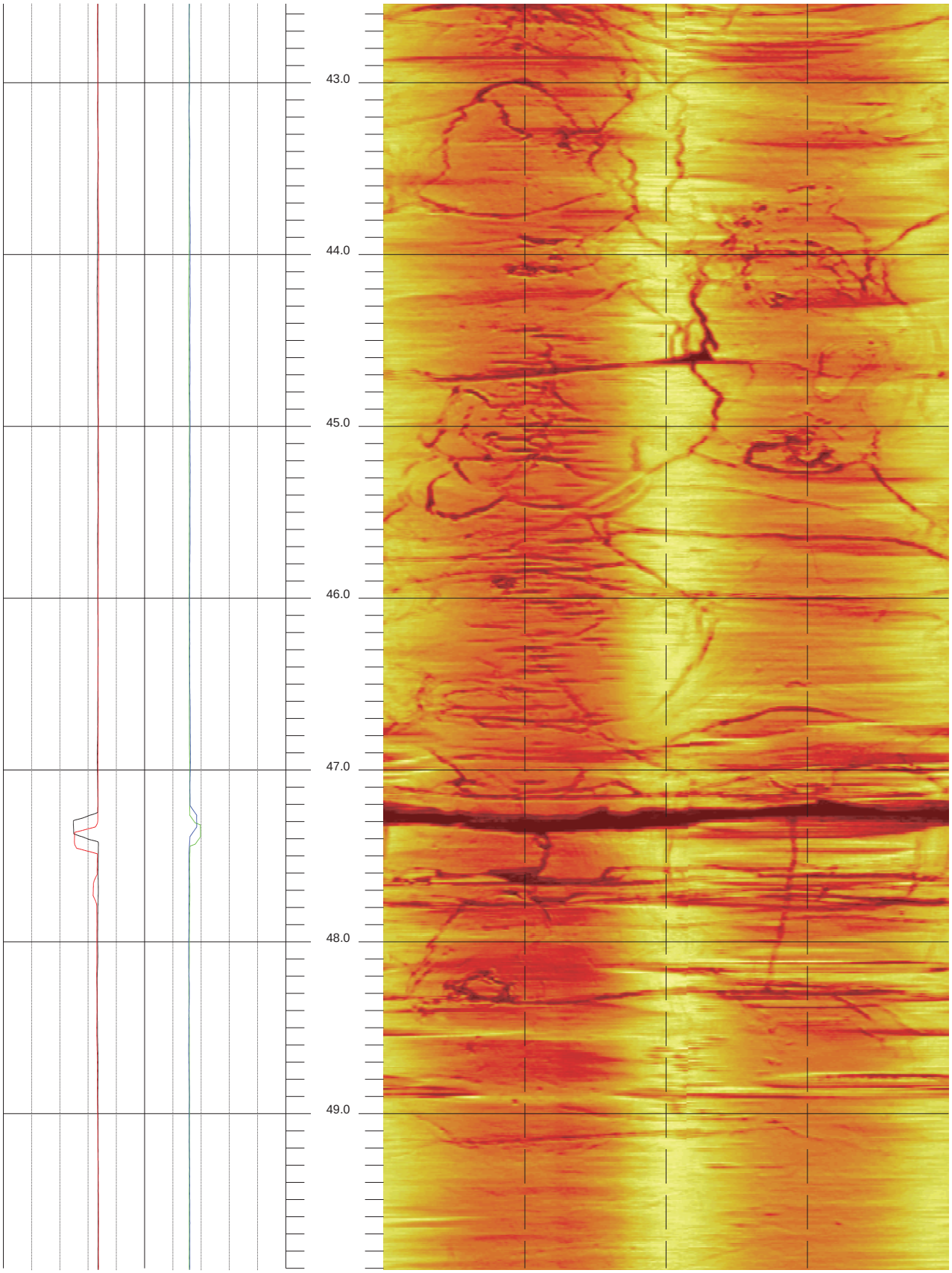
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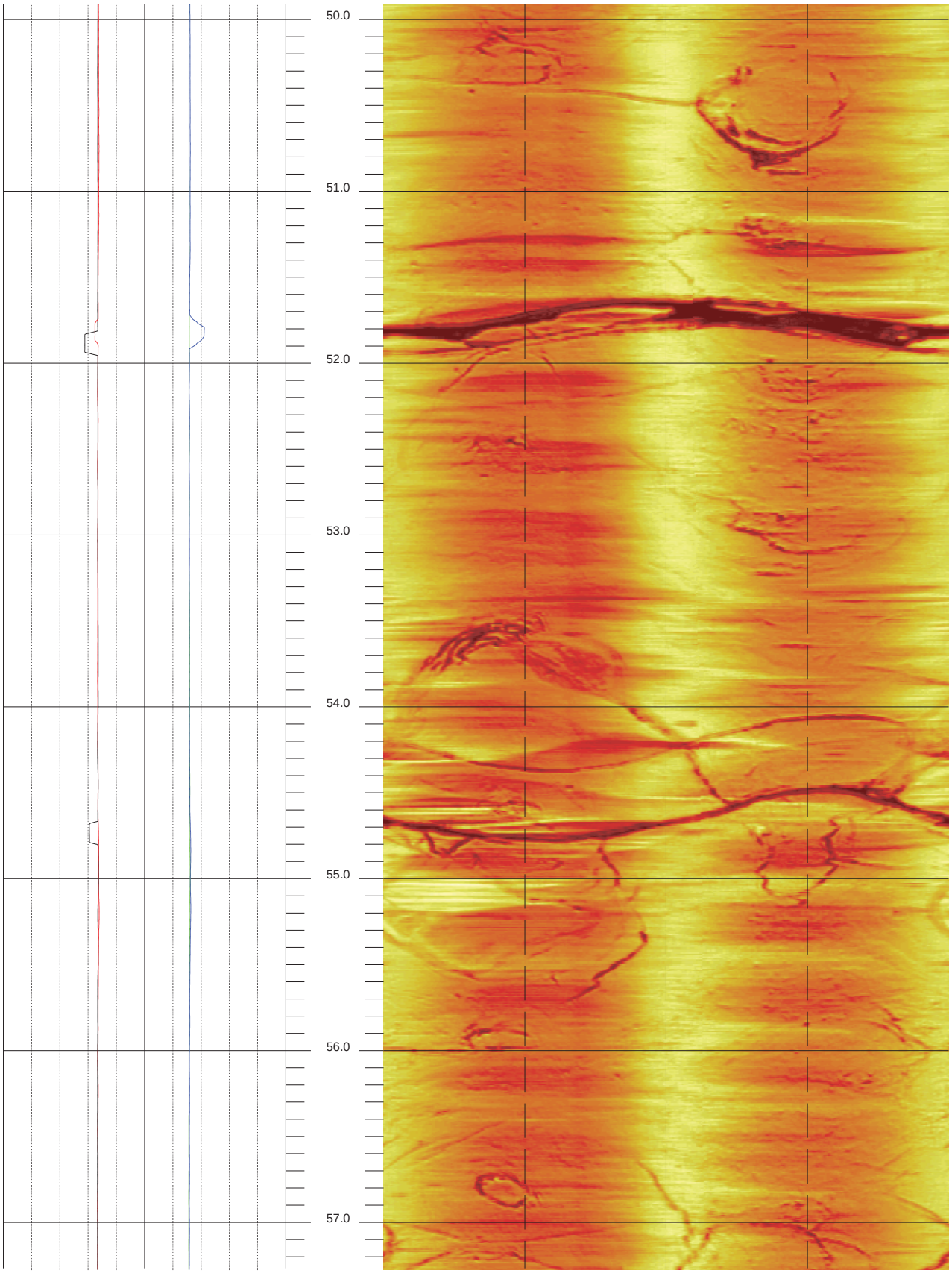
REFLECTANCE

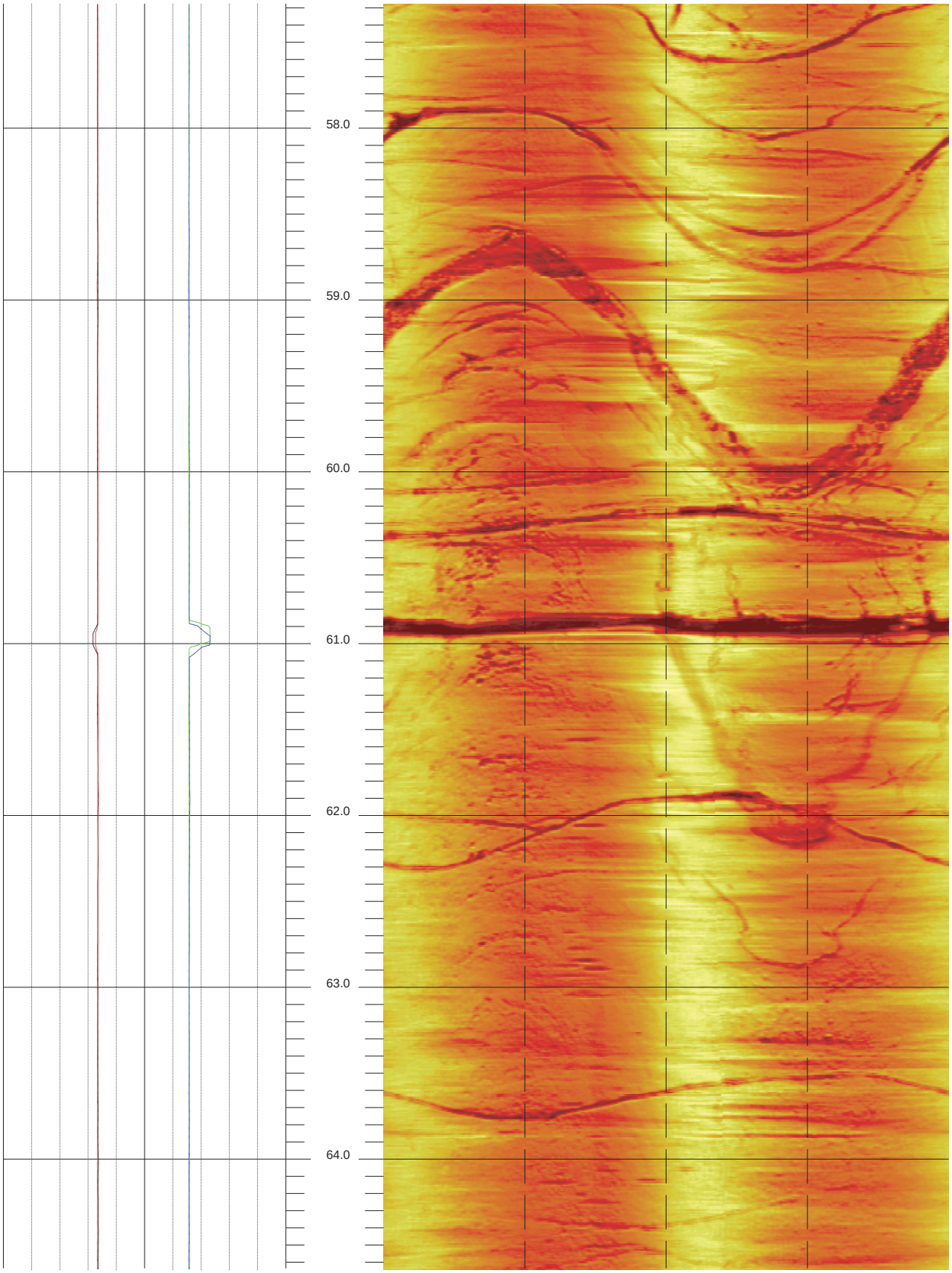


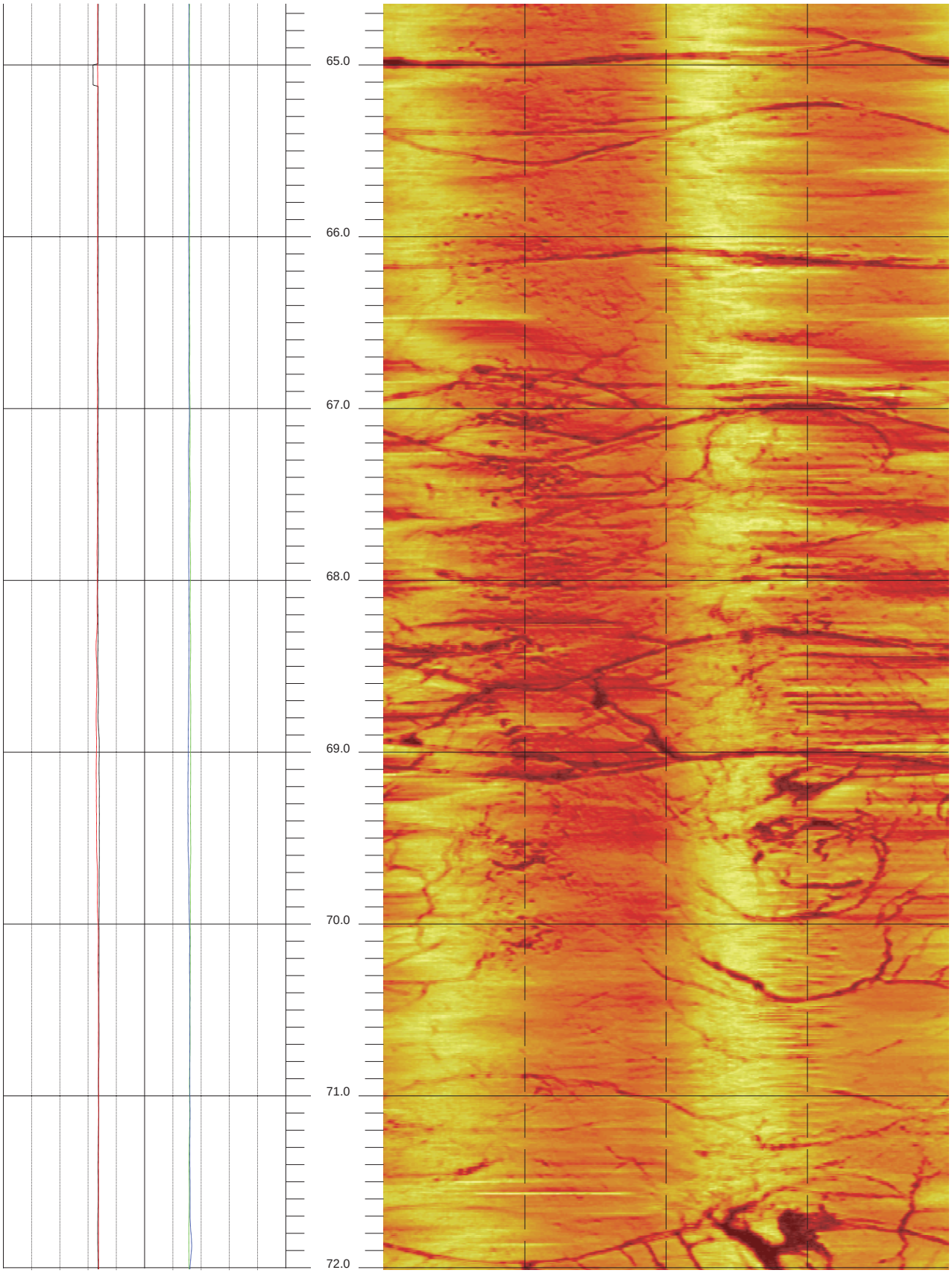

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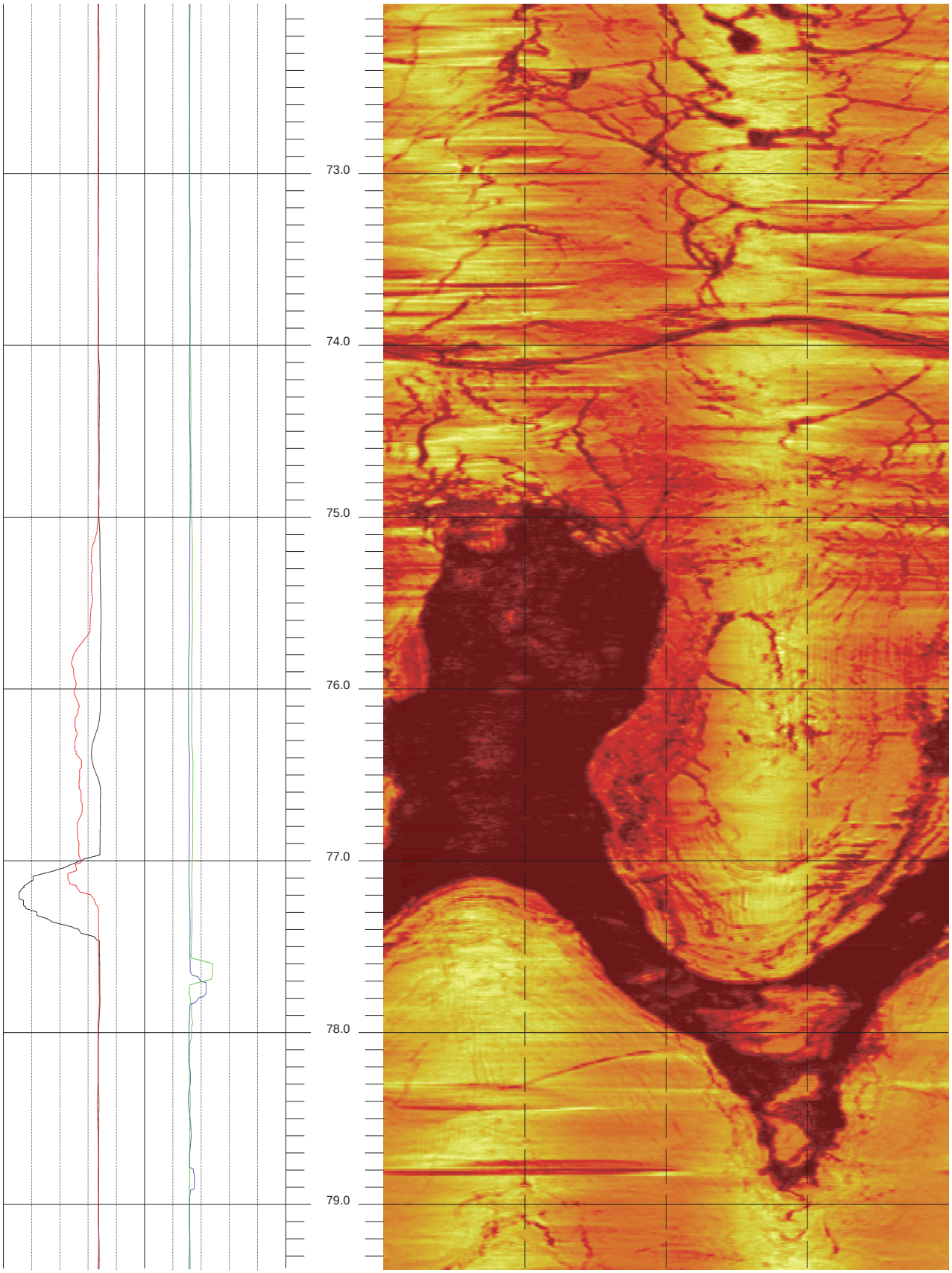

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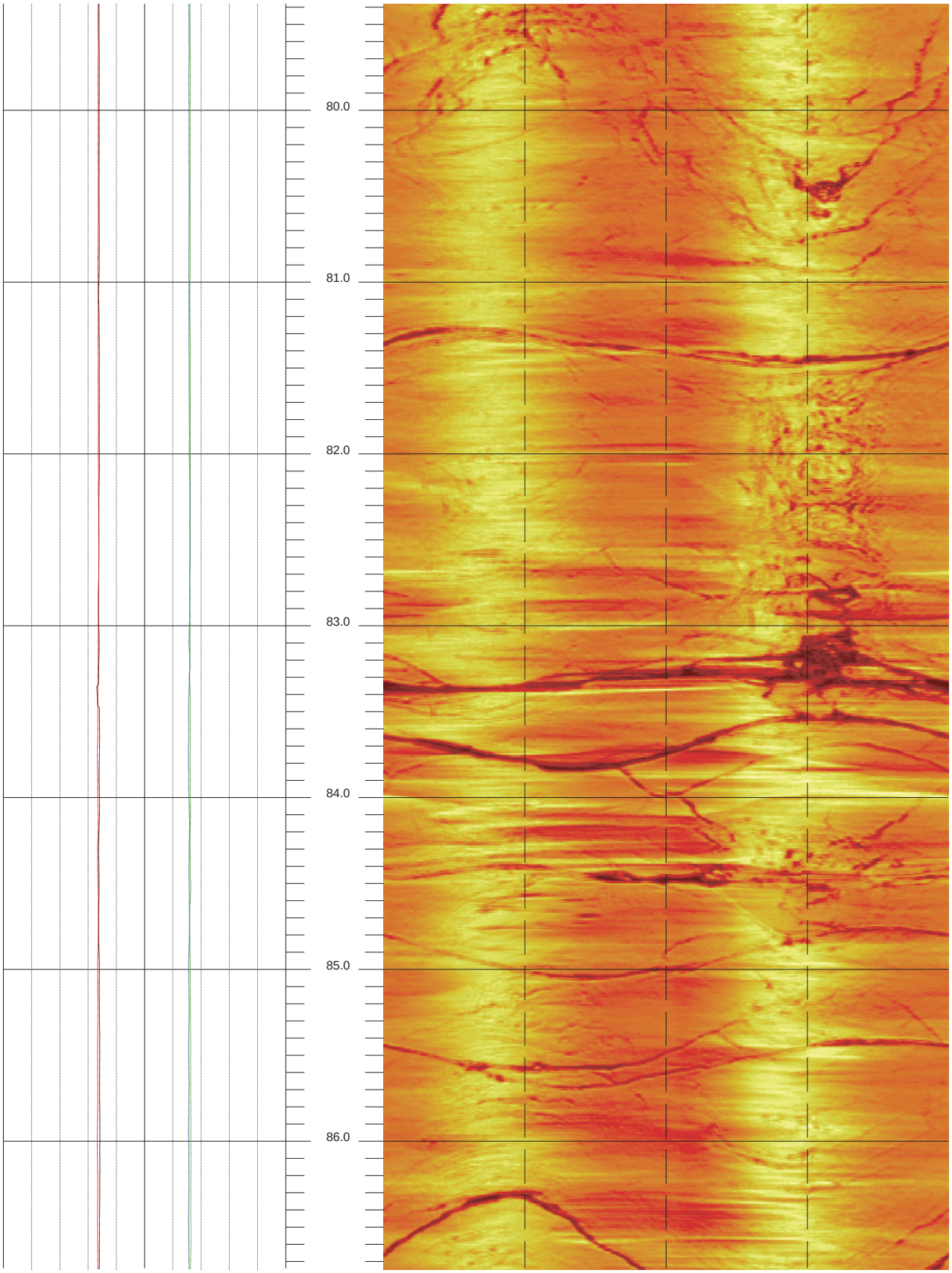

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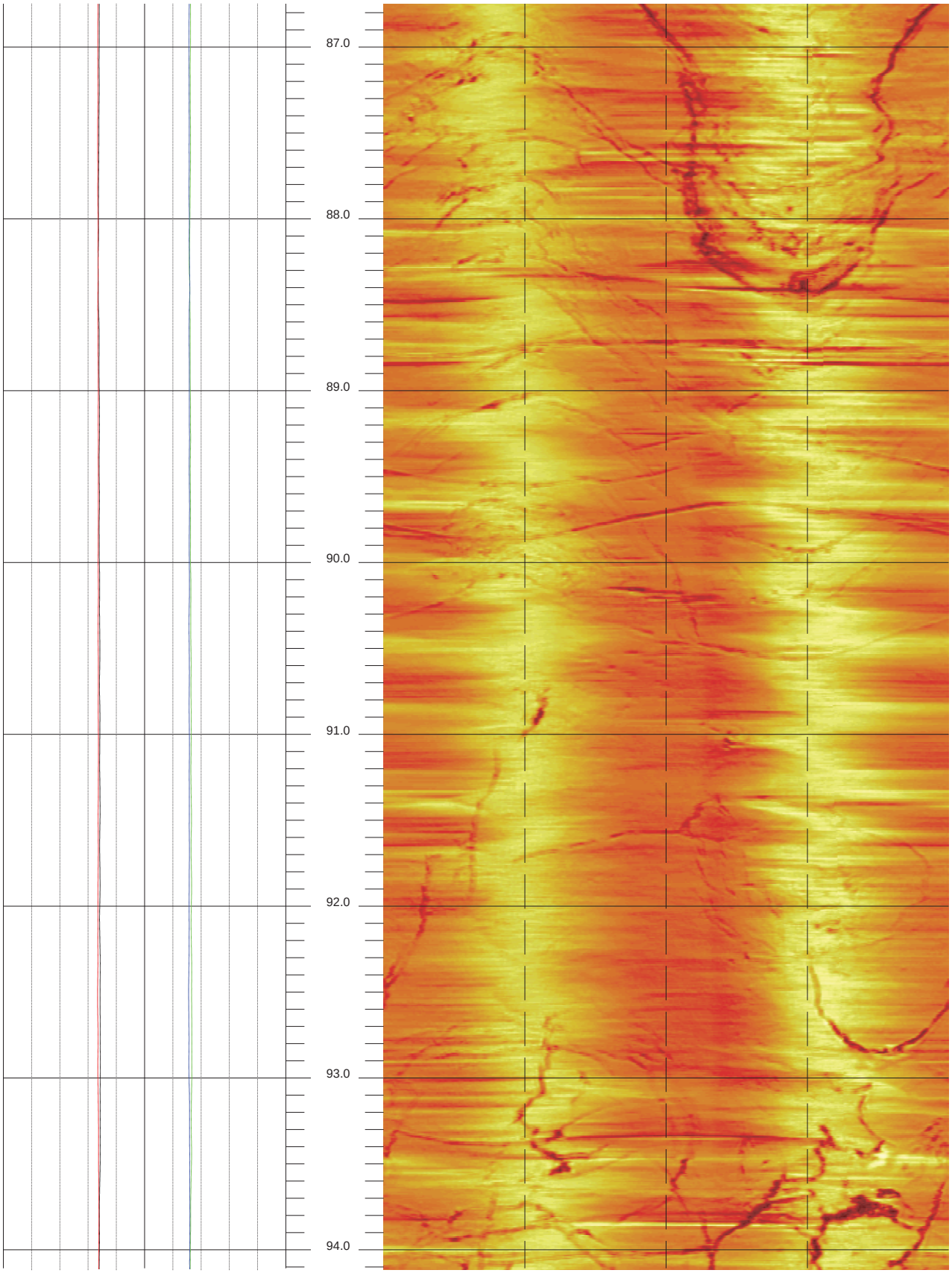

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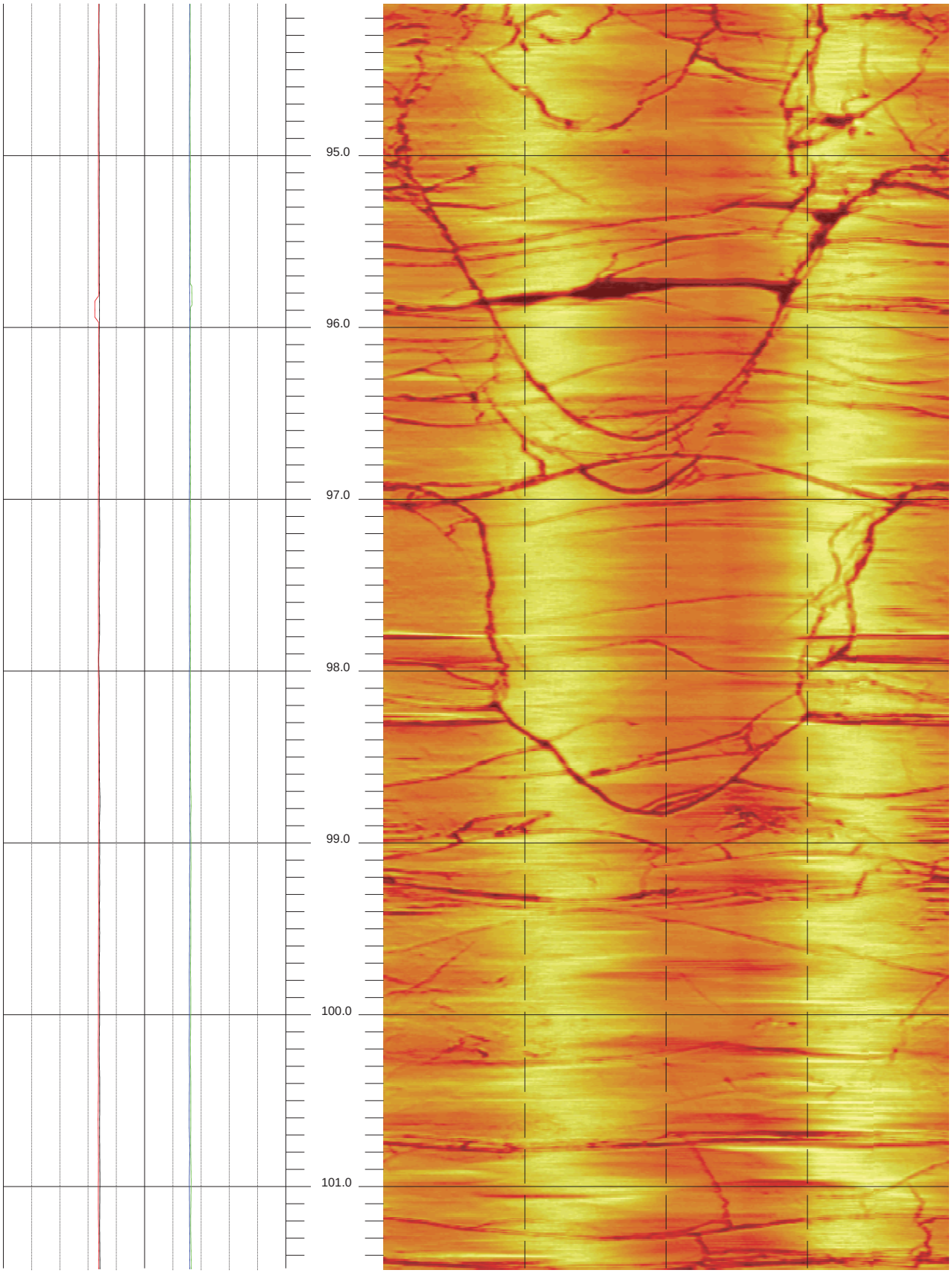

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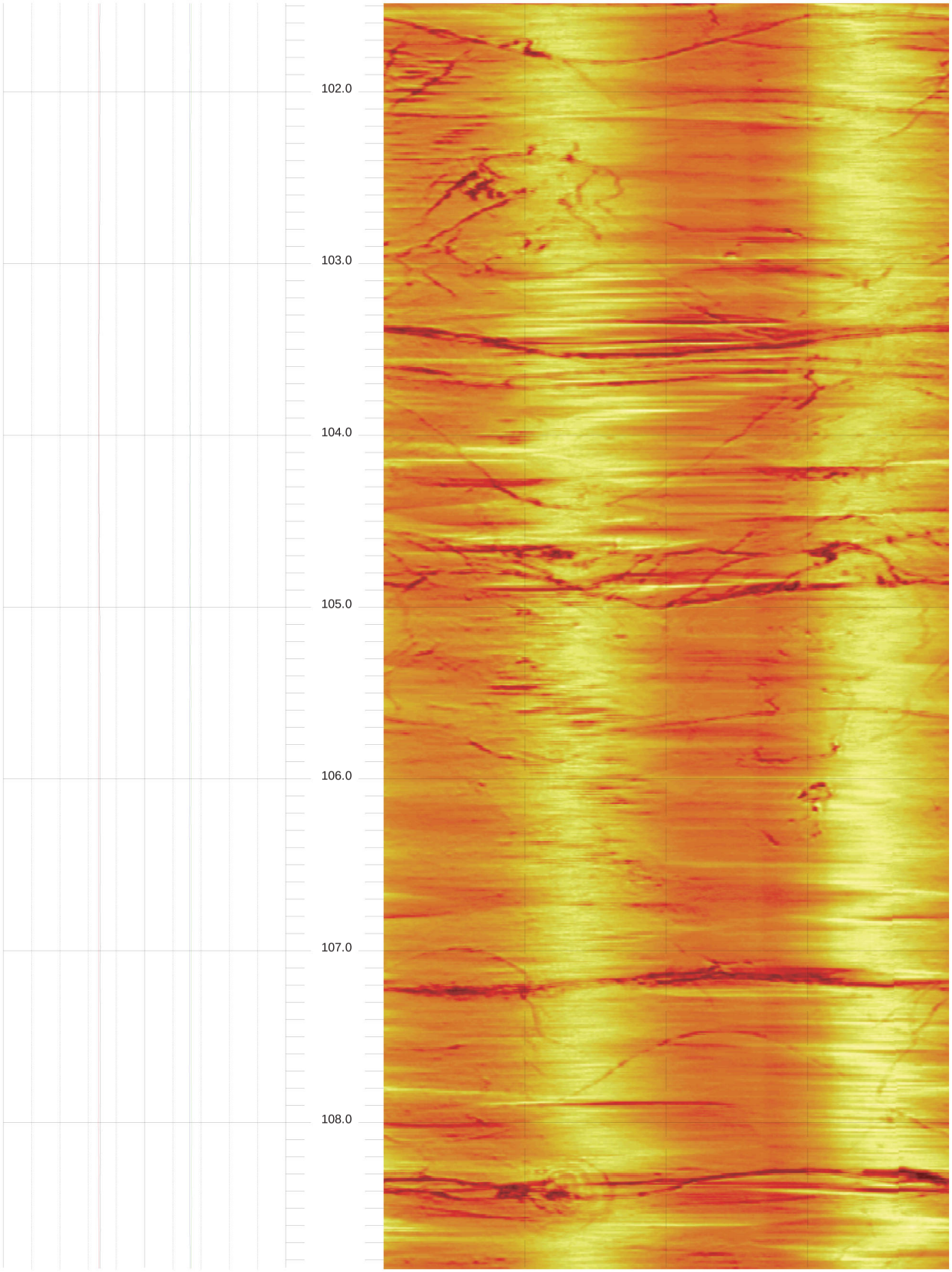

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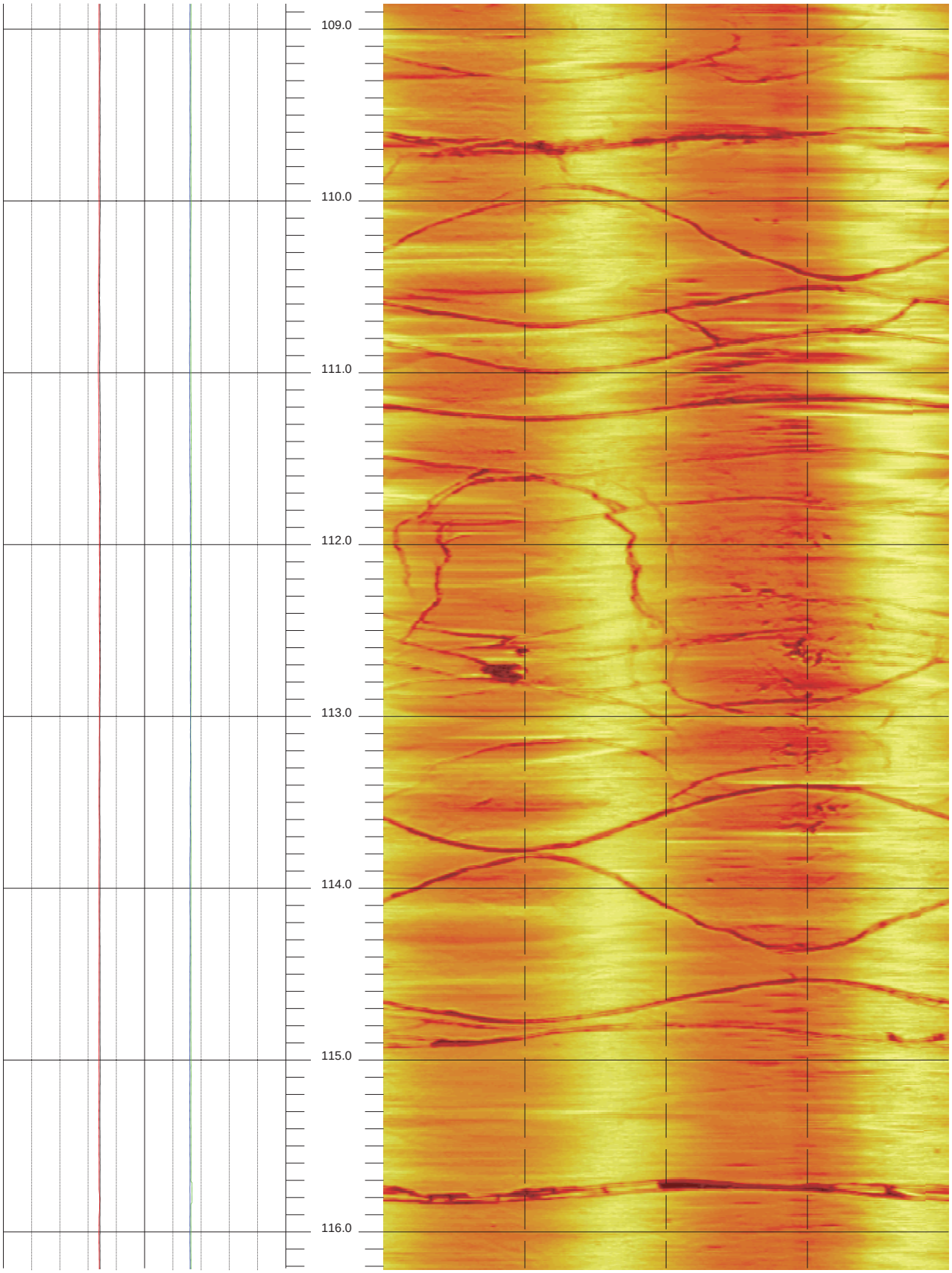

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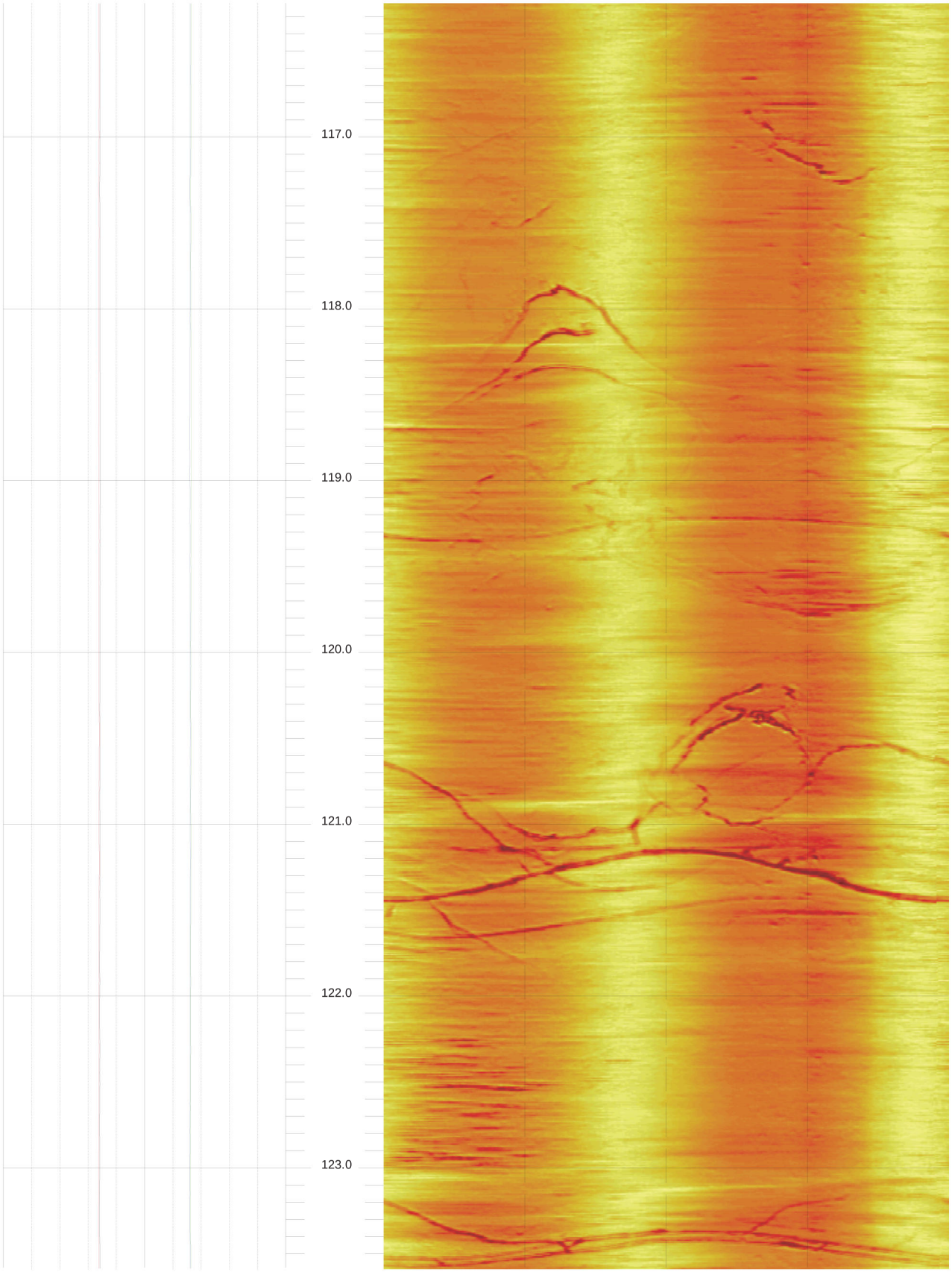

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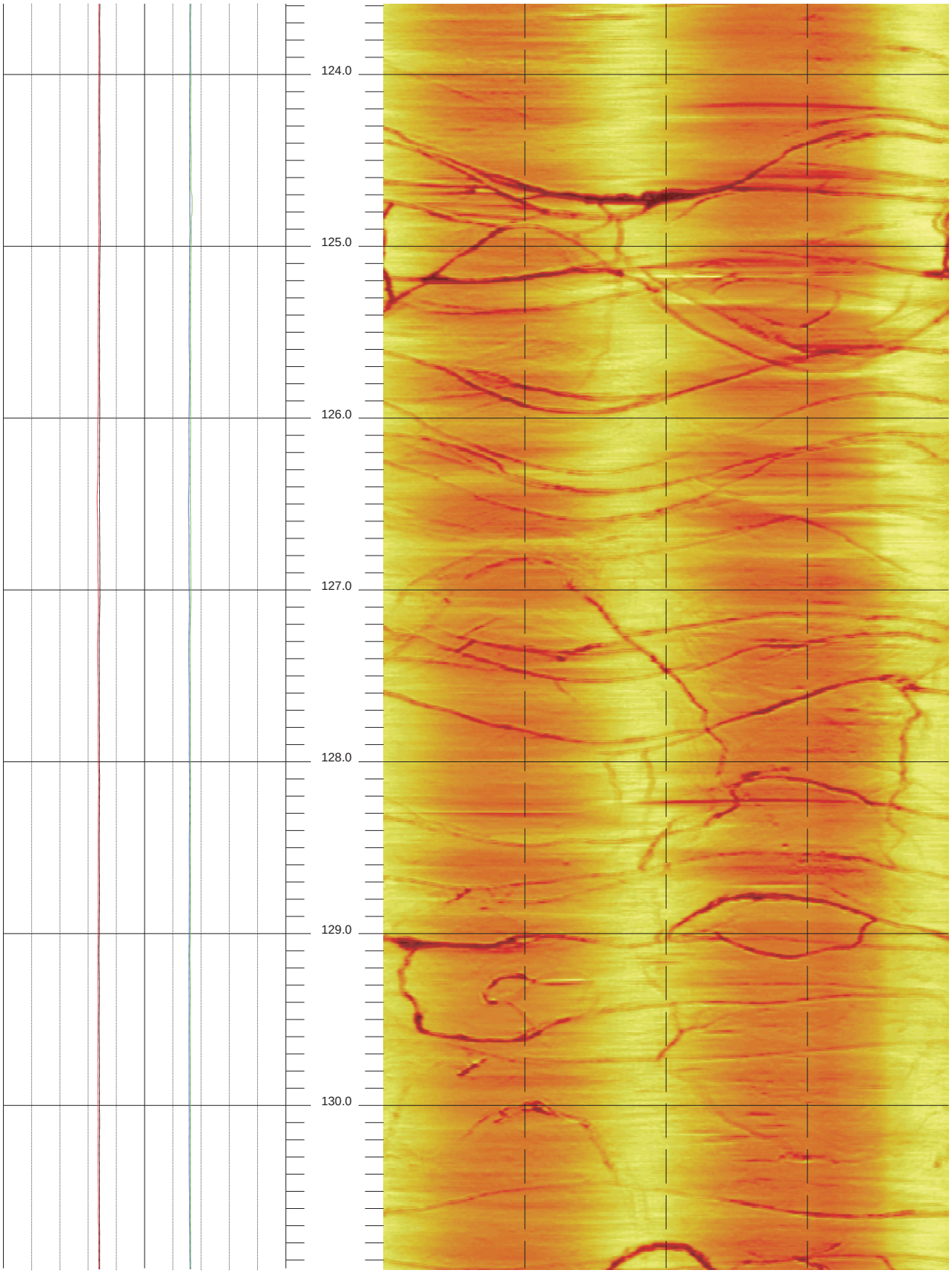

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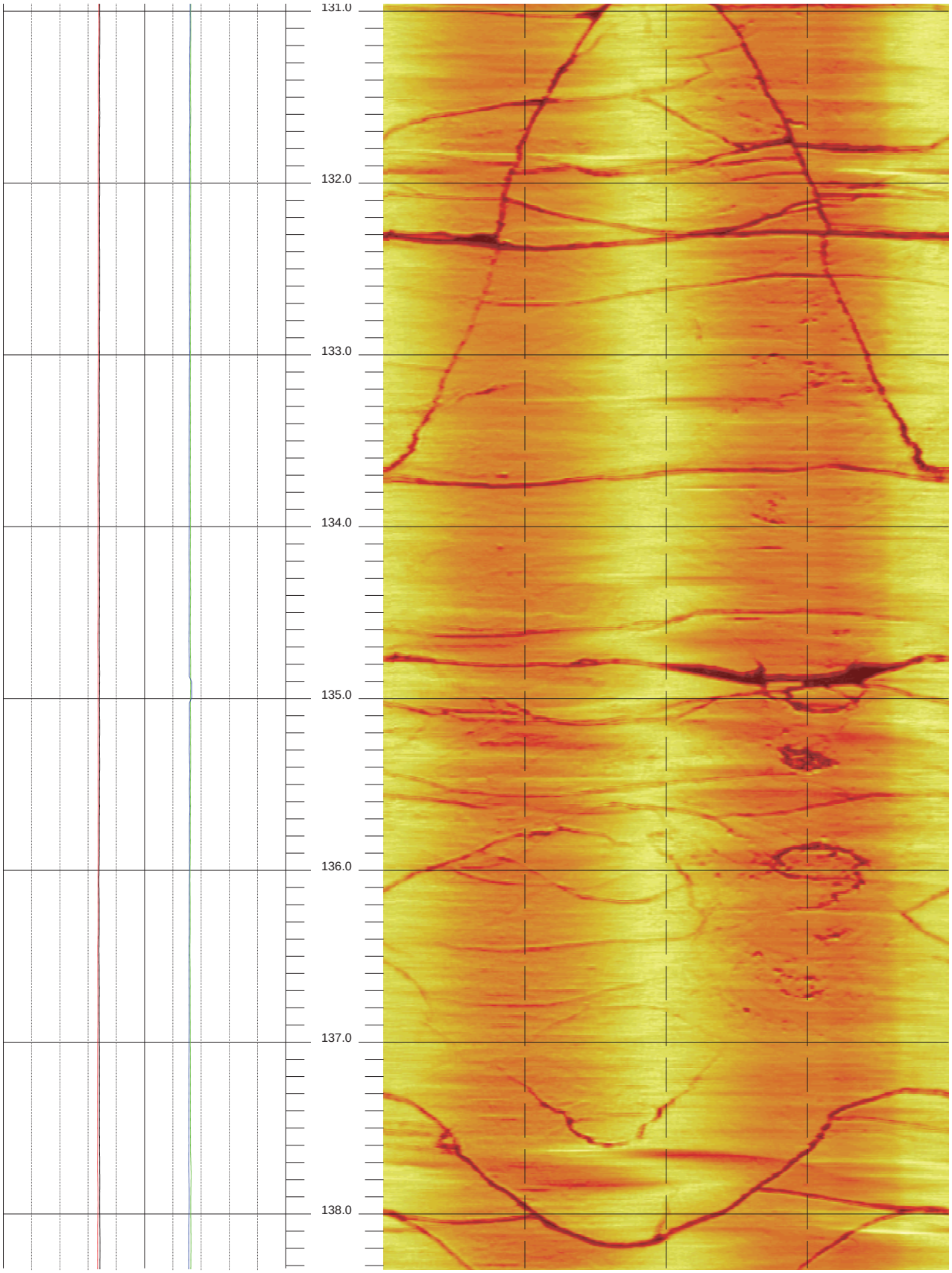

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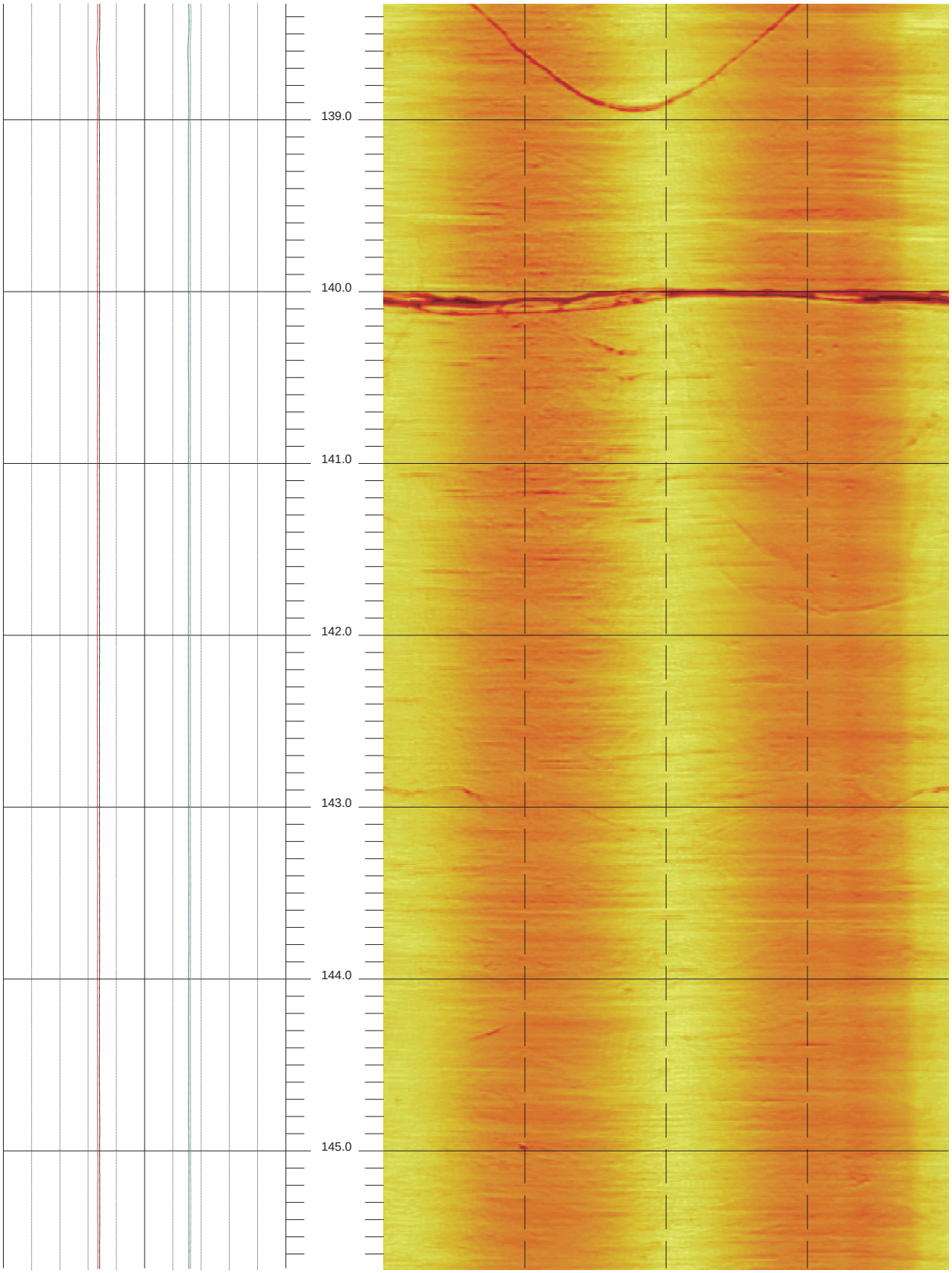

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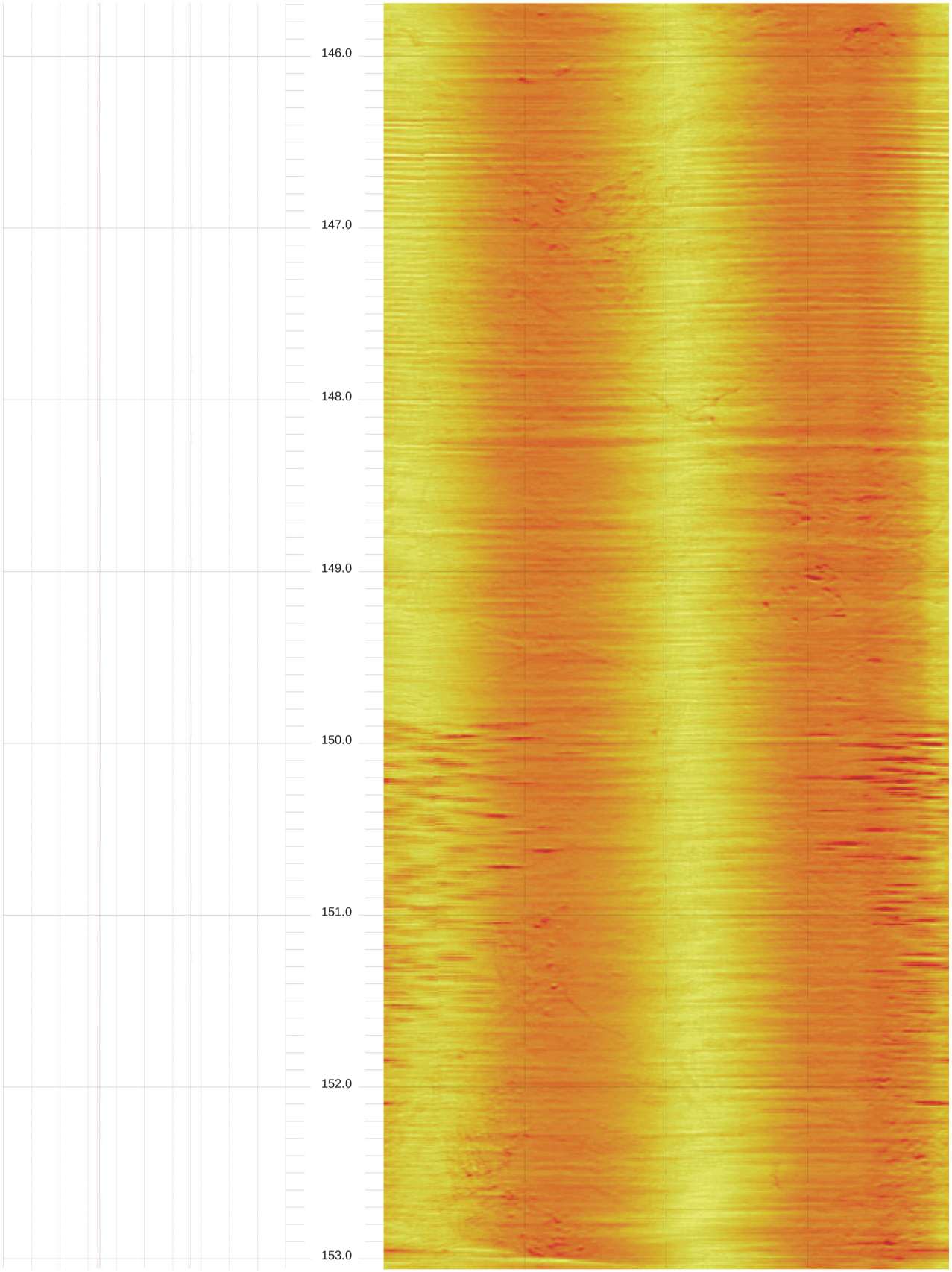

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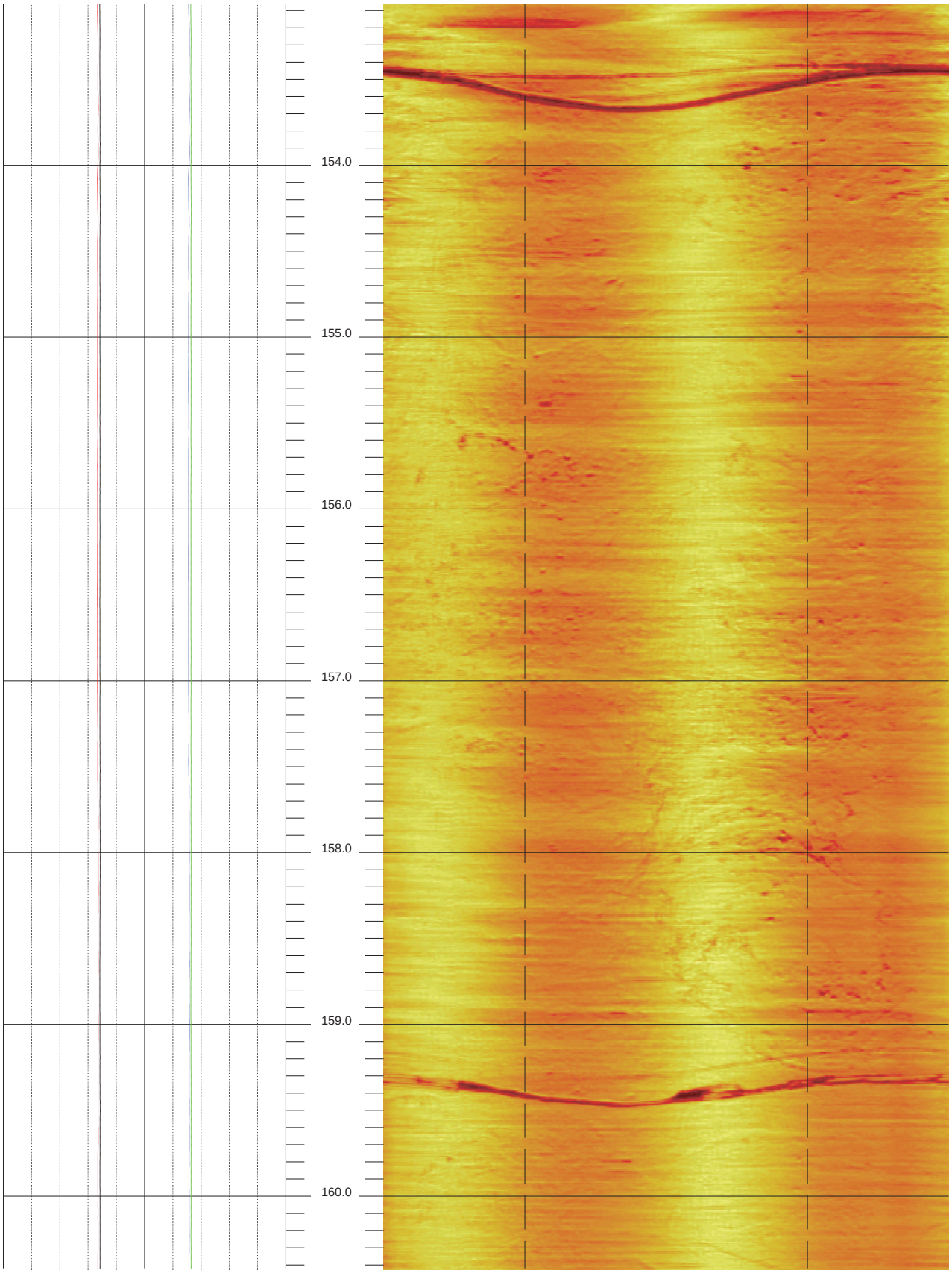

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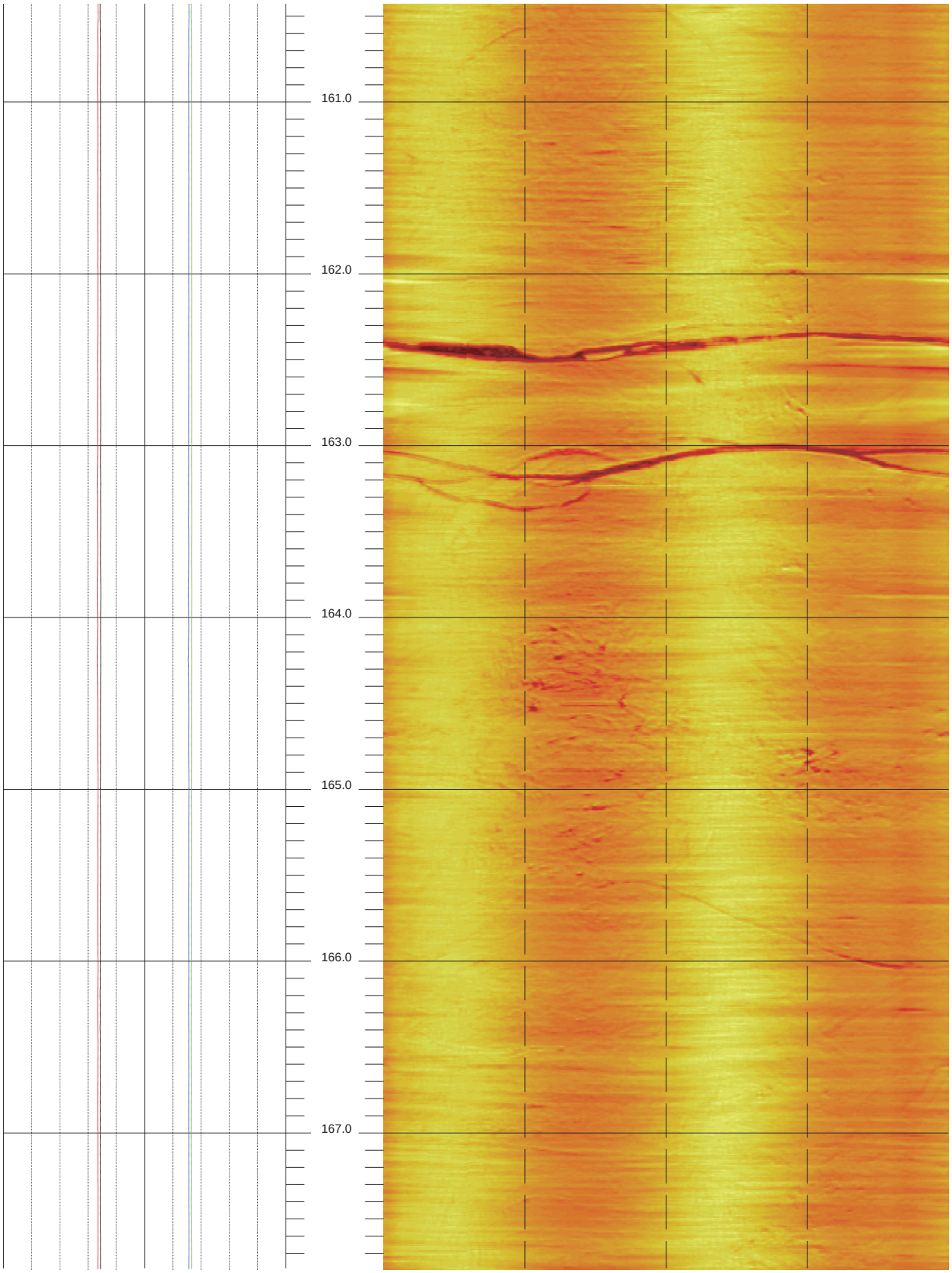

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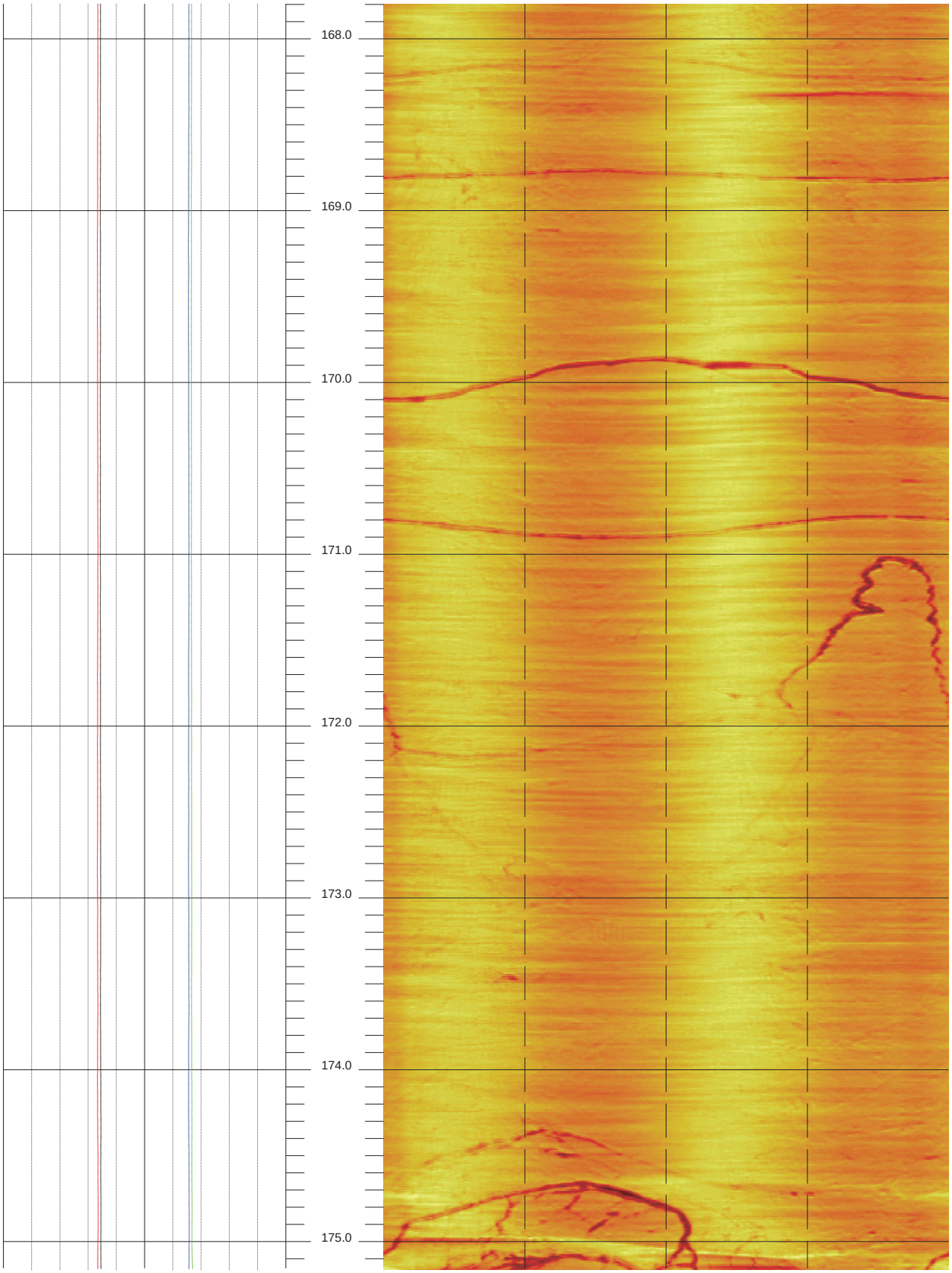

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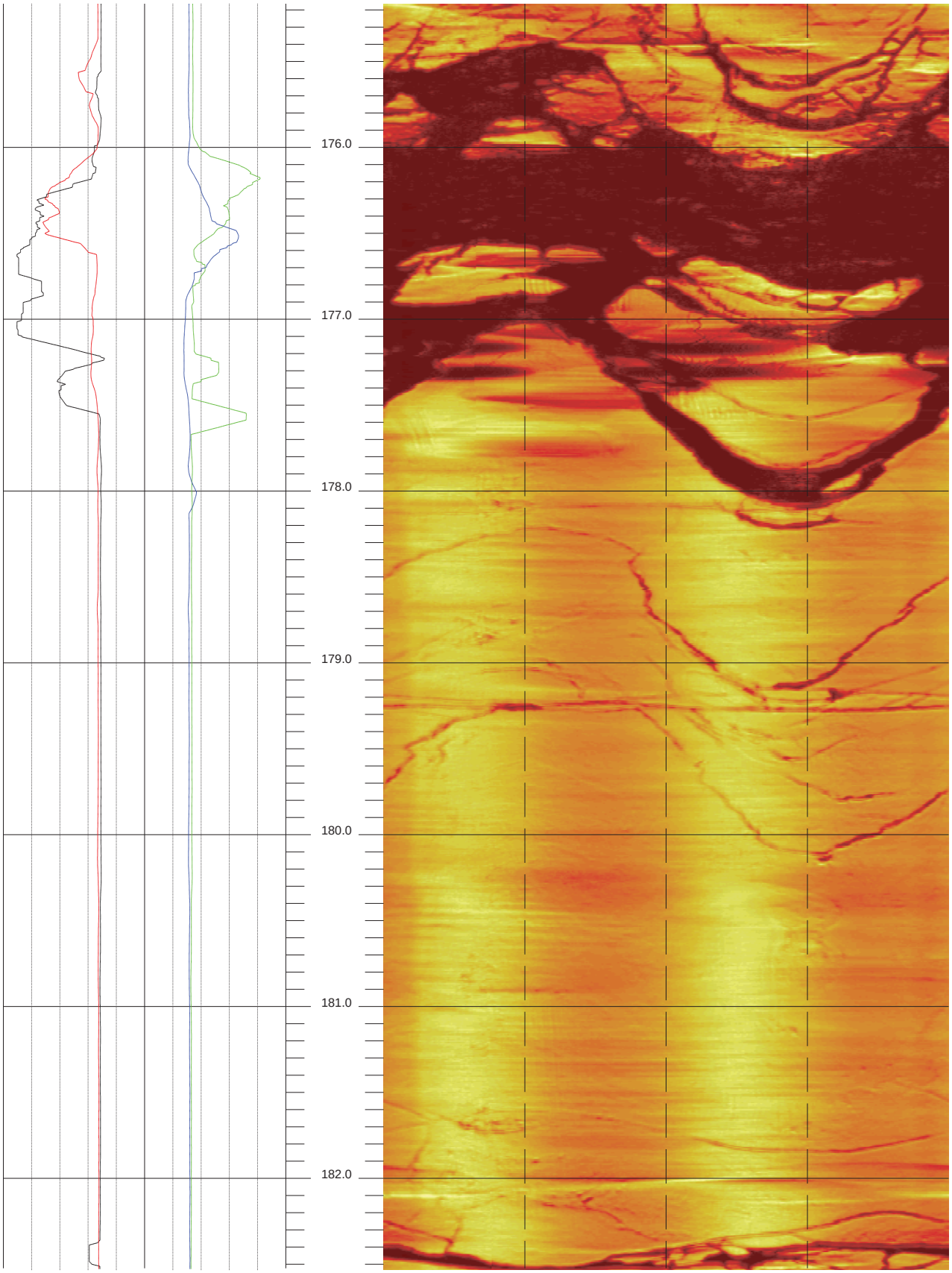

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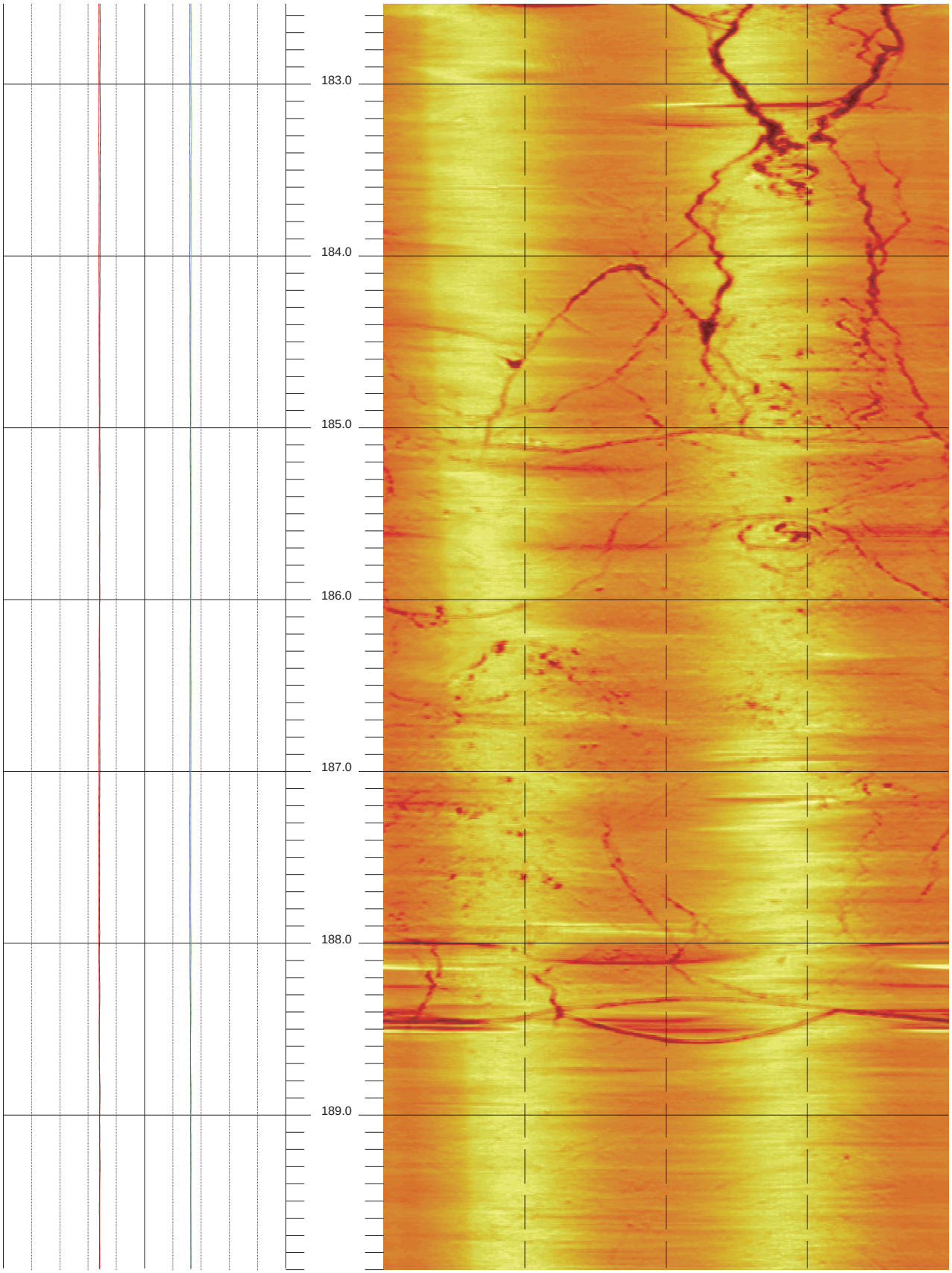

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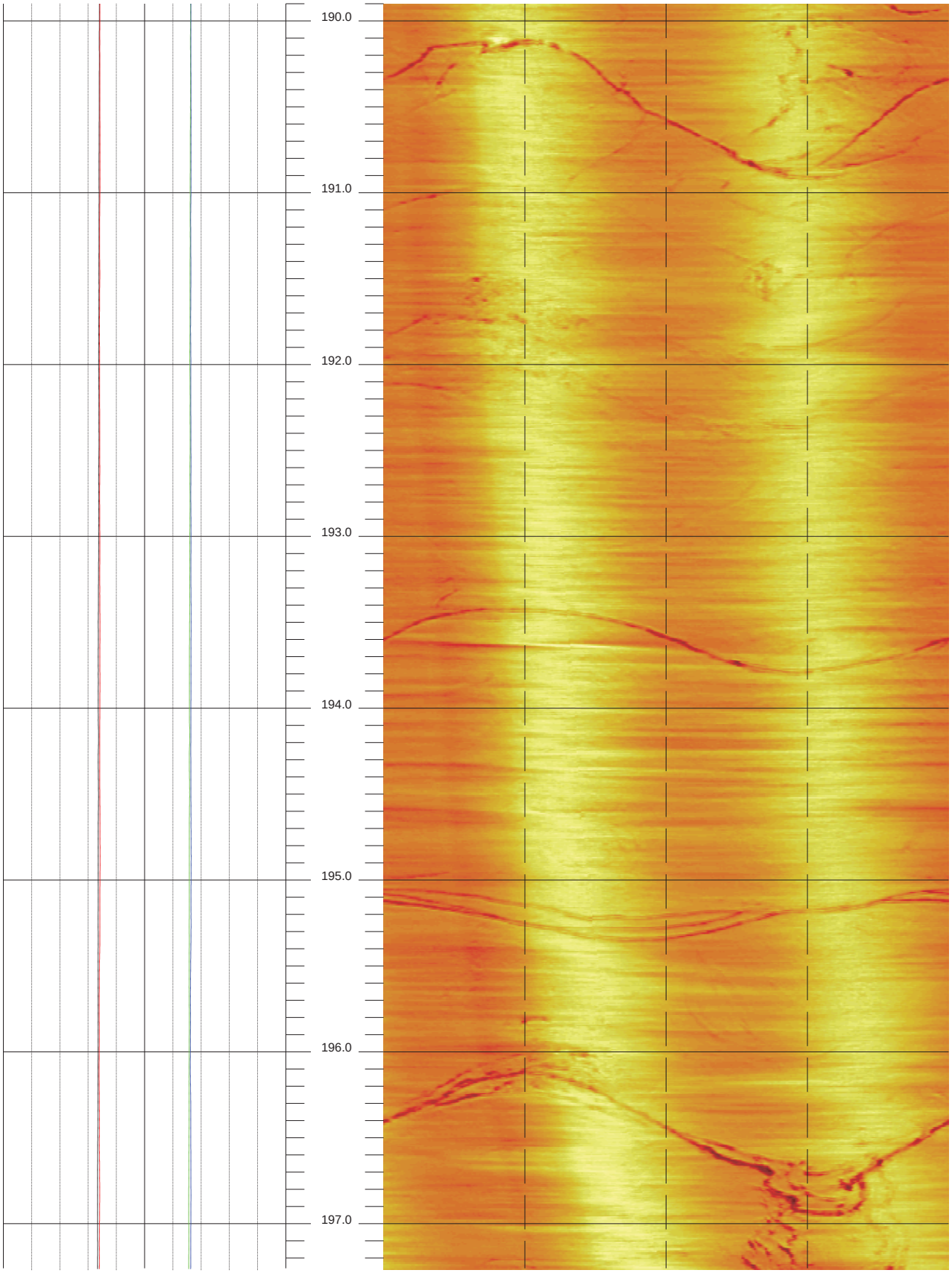

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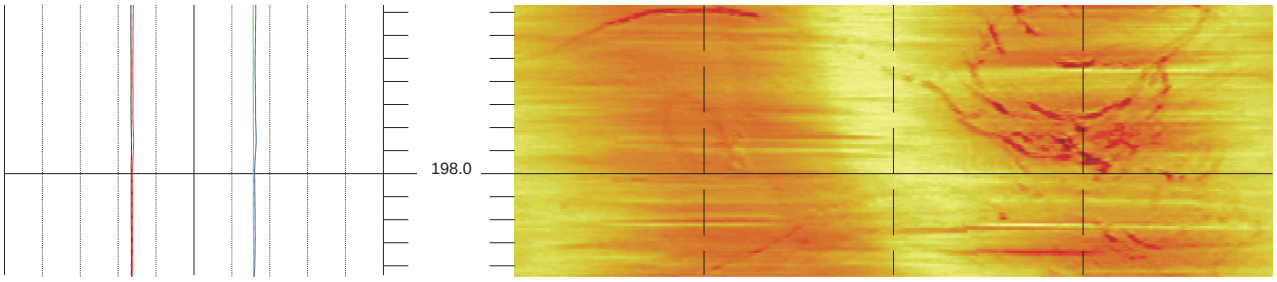

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BHTV DATA PROCESSING
RGLDIP vsn 6.2
ACOUSTIC CALIPER LOG

AECOM

Borehole: B-103

VAIL DAM

top of borehole.....
East: _
North:_
Elev: _

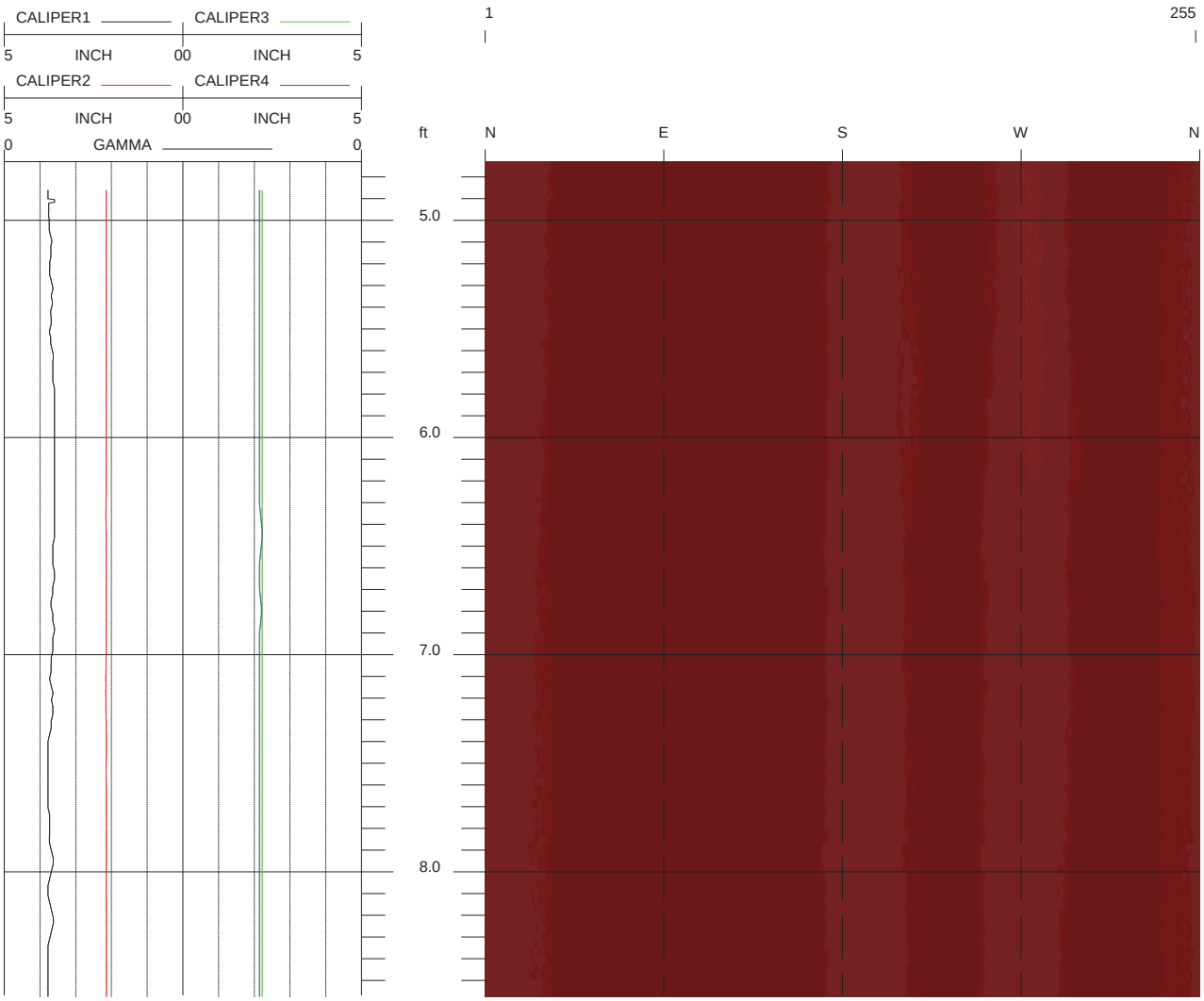
North ref. is true
Depth units are feet
Vertical scale: 1/10

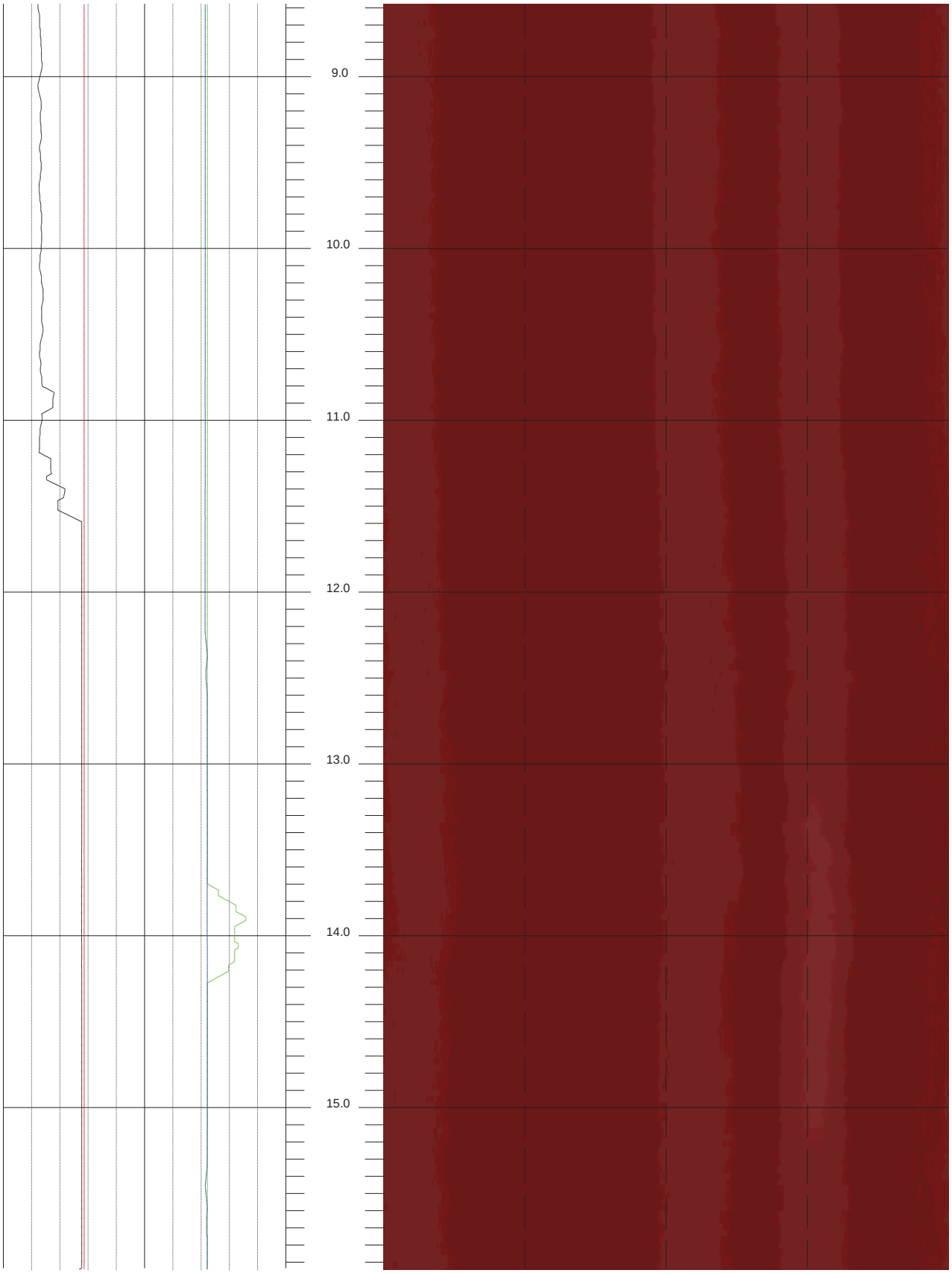
Zone from 200.000 to 4.732ft

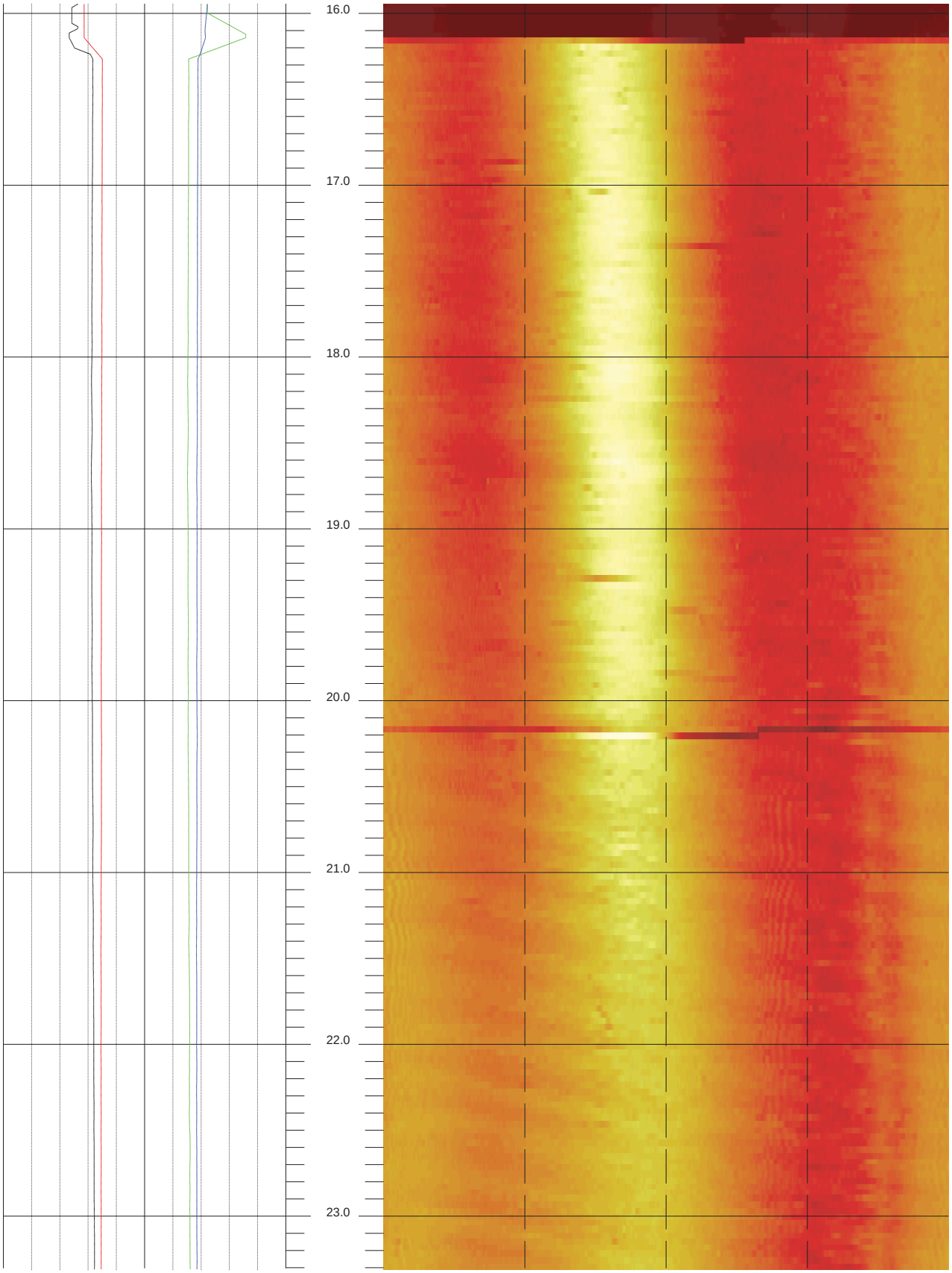
Borehole diam: 3.860inch
Vertical = borehole-axis
Image: Amplitude

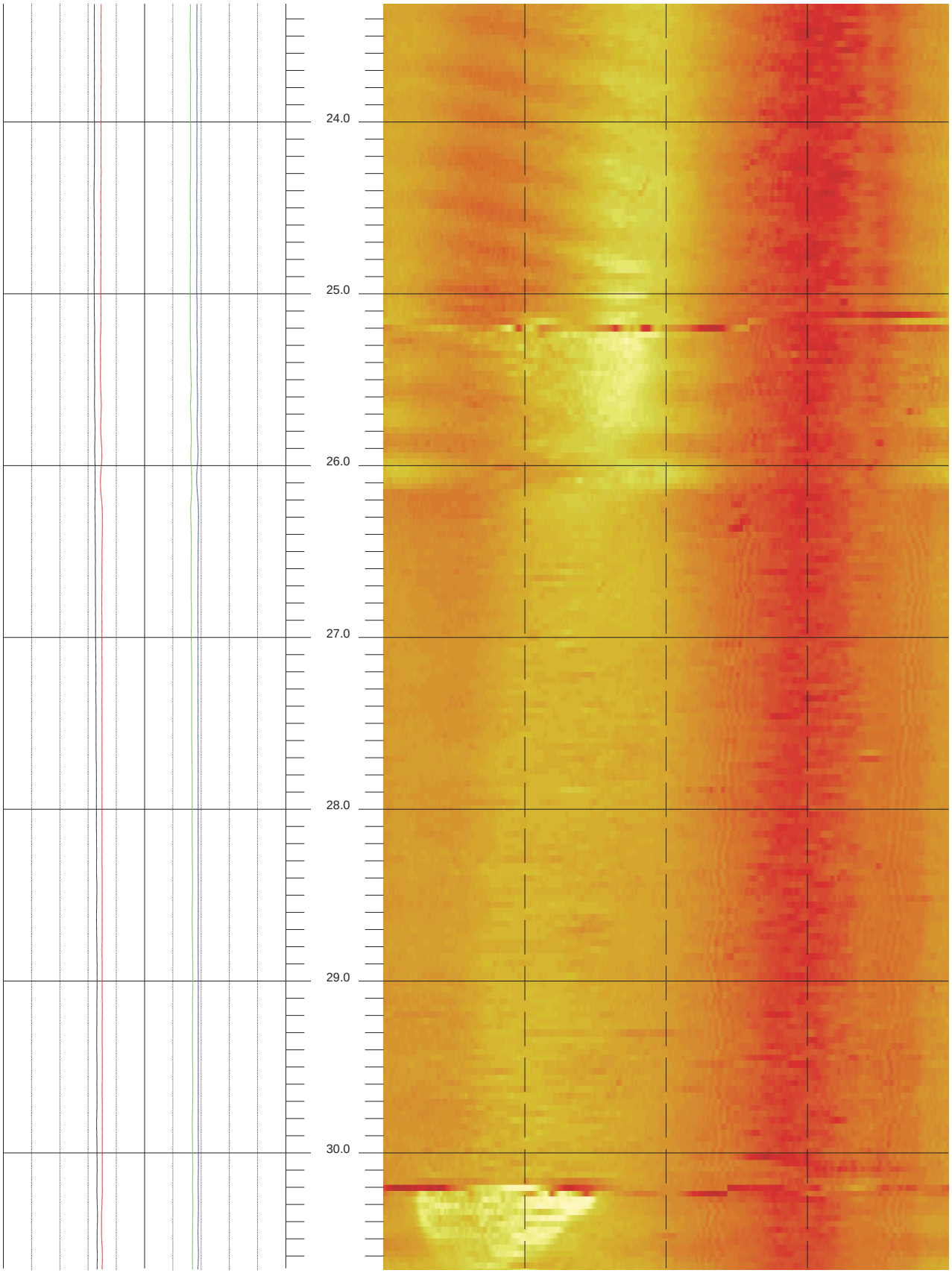
Depth interval 0.004ft, Filter length 0.124ft

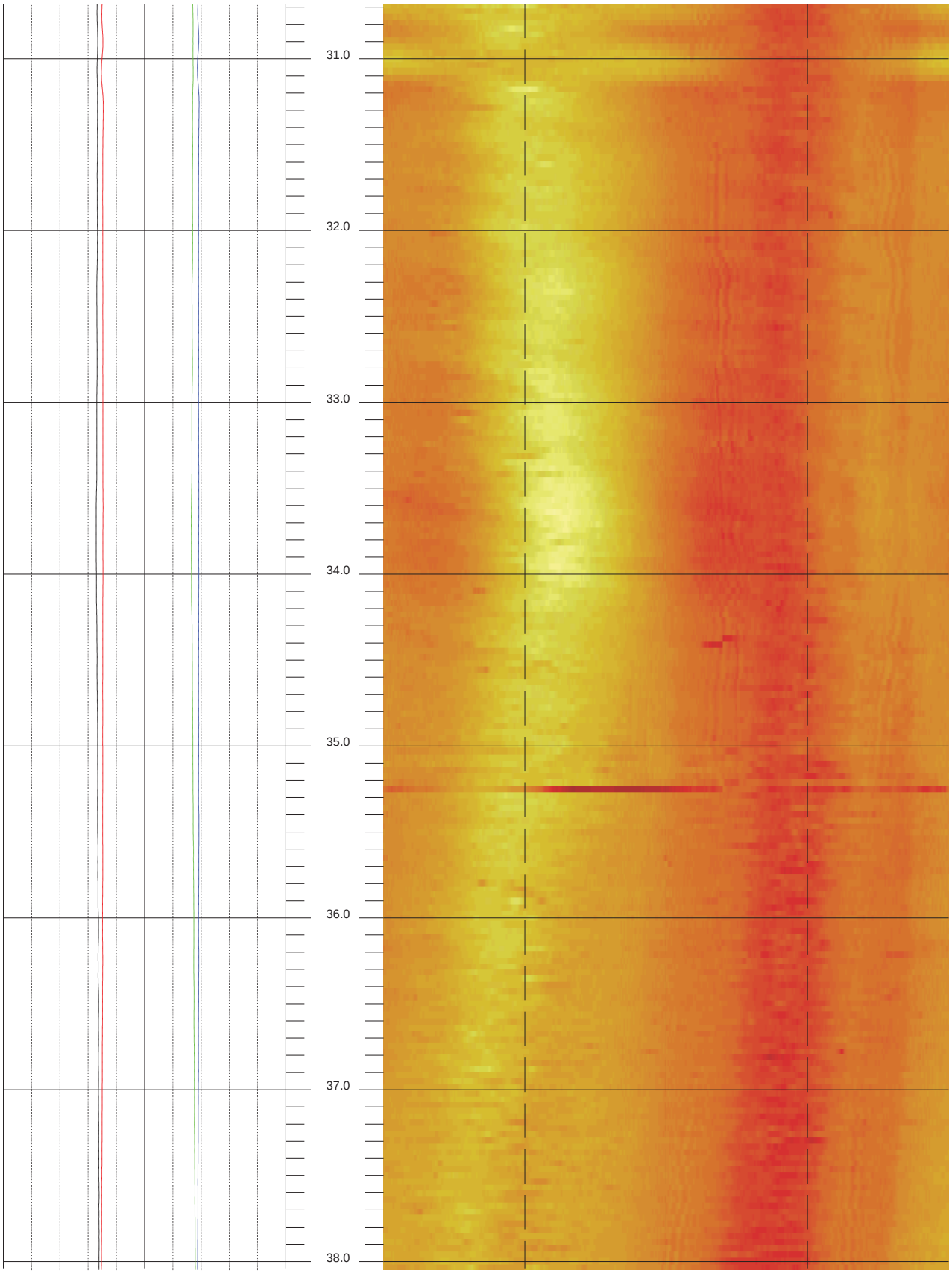
REFLECTANCE

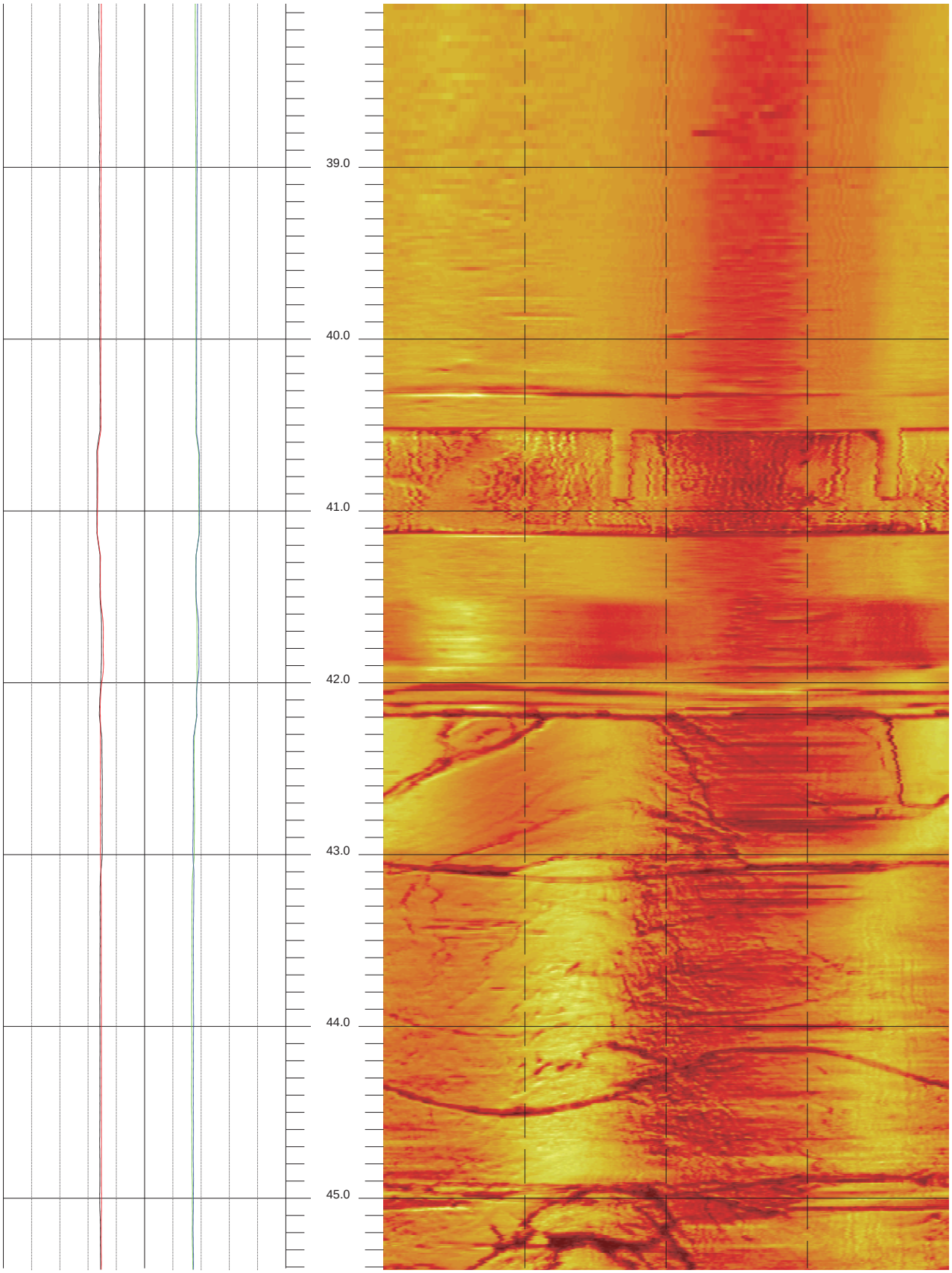


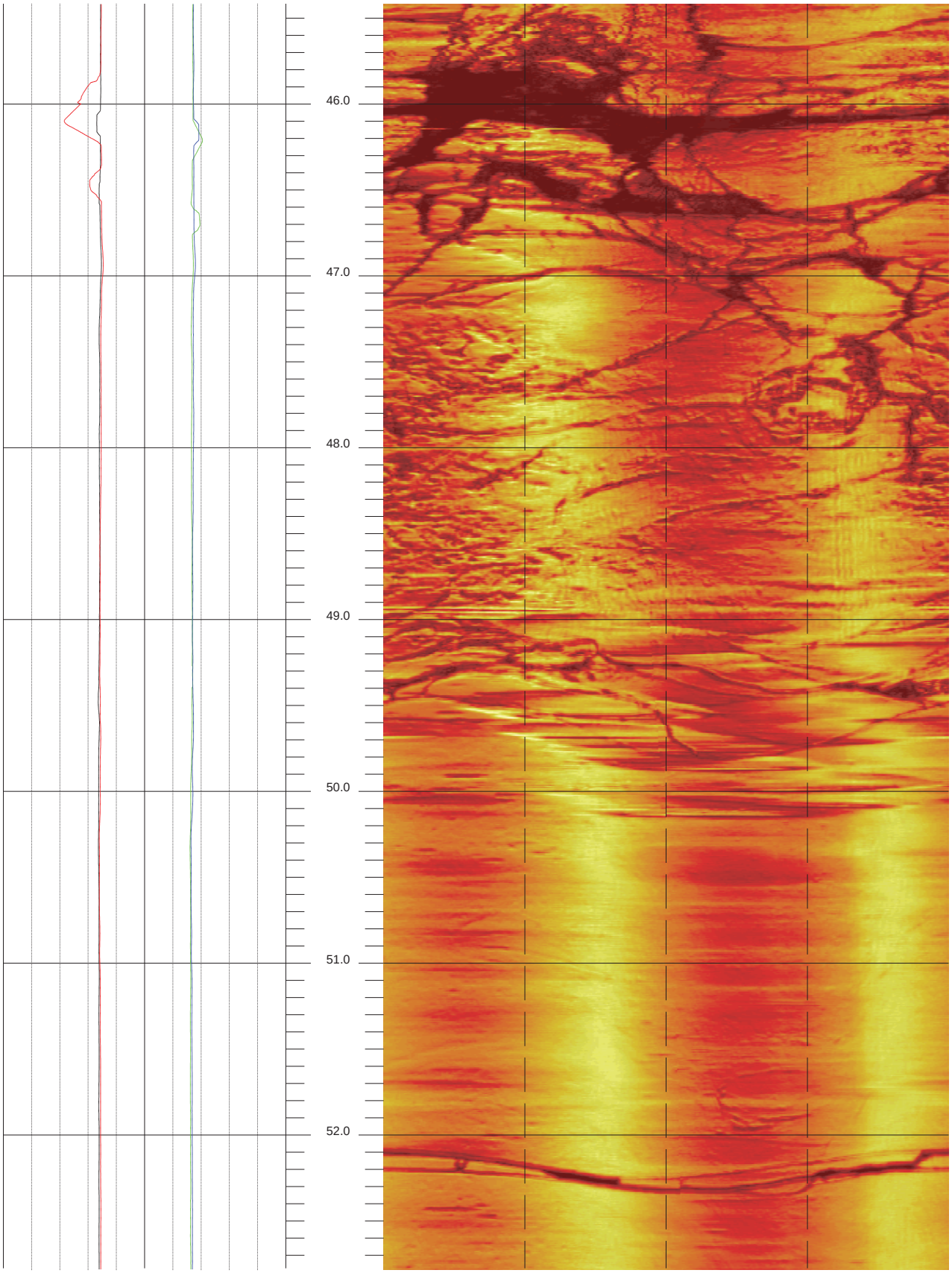

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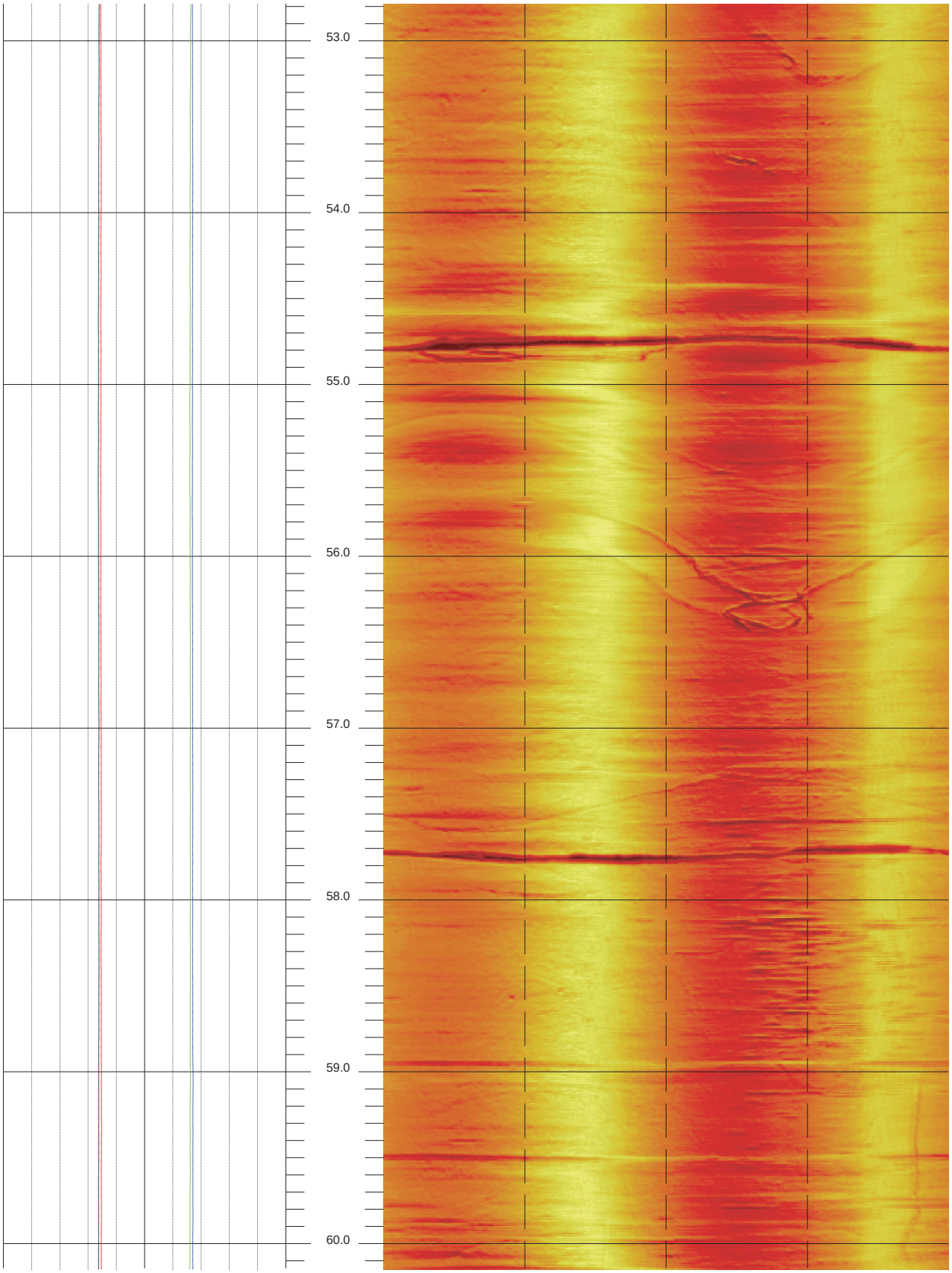

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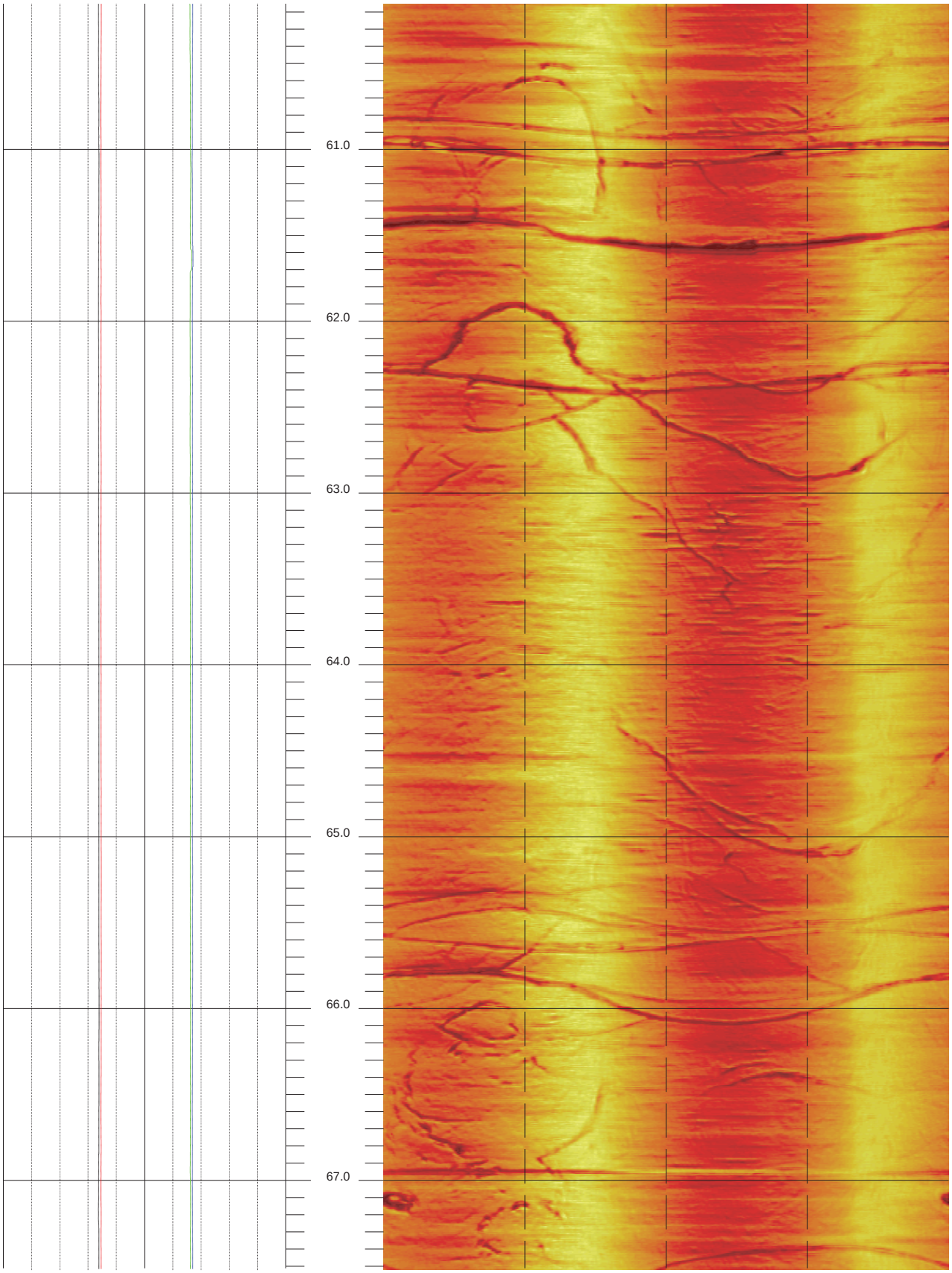

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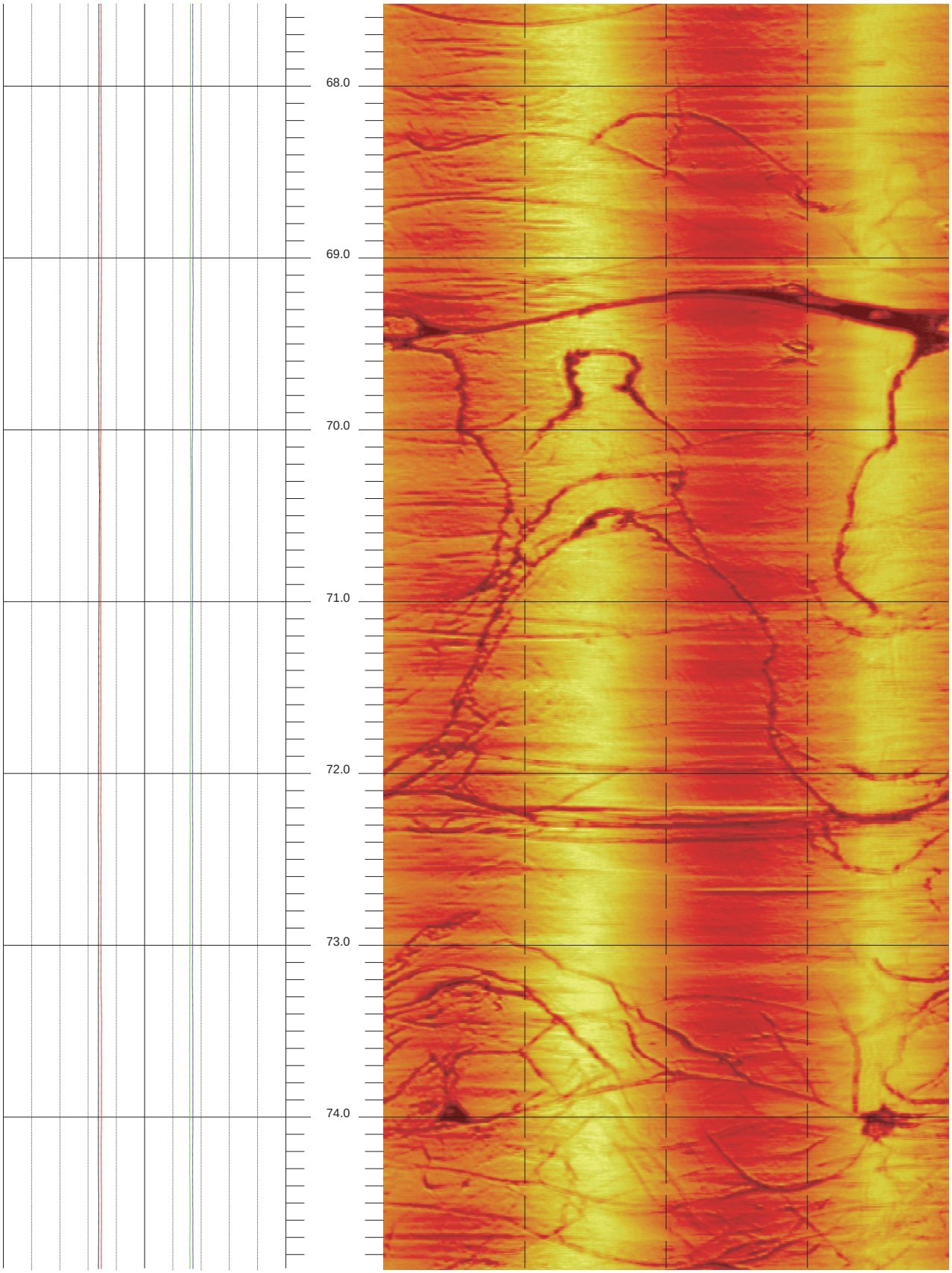

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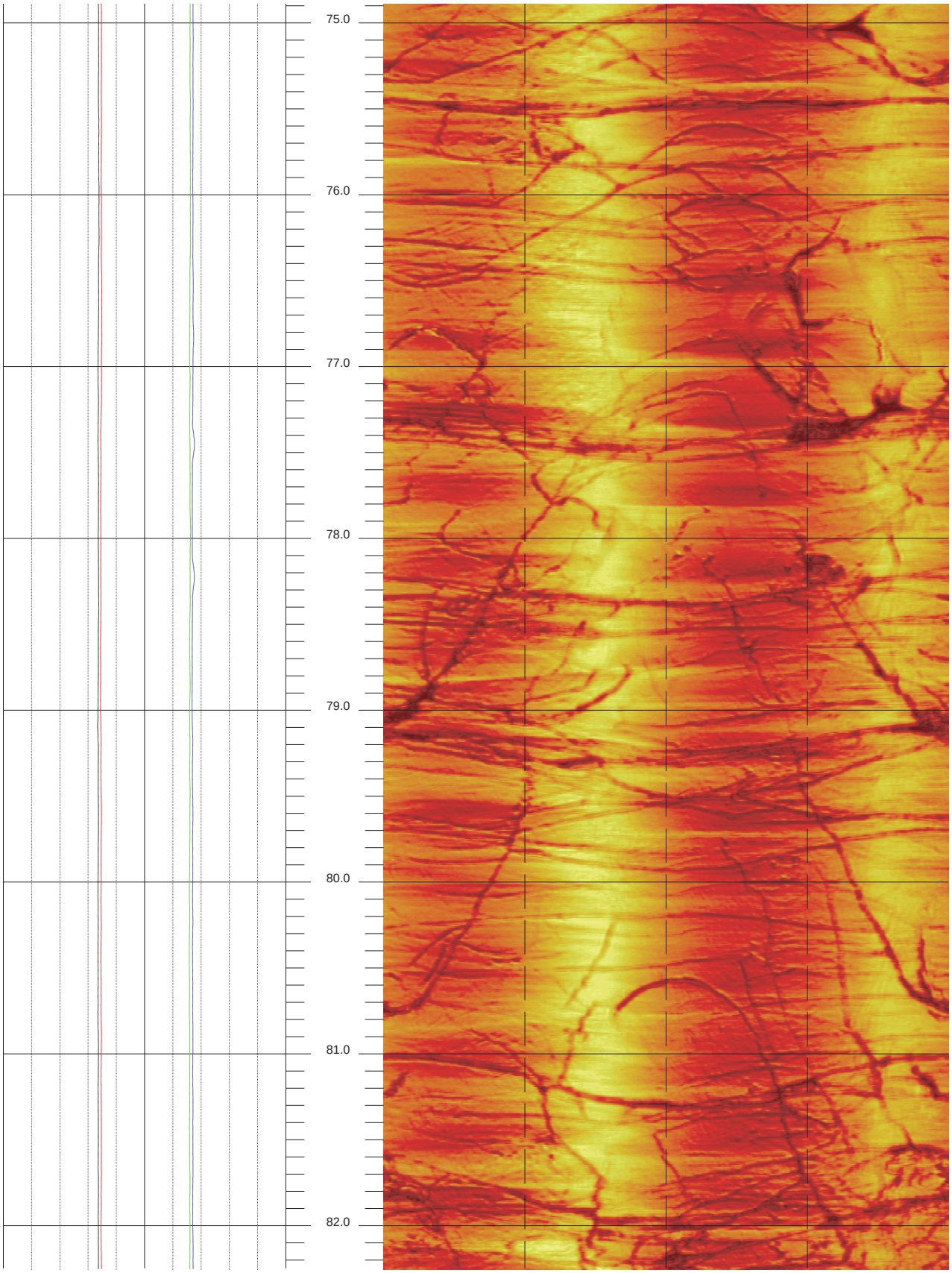

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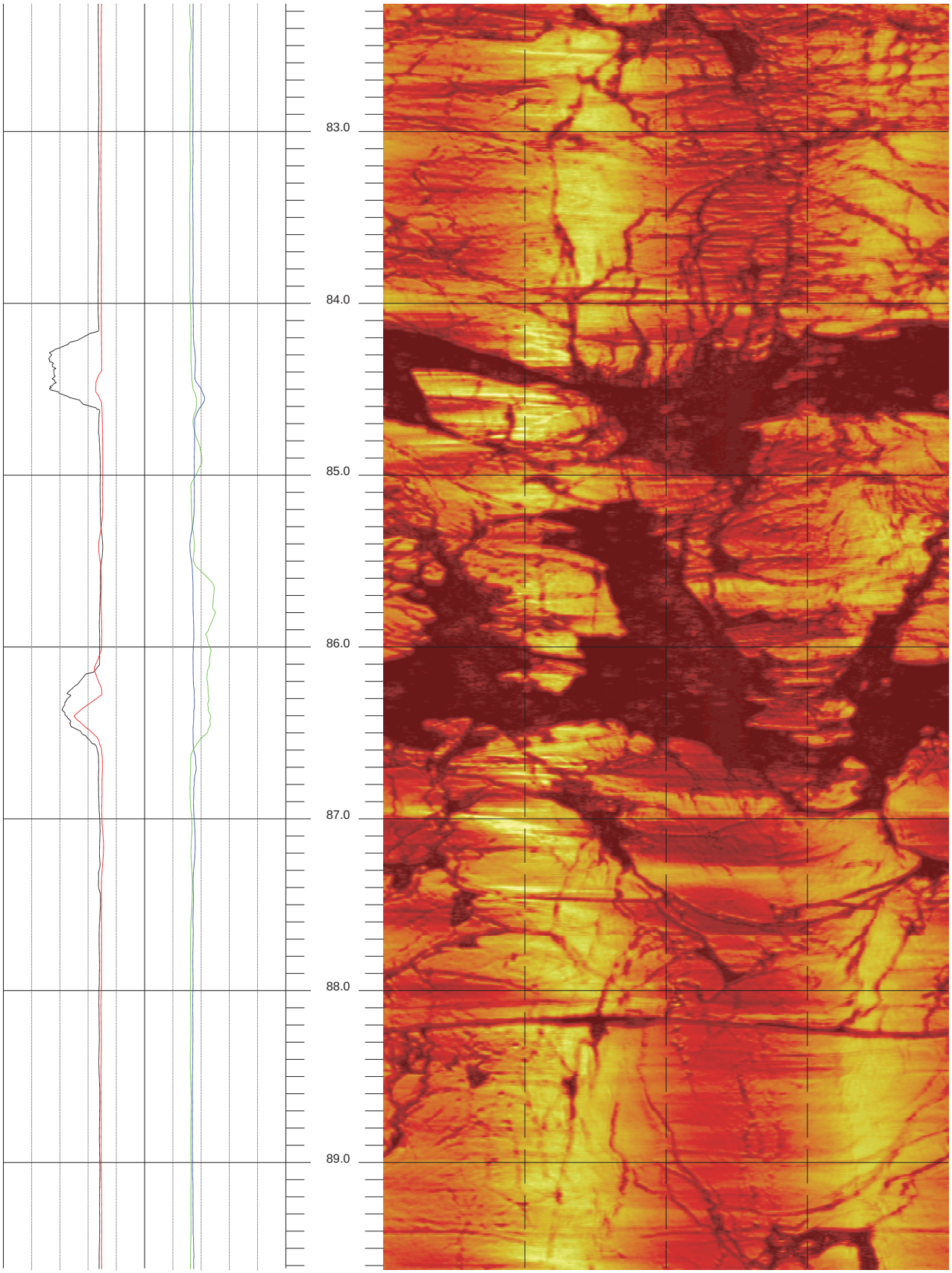

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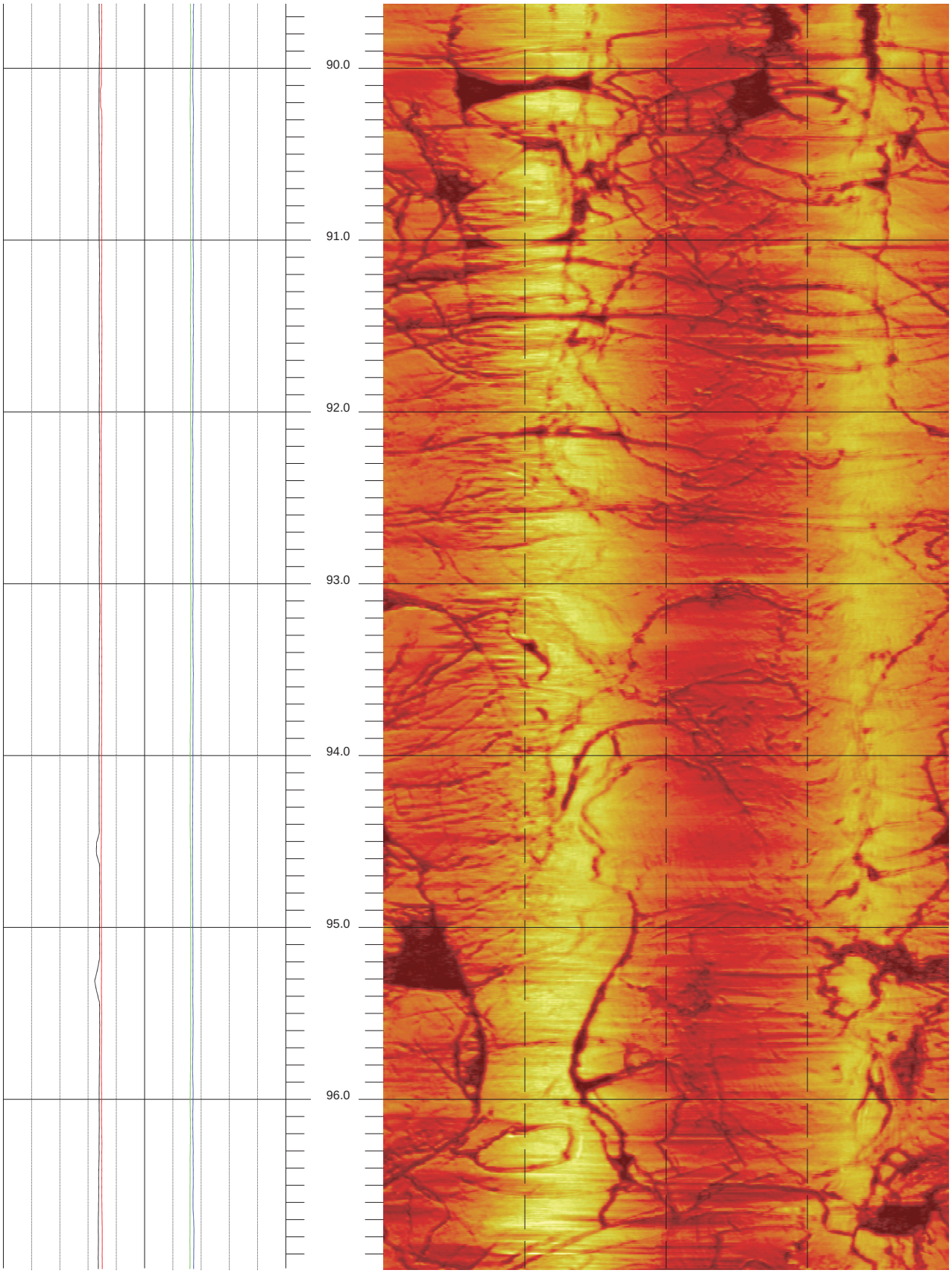

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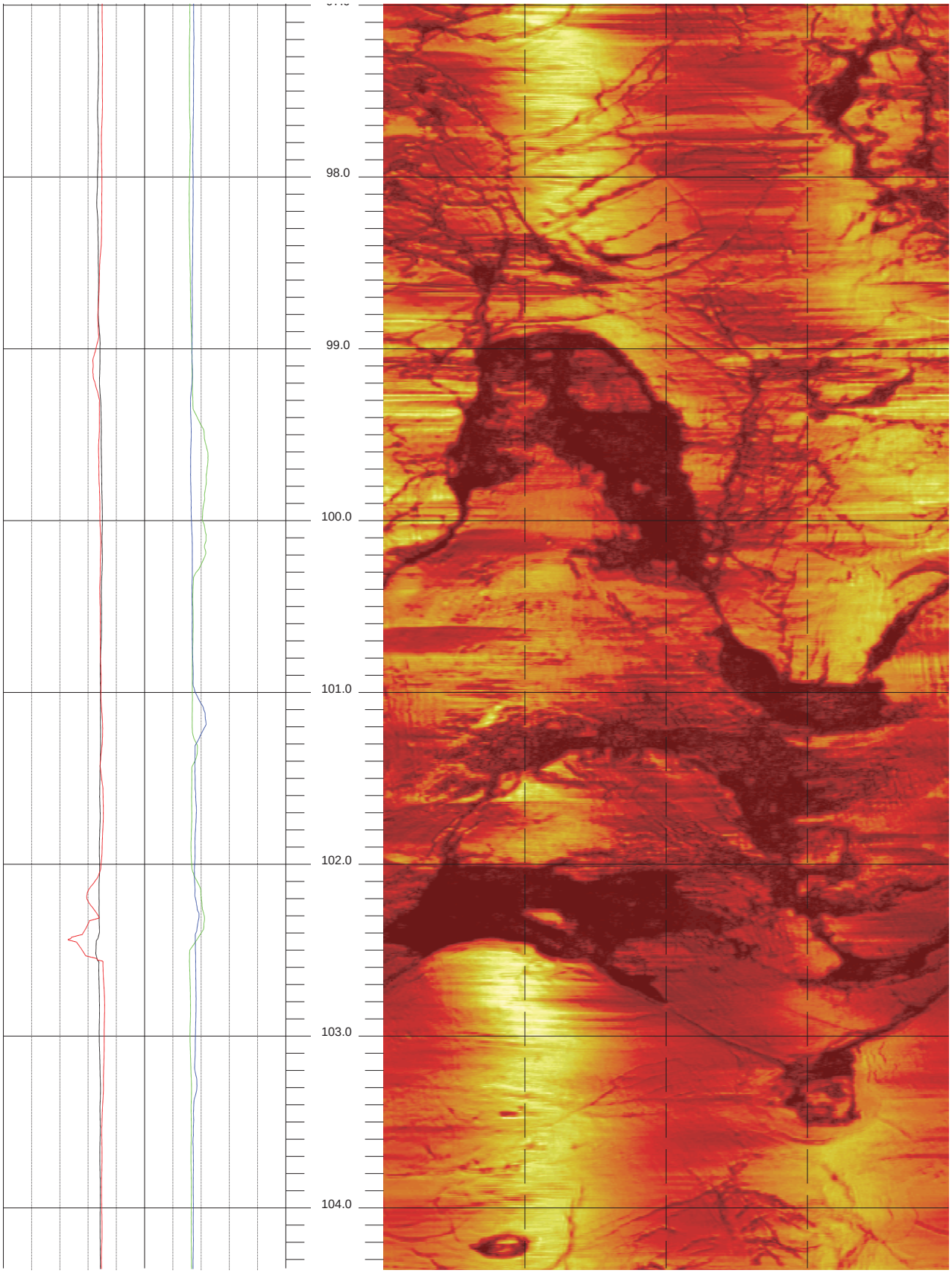

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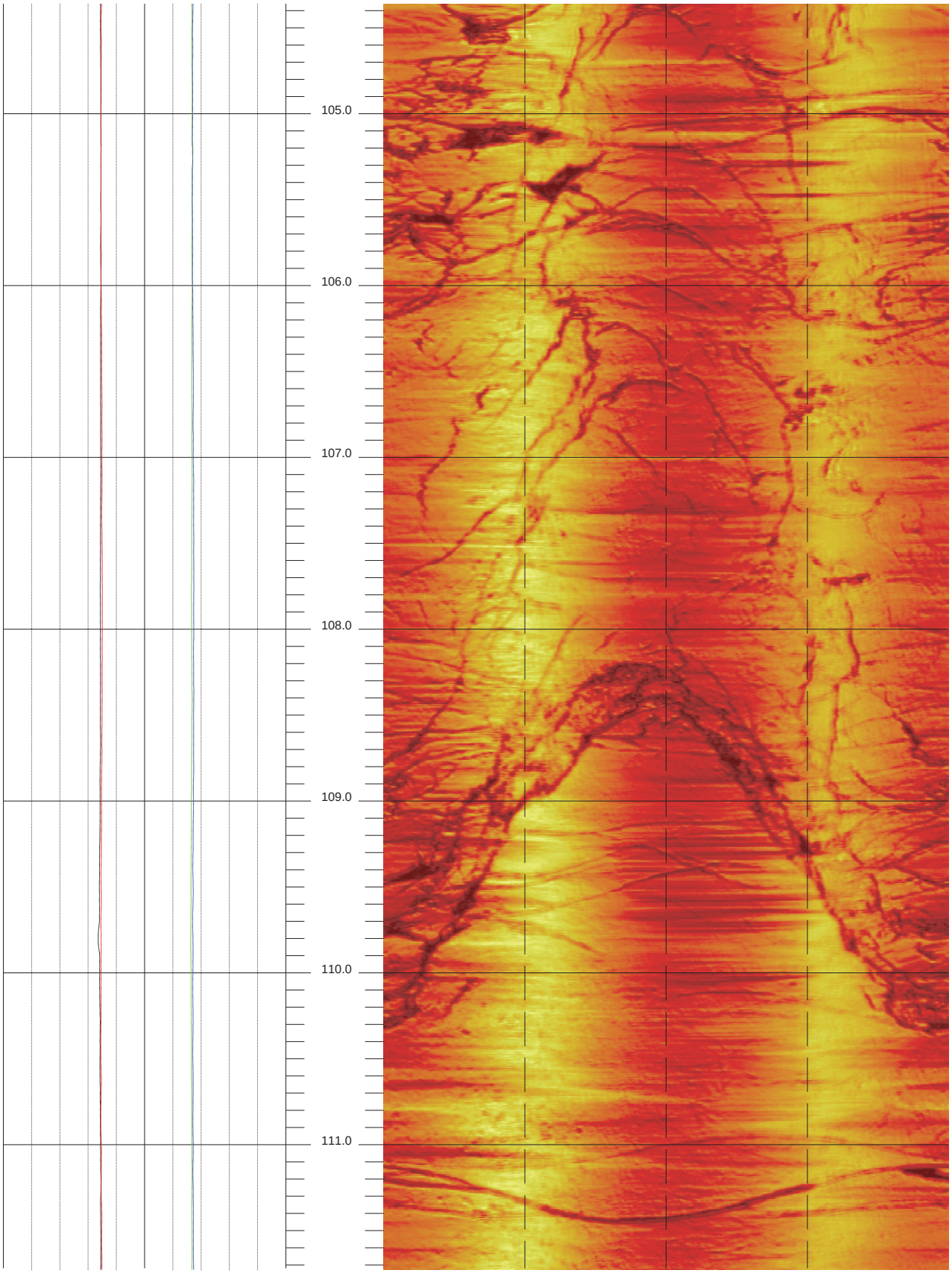

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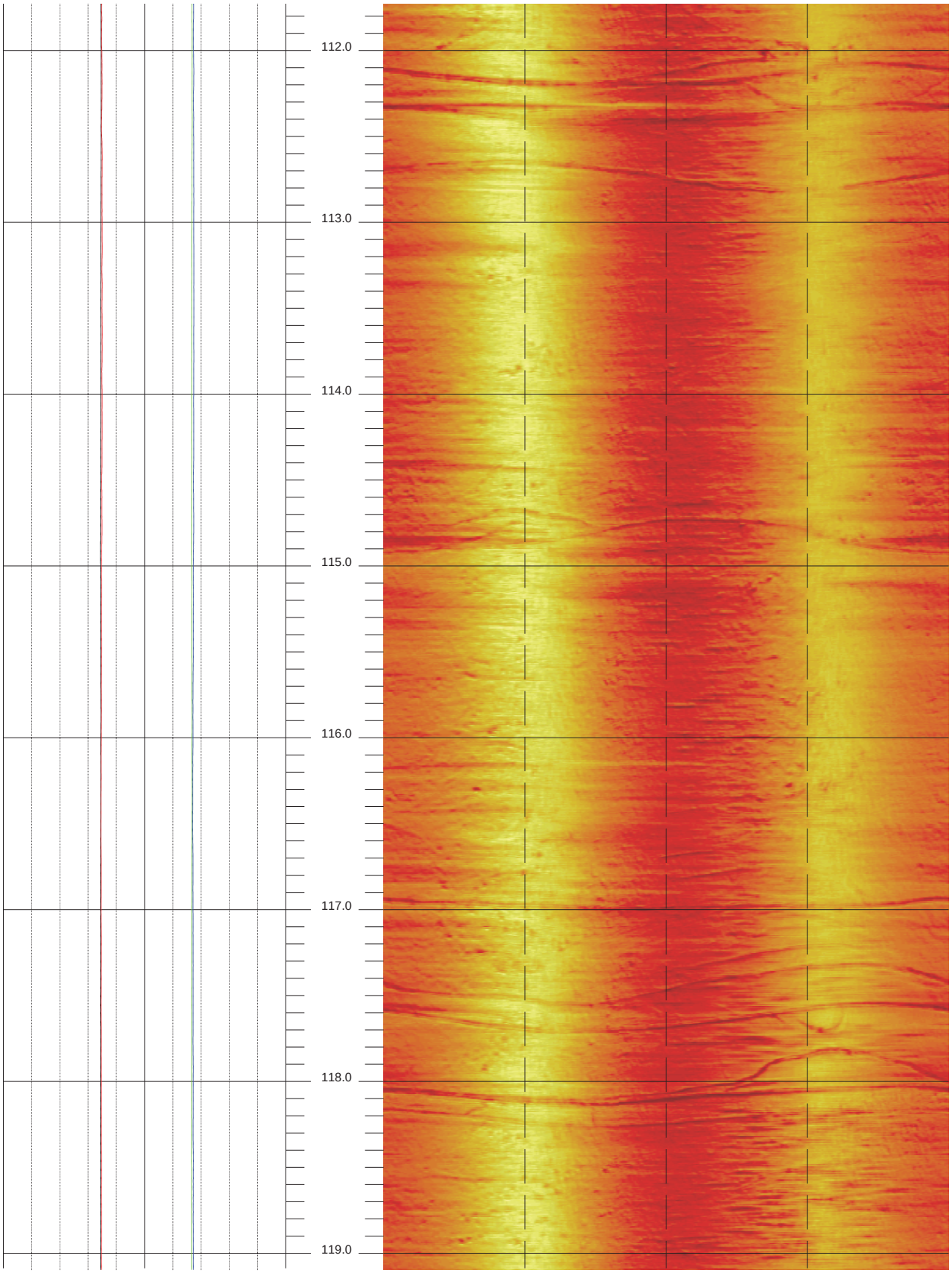

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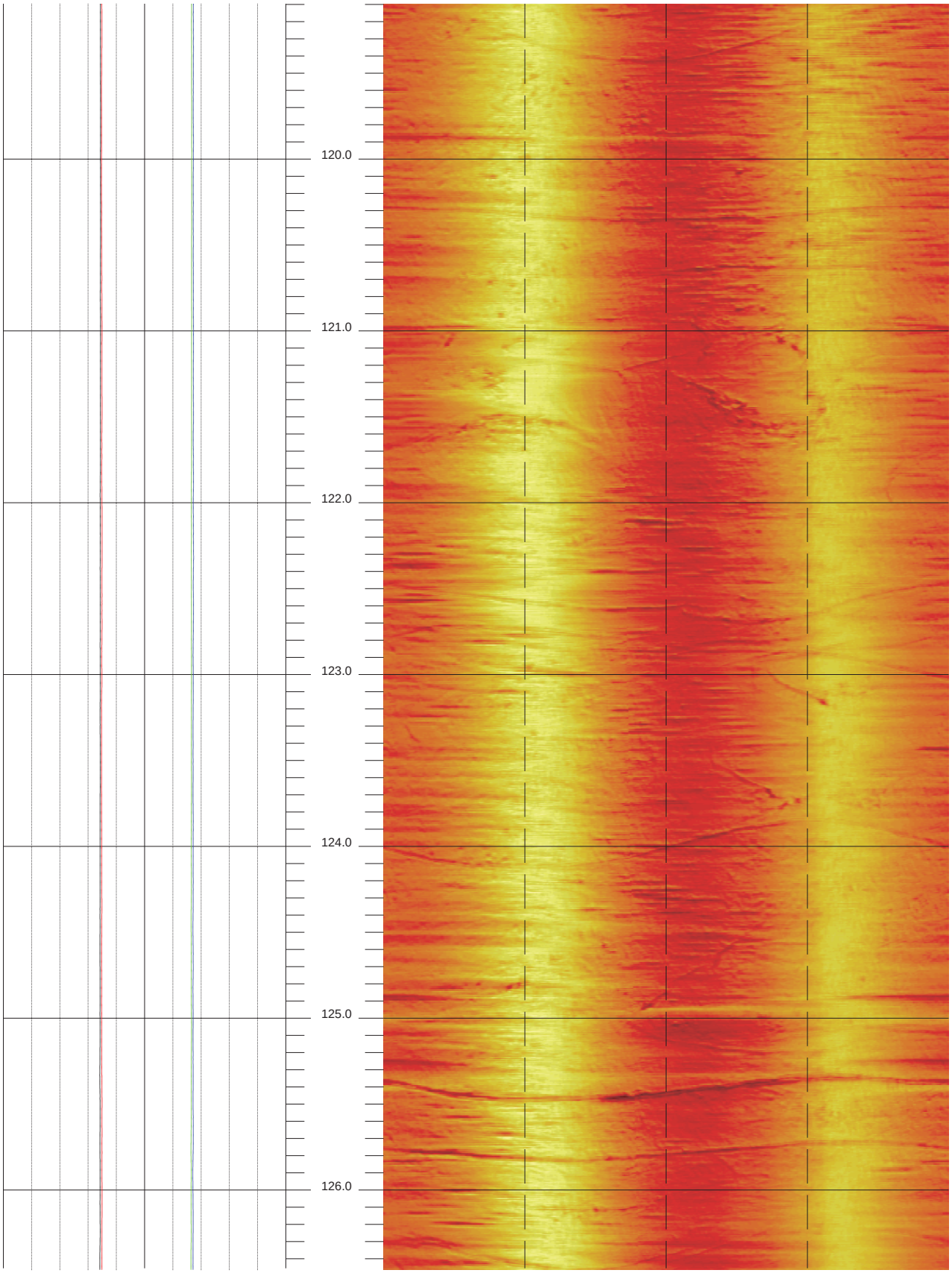

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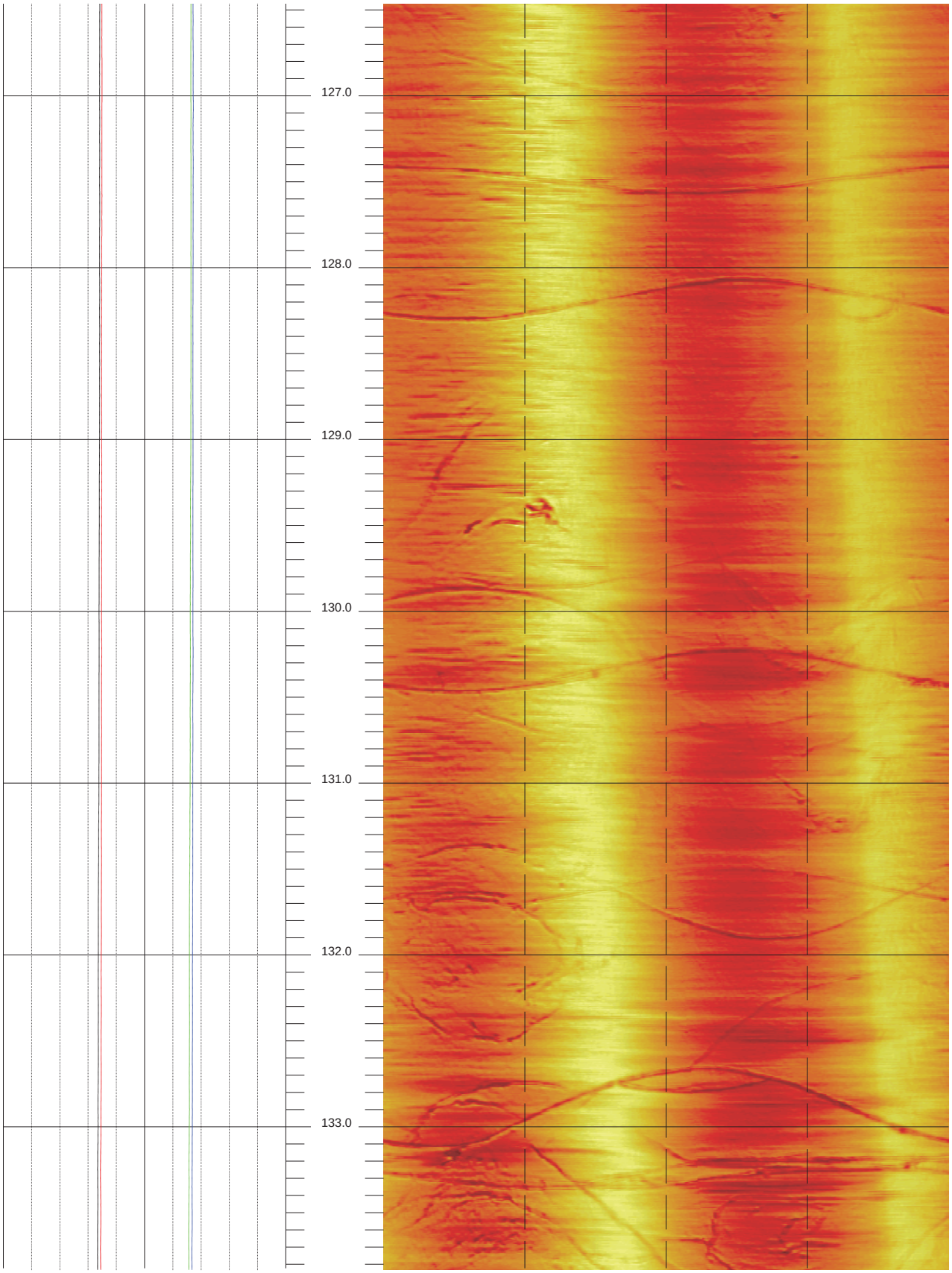

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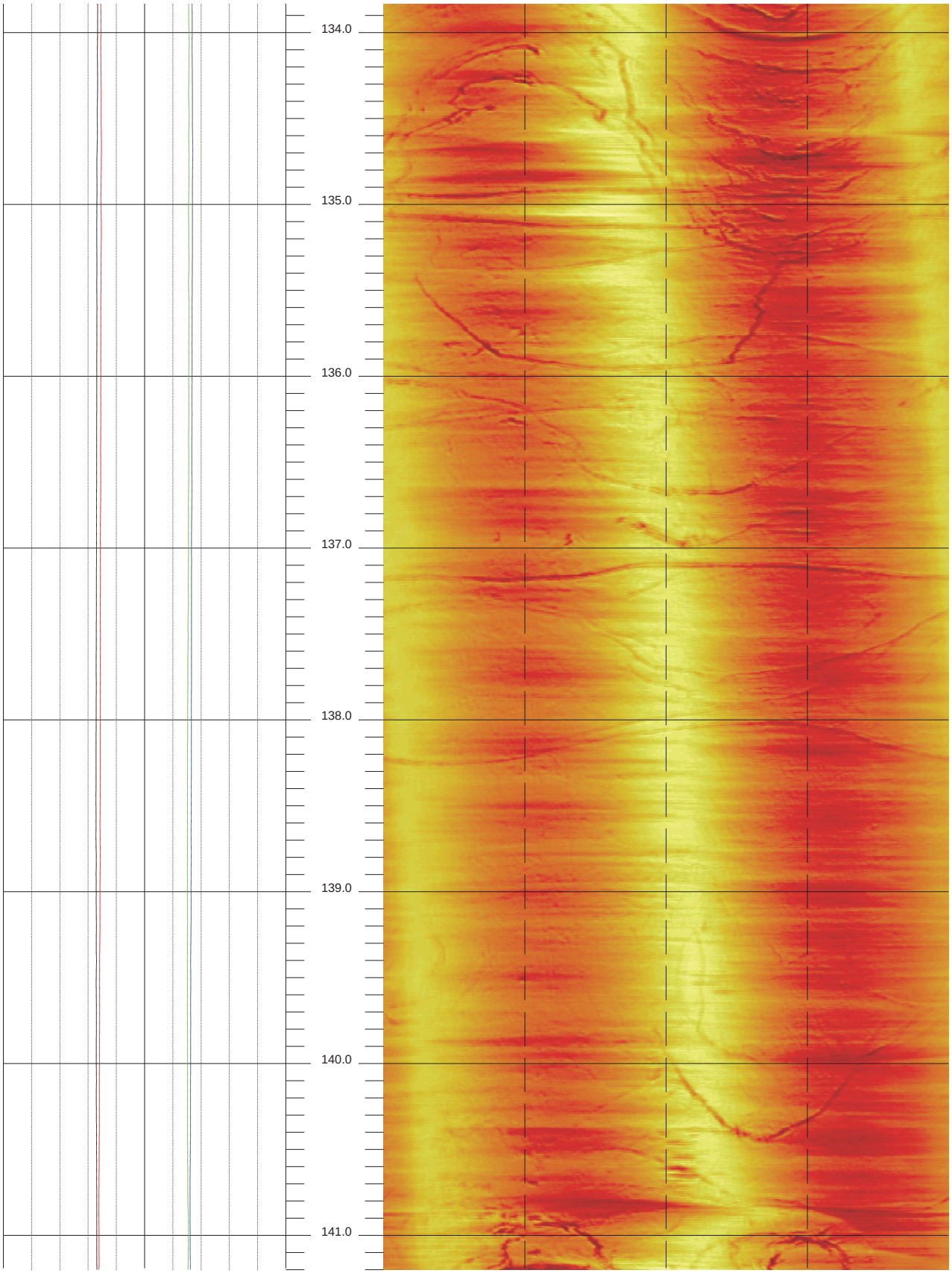

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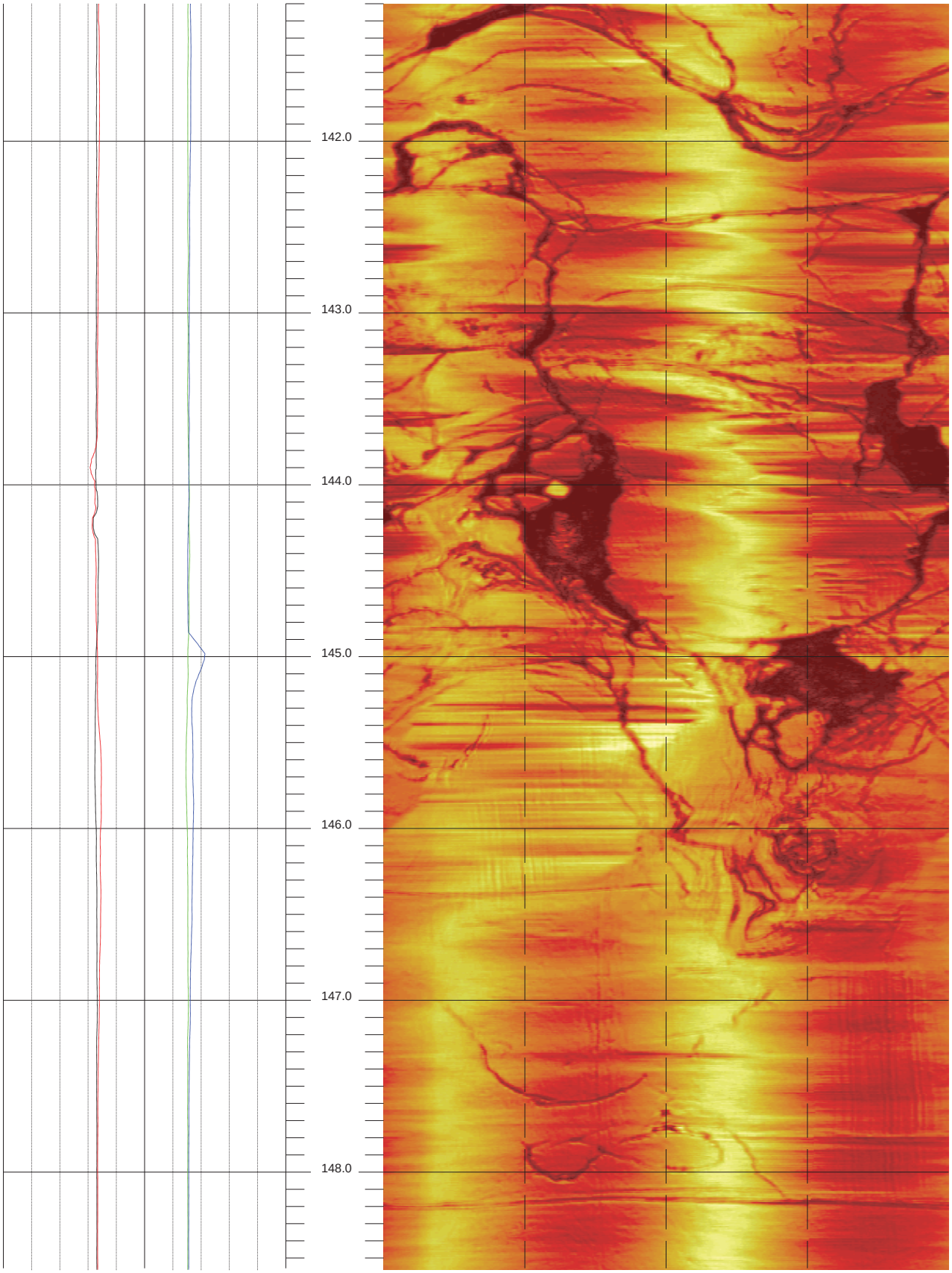

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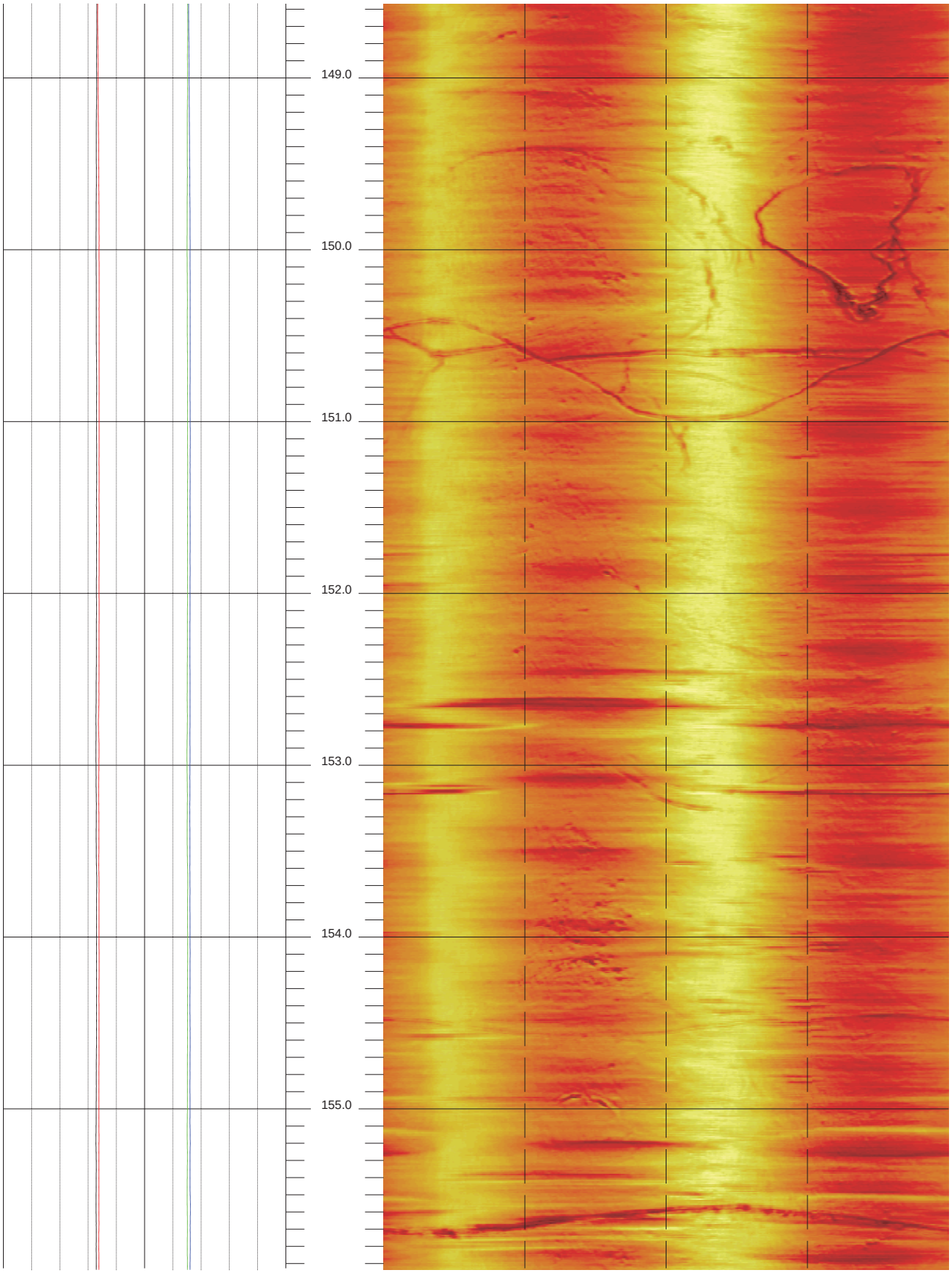

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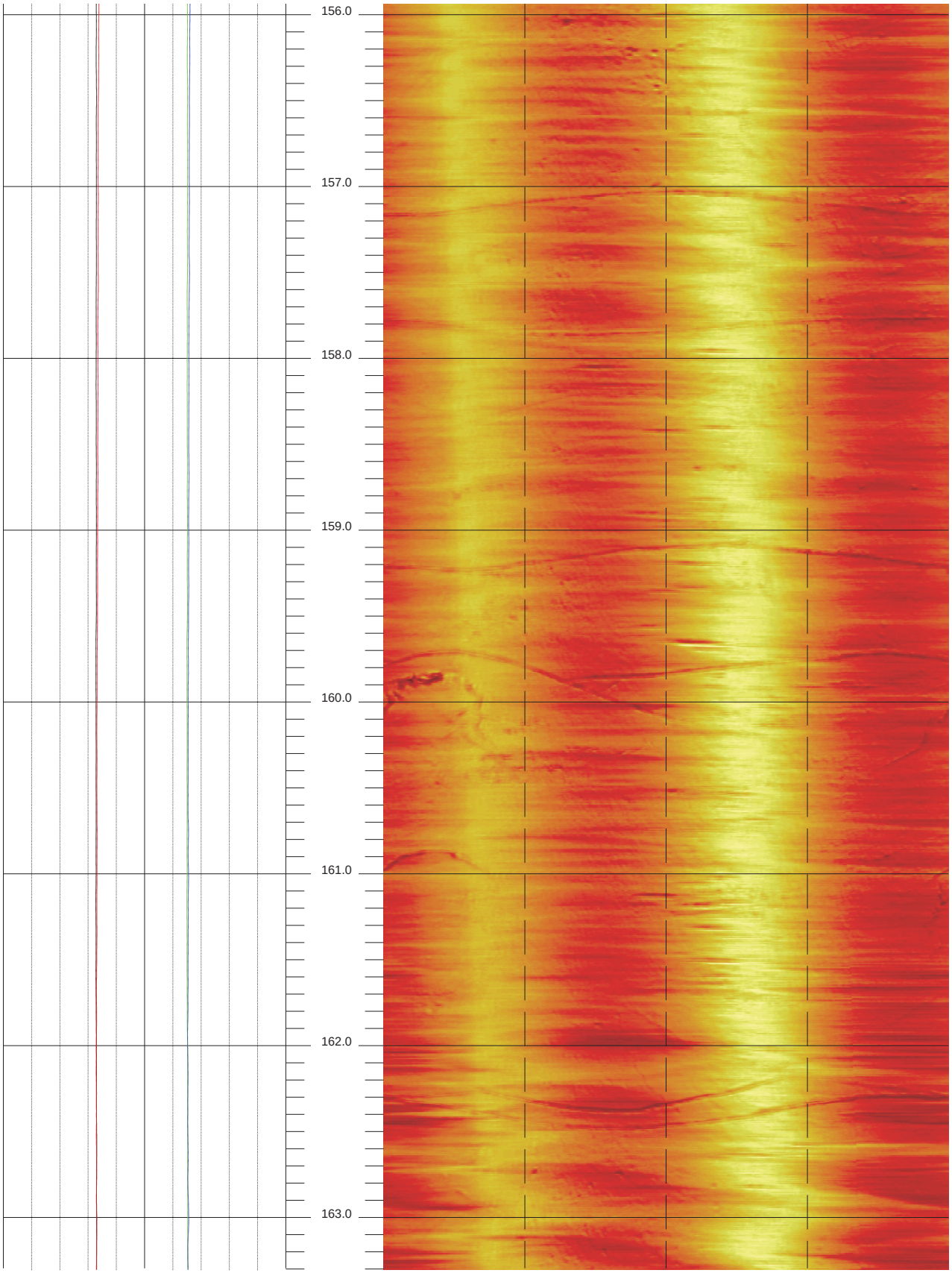

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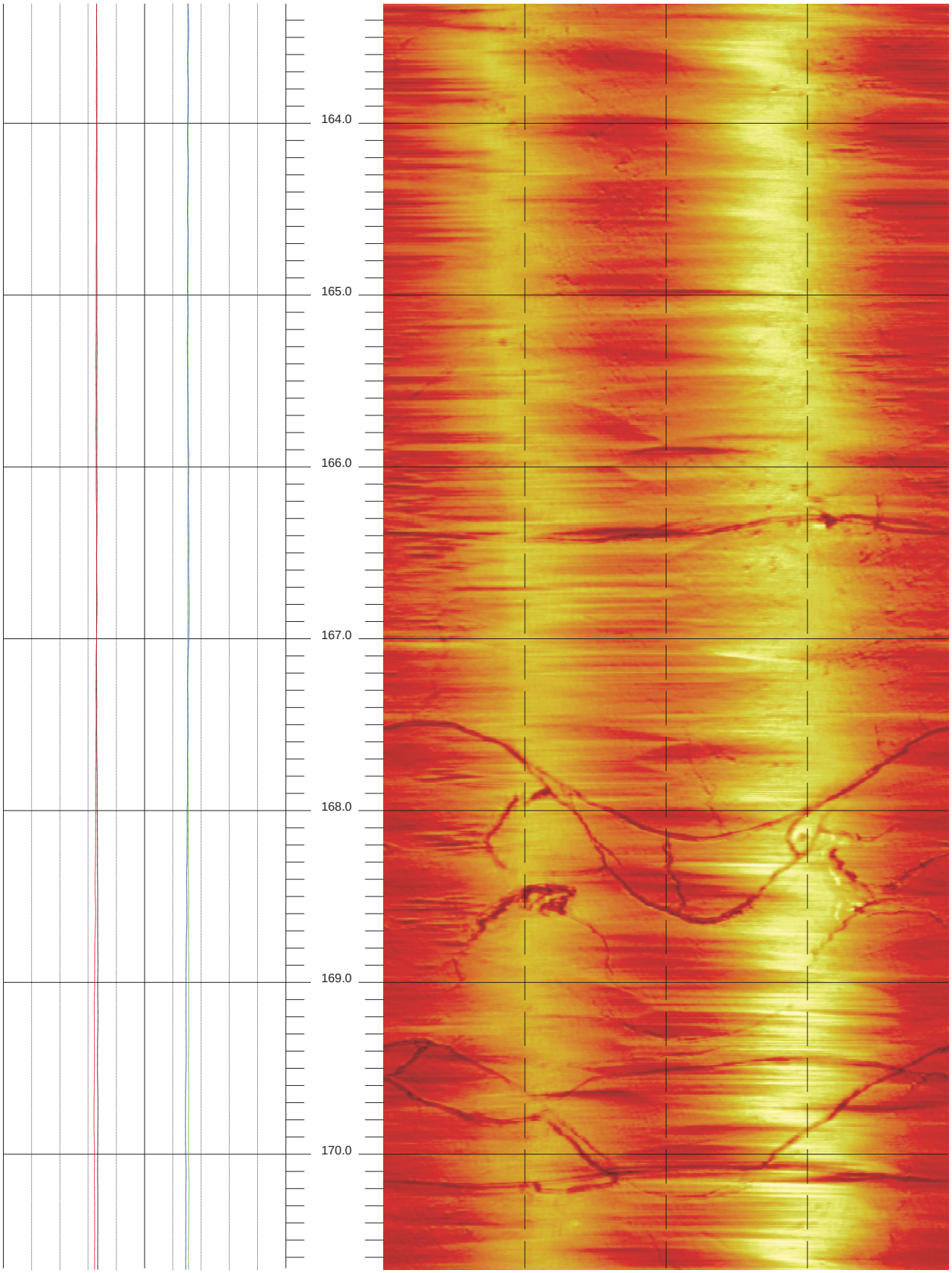

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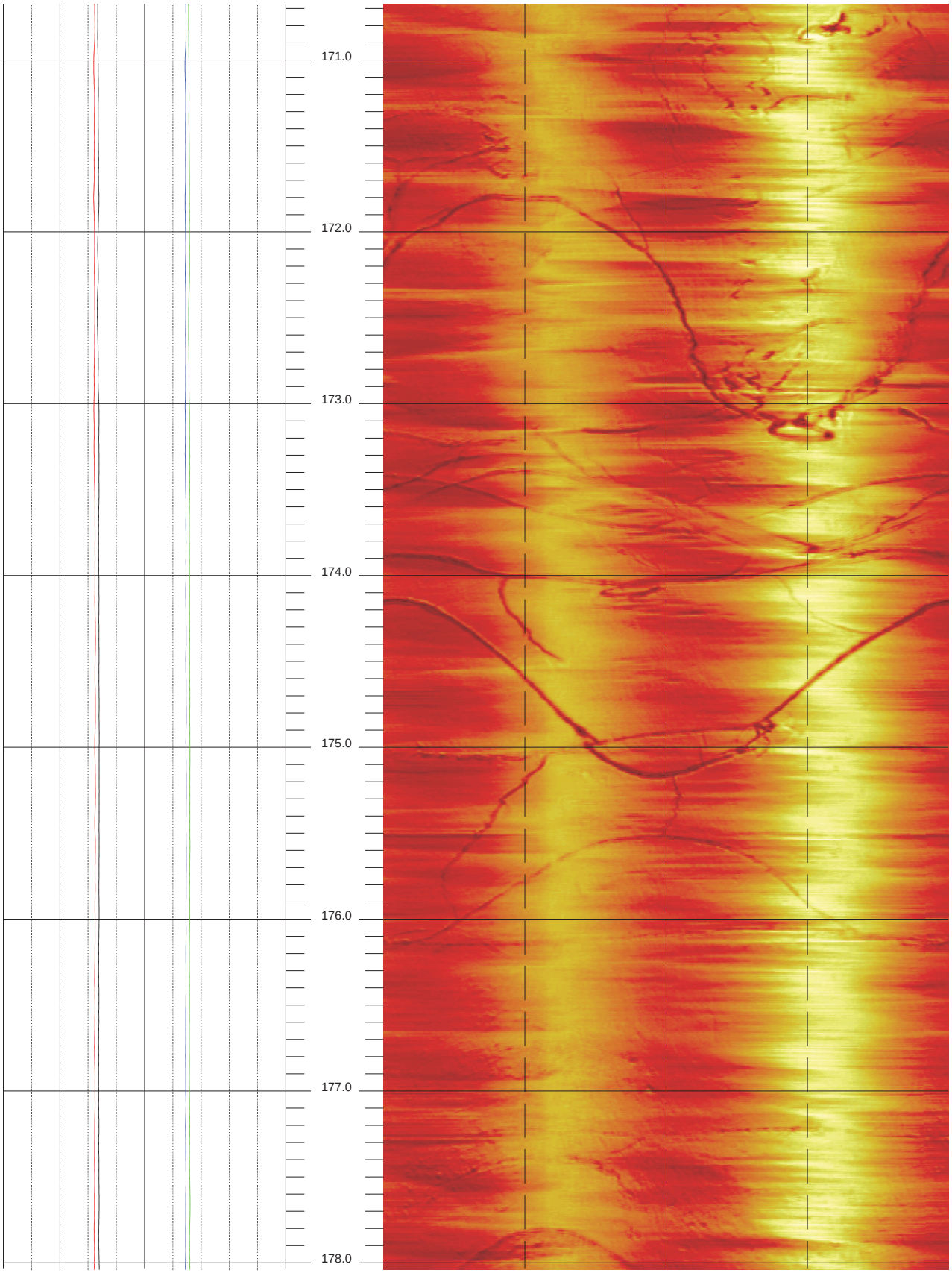

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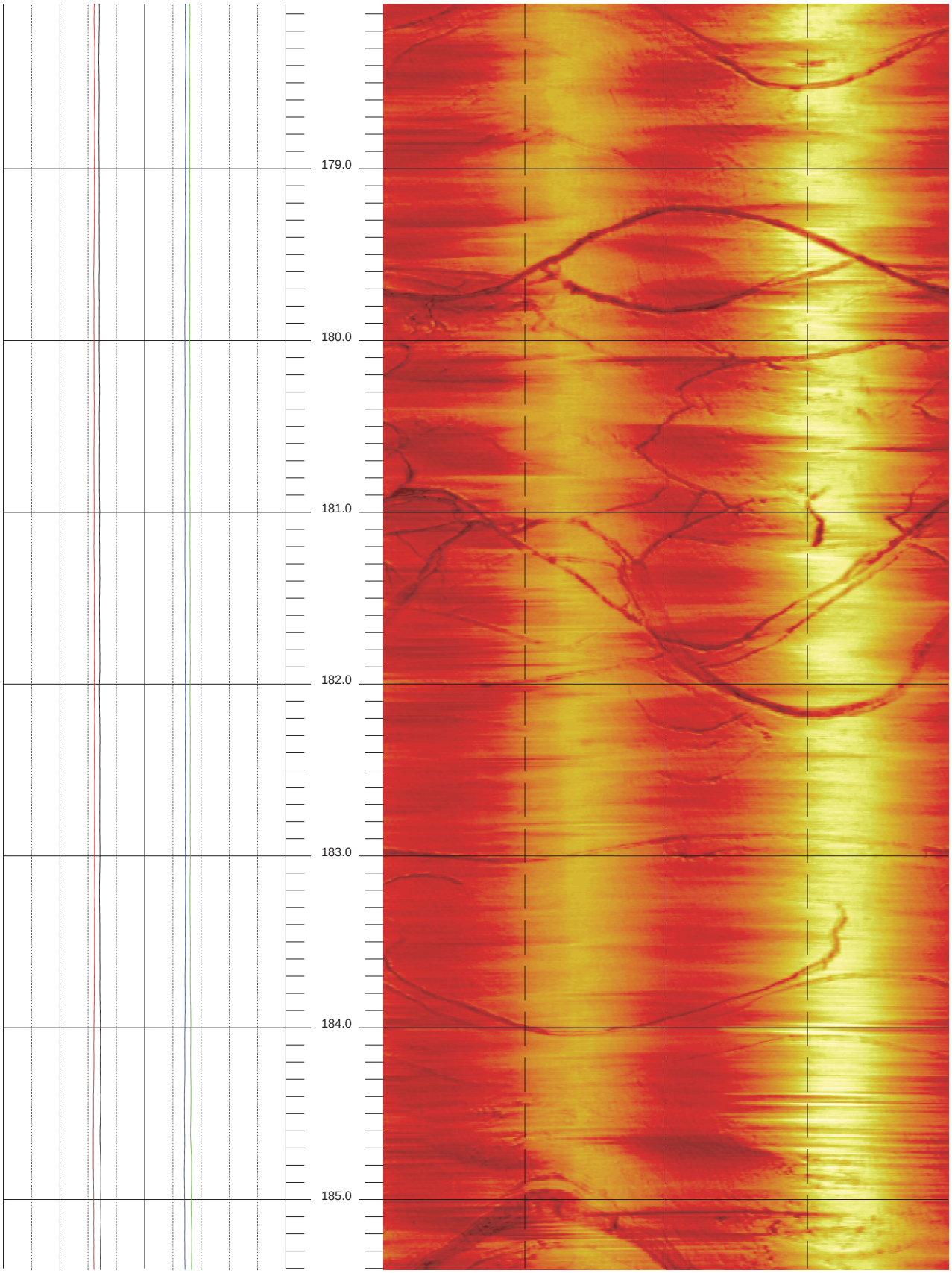

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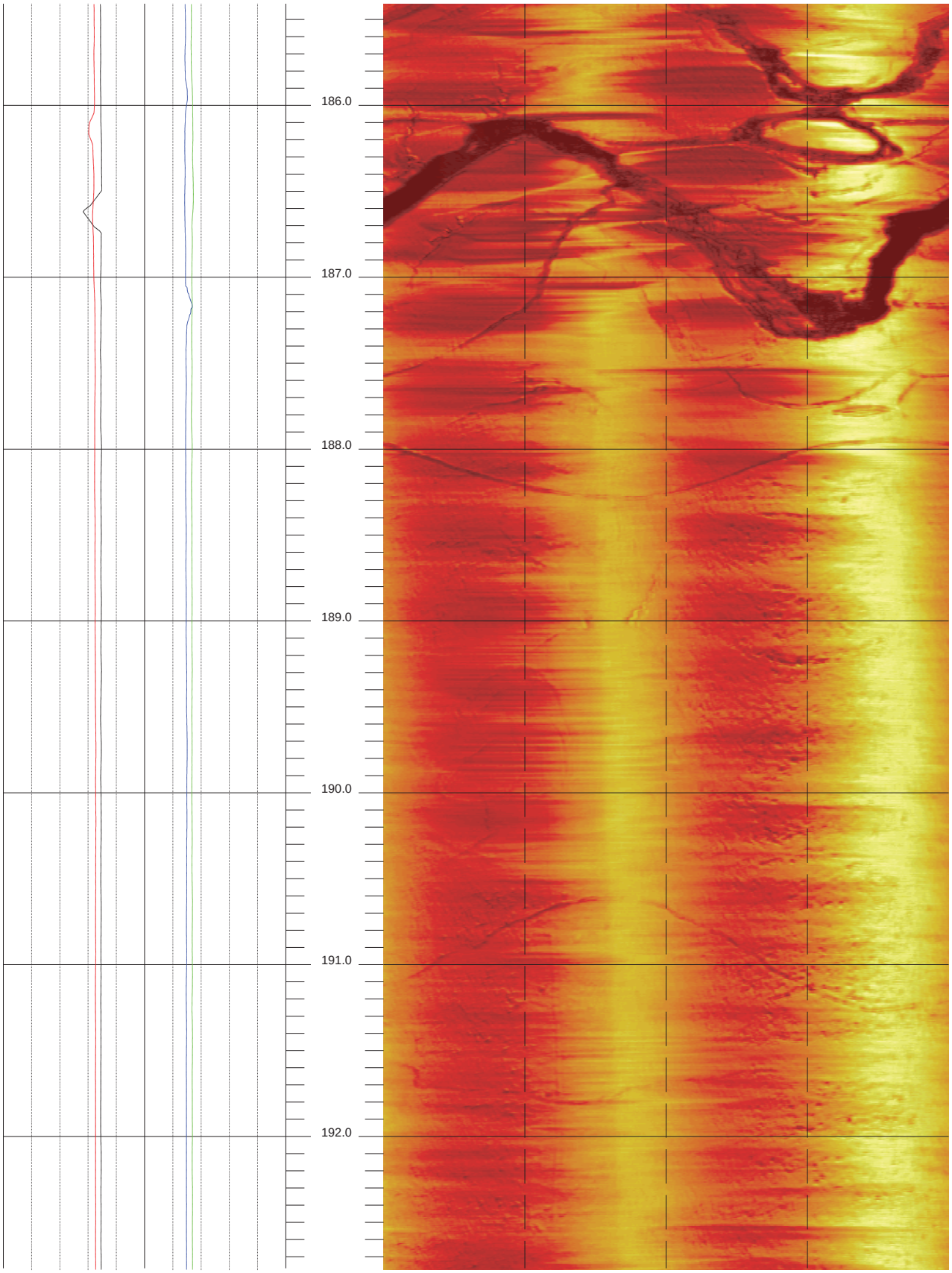

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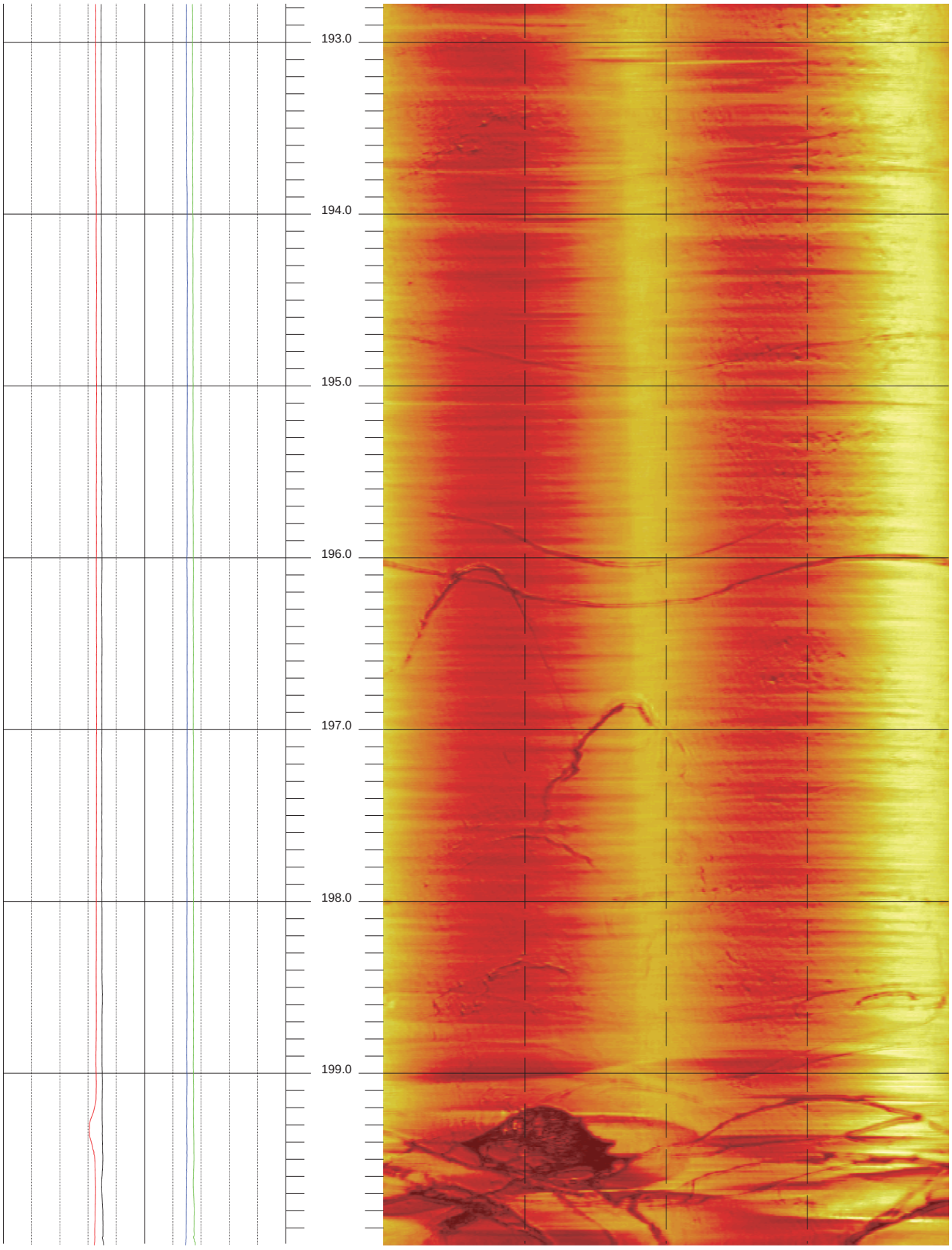

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BHTV DATA PROCESSING
RGLDIP vsn 6.2
ACOUSTIC CALIPER LOG

AECOM

Borehole: B-104

VAIL DAM

top of borehole.....
East: _
North:_
Elev: _

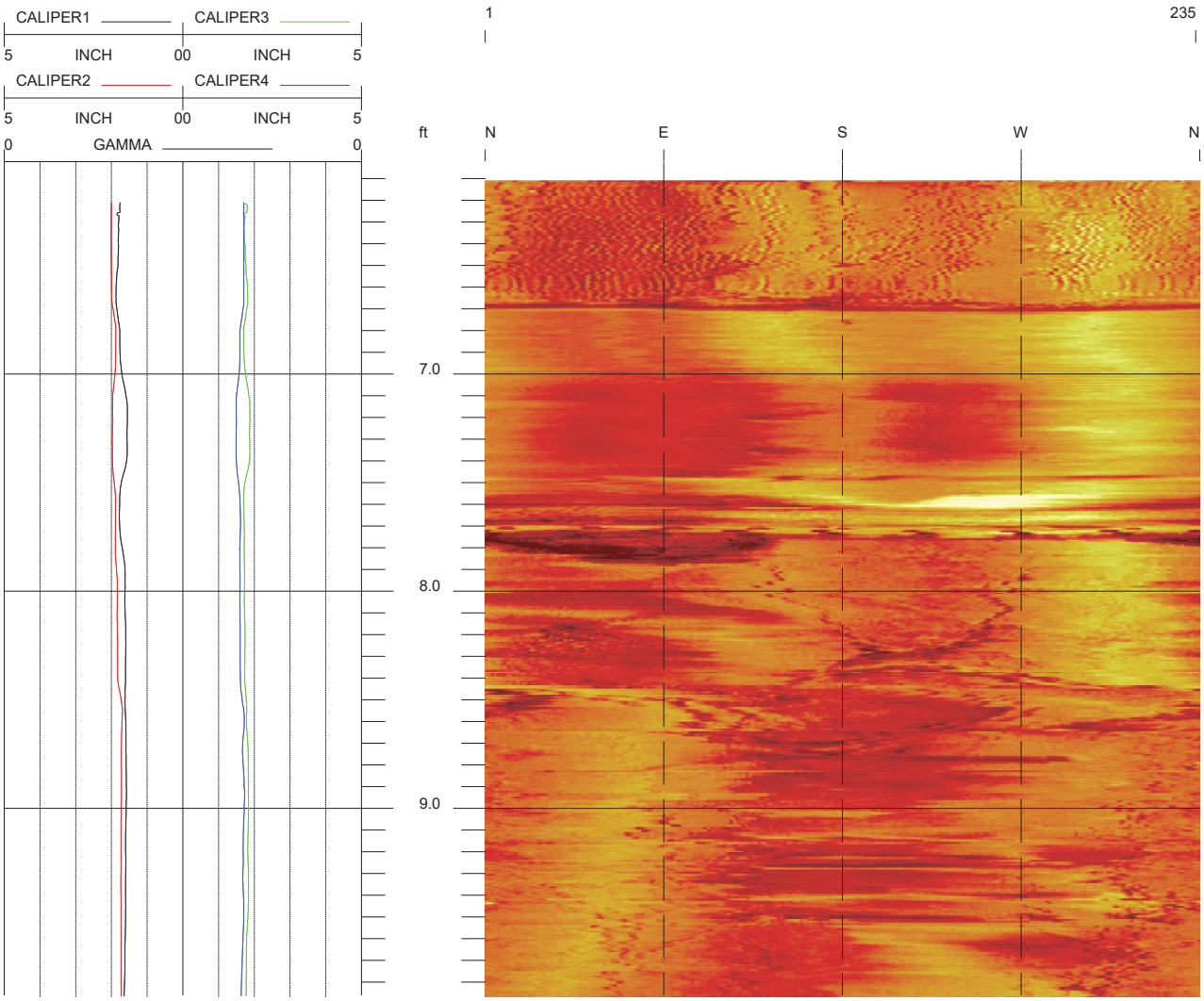
North ref. is true
Depth units are feet
Vertical scale: 1/10

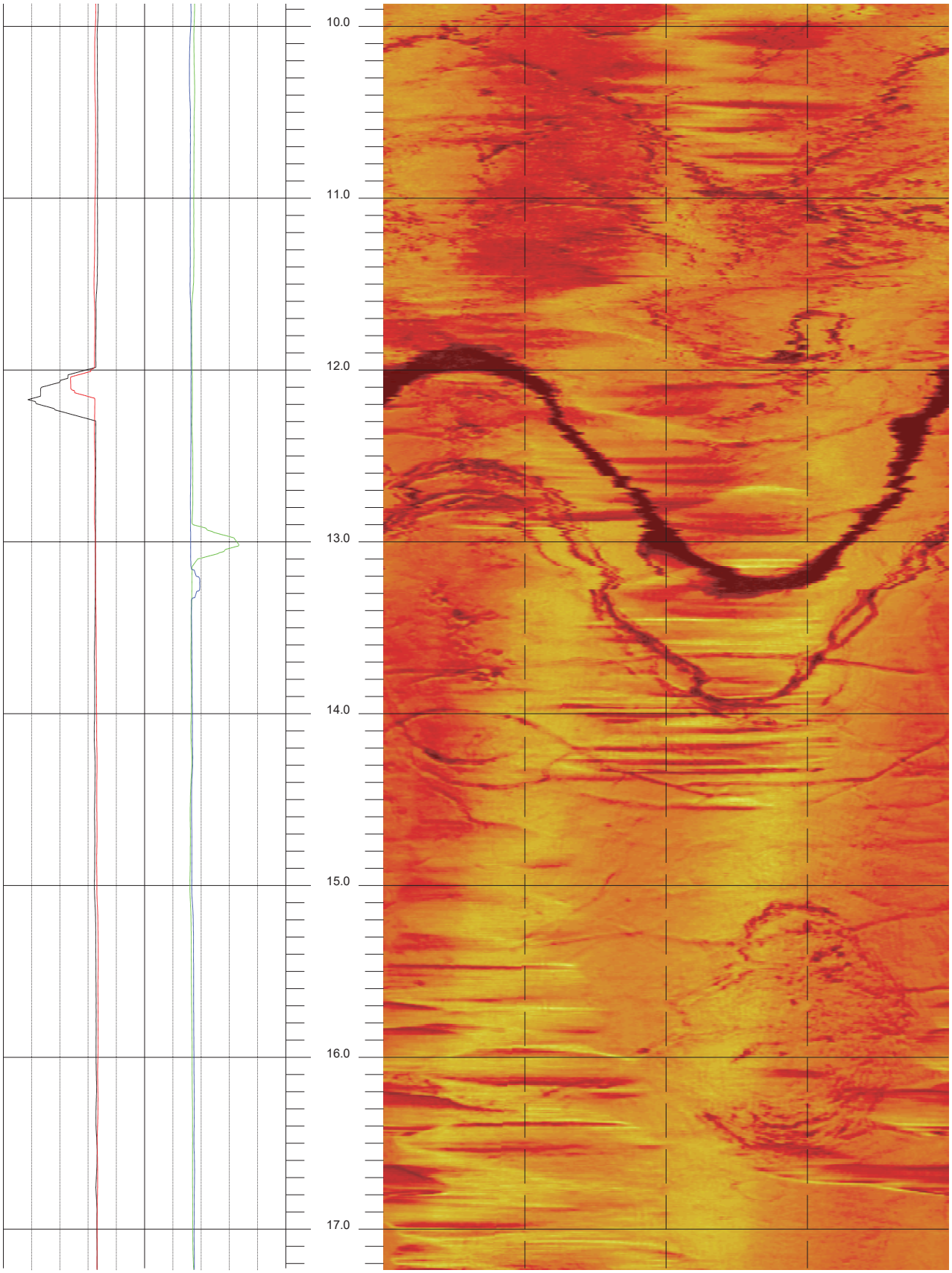
Zone from 148.344 to 6.024ft

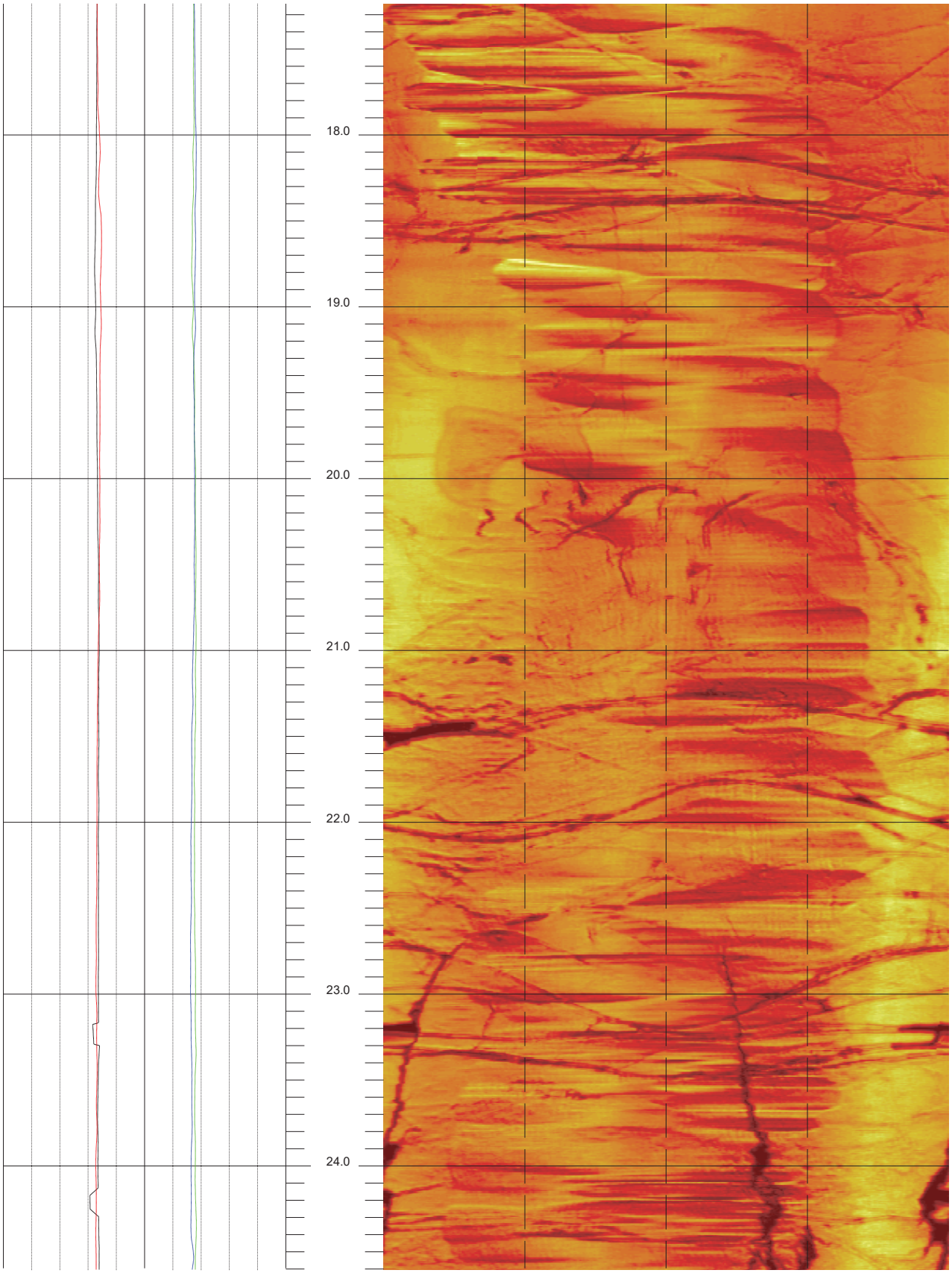
Borehole diam: 3.860inch
Vertical = borehole-axis
Image: Amplitude

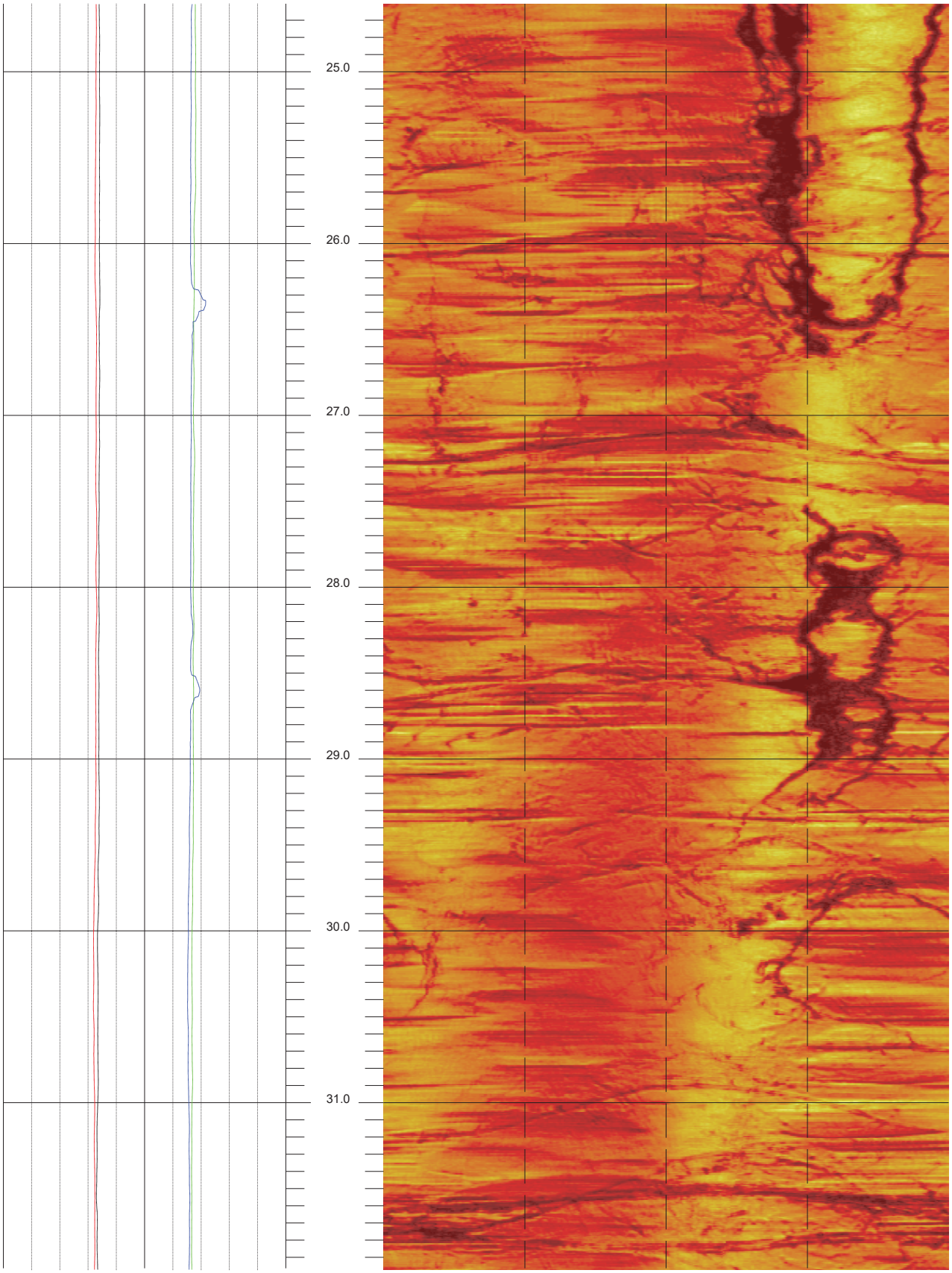
Depth interval 0.004ft, Filter length 0.124ft

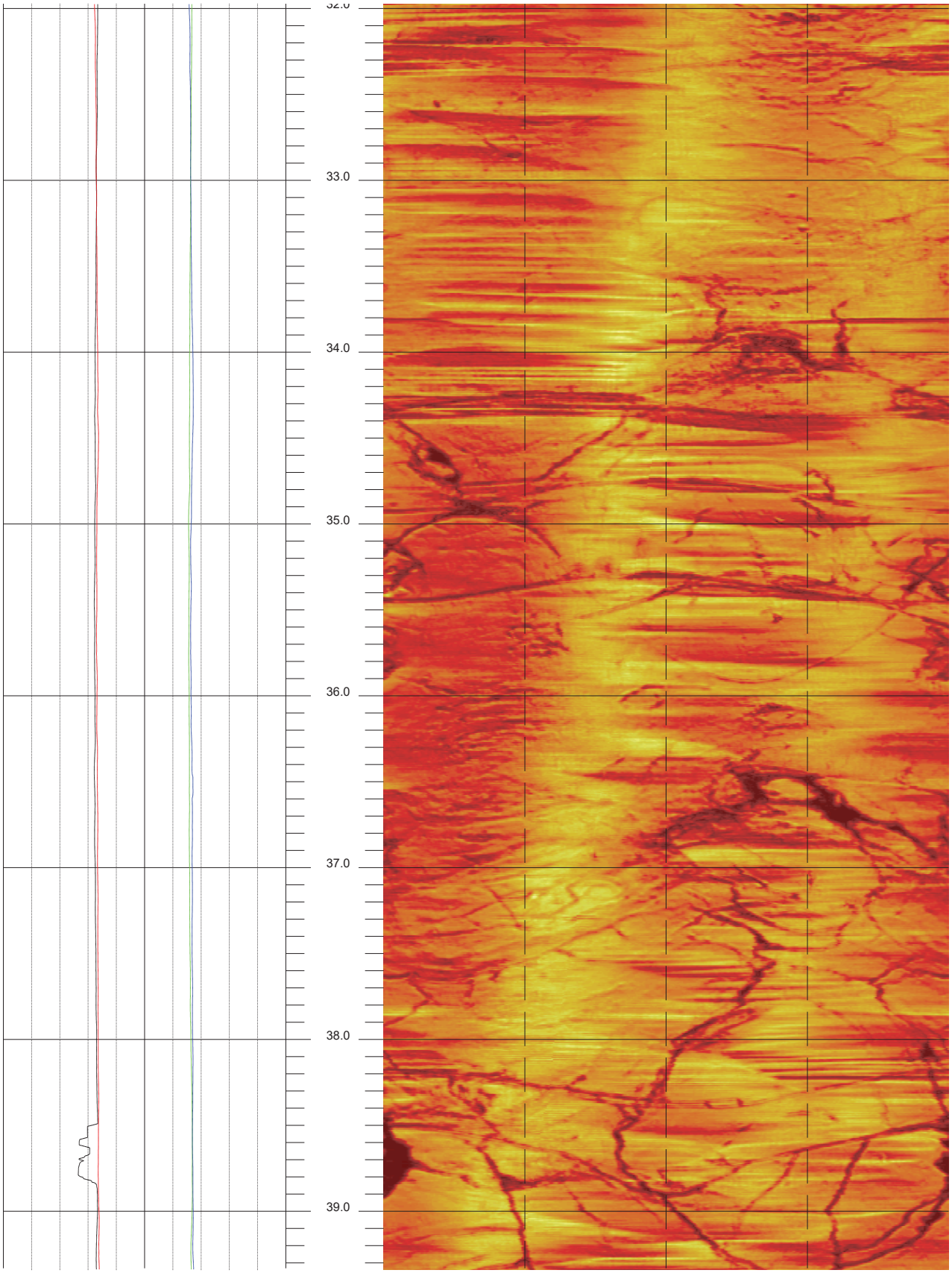
REFLECTANCE

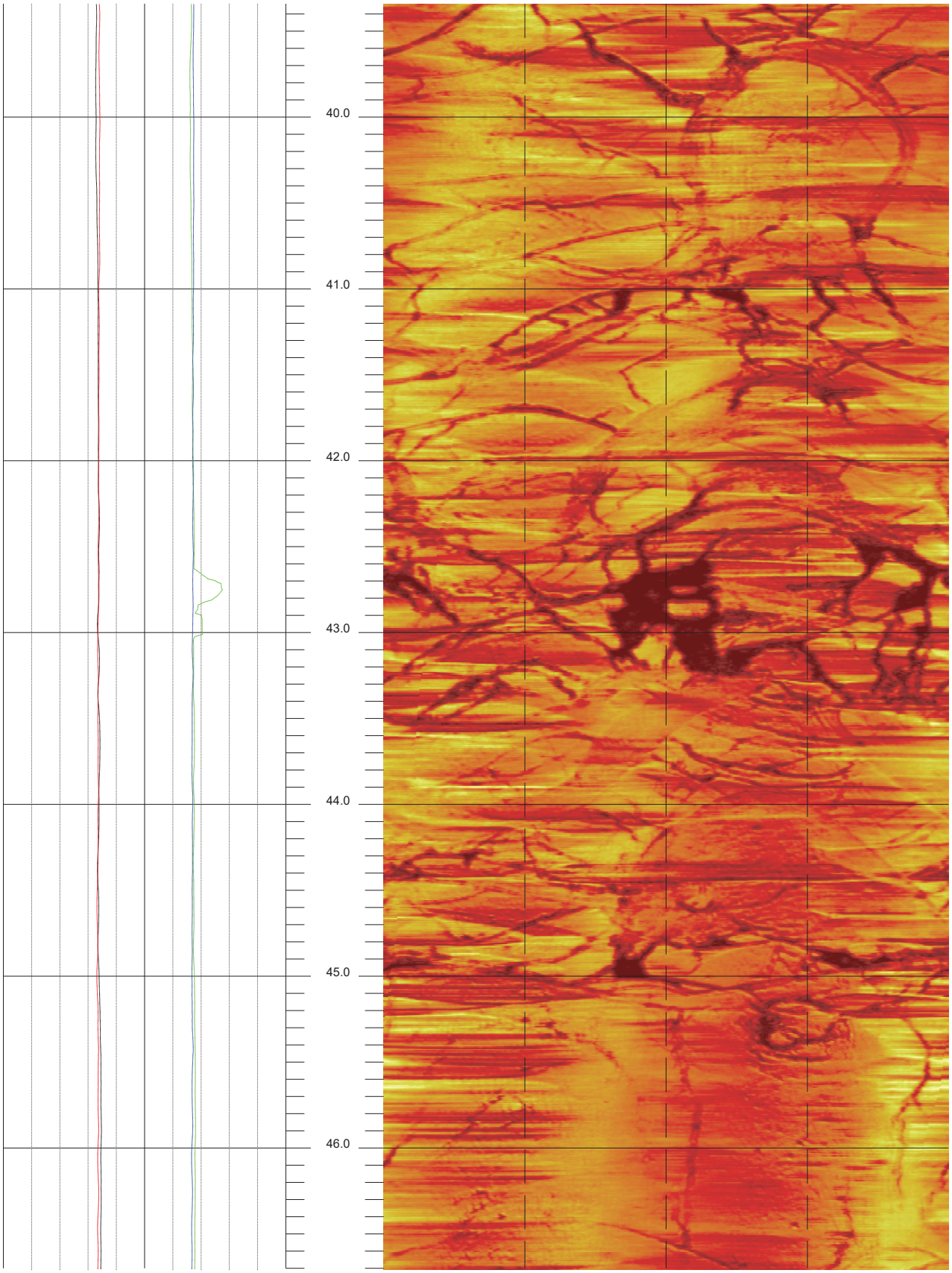


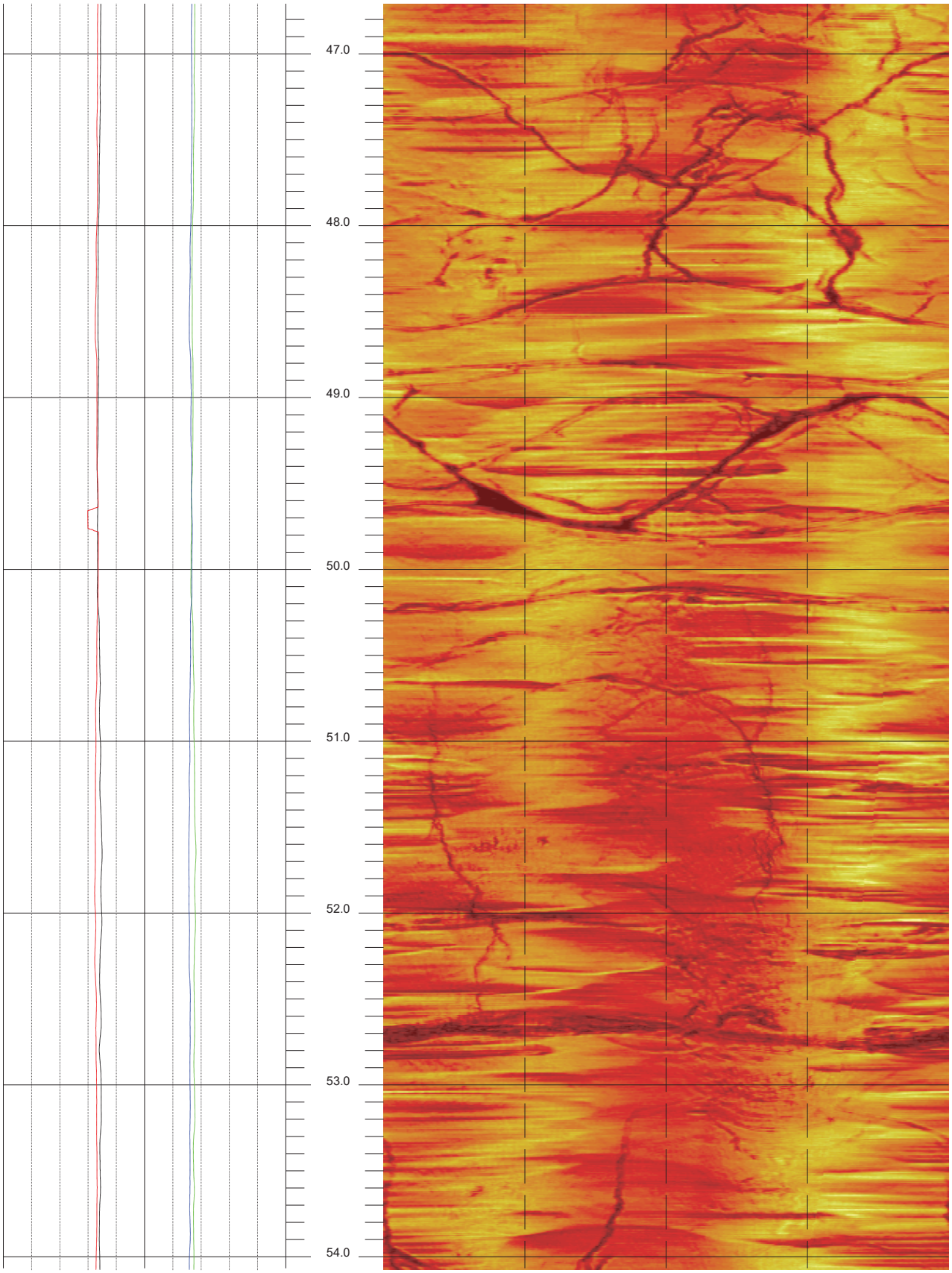

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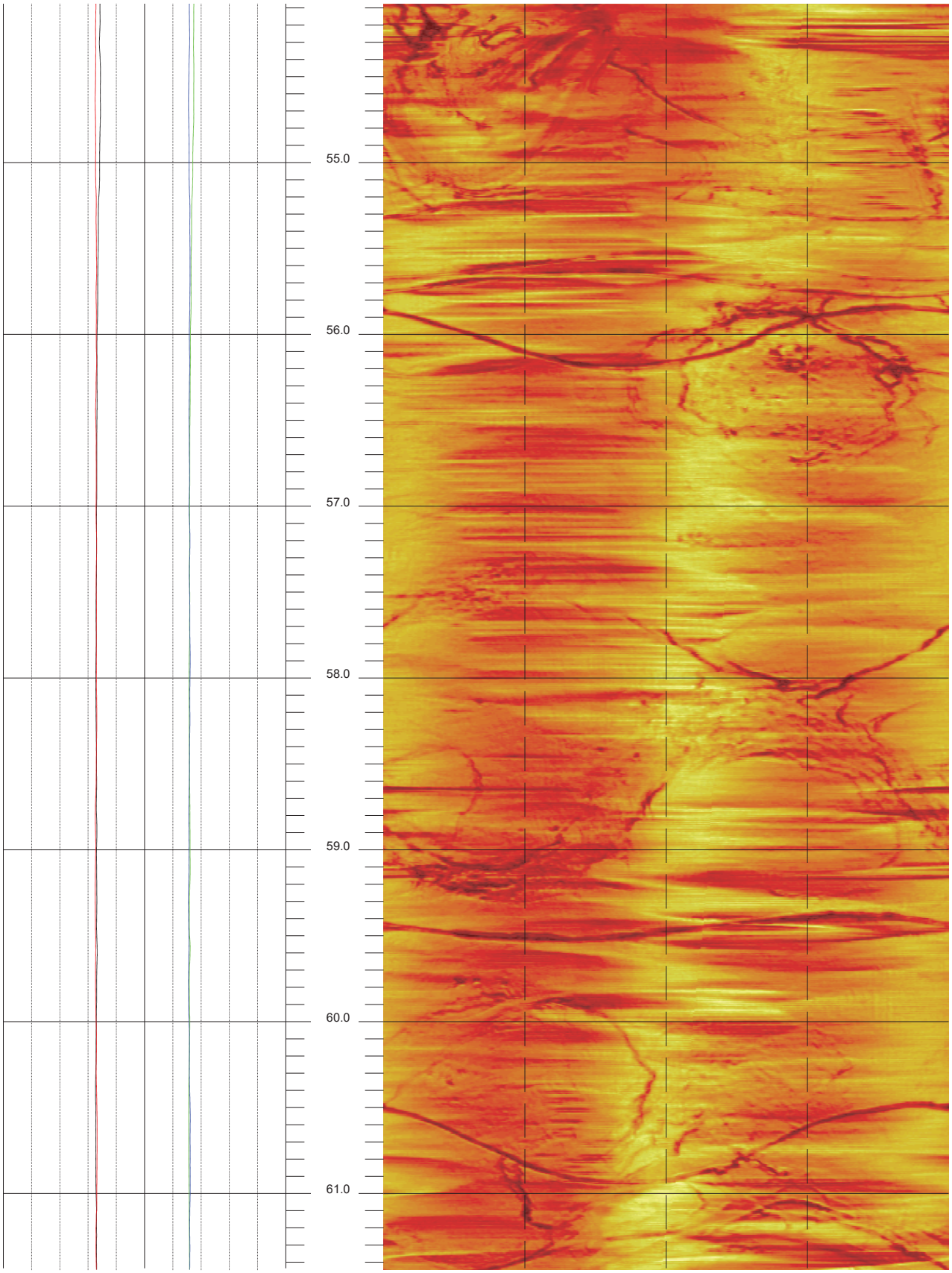

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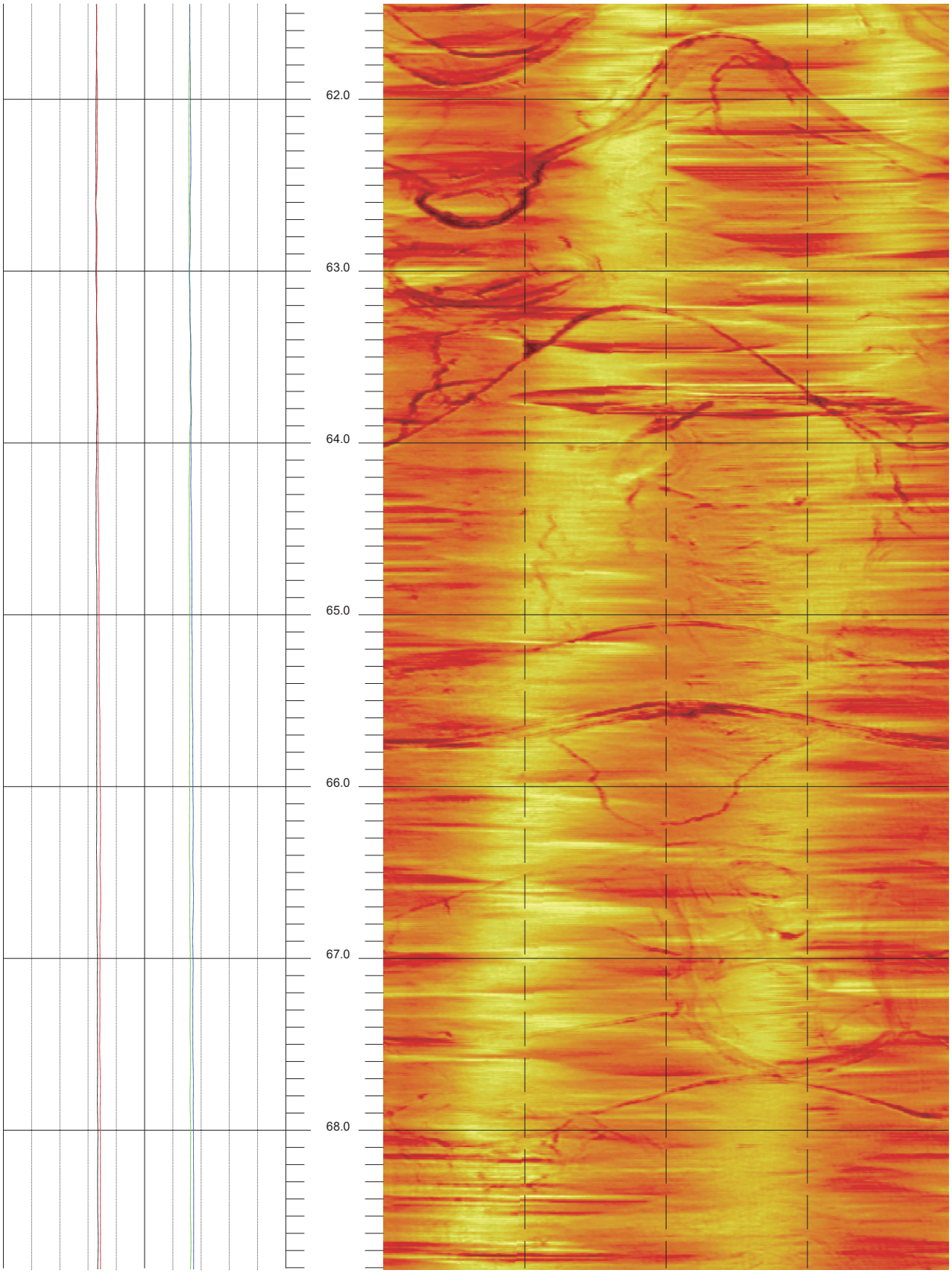

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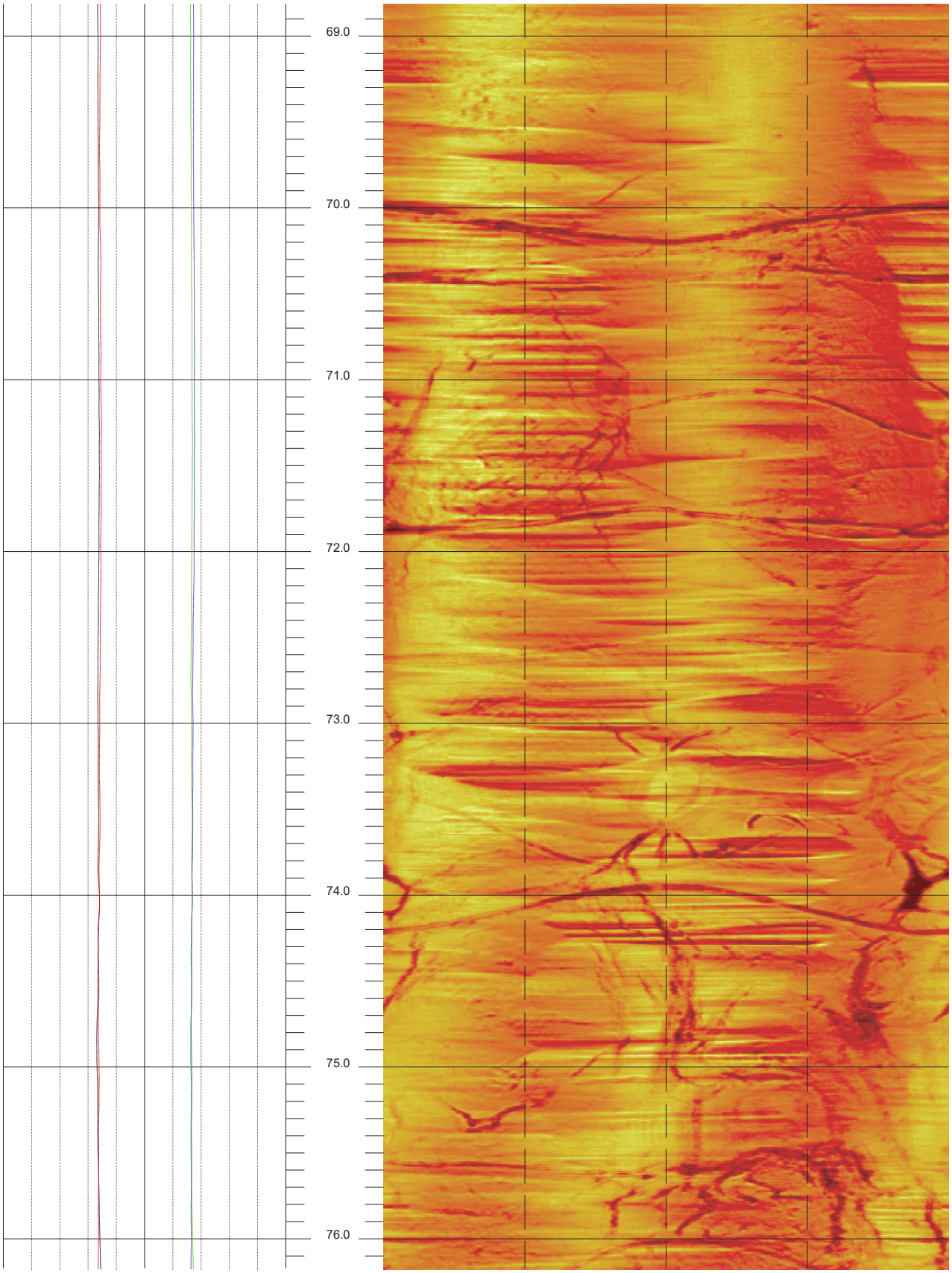

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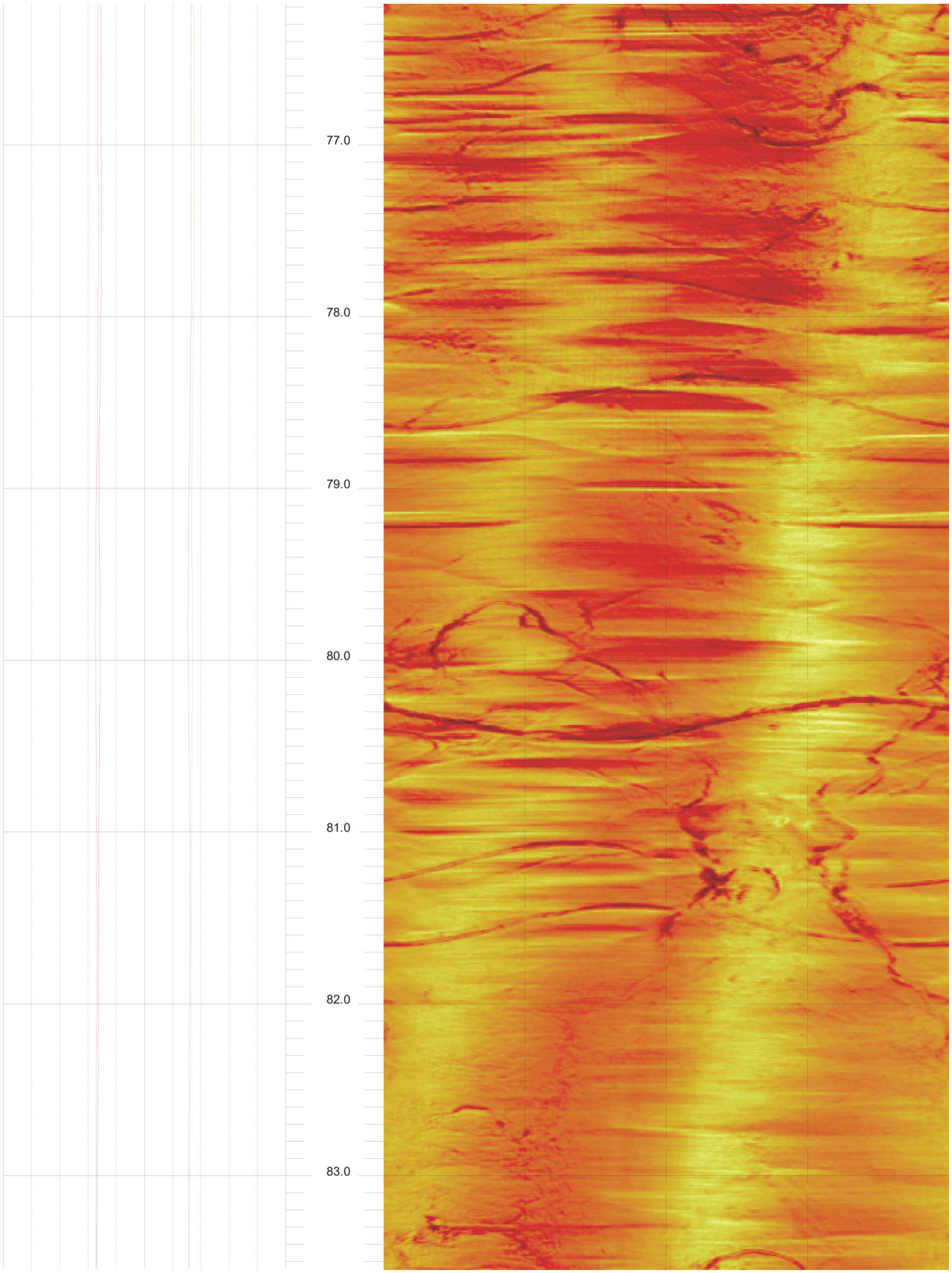

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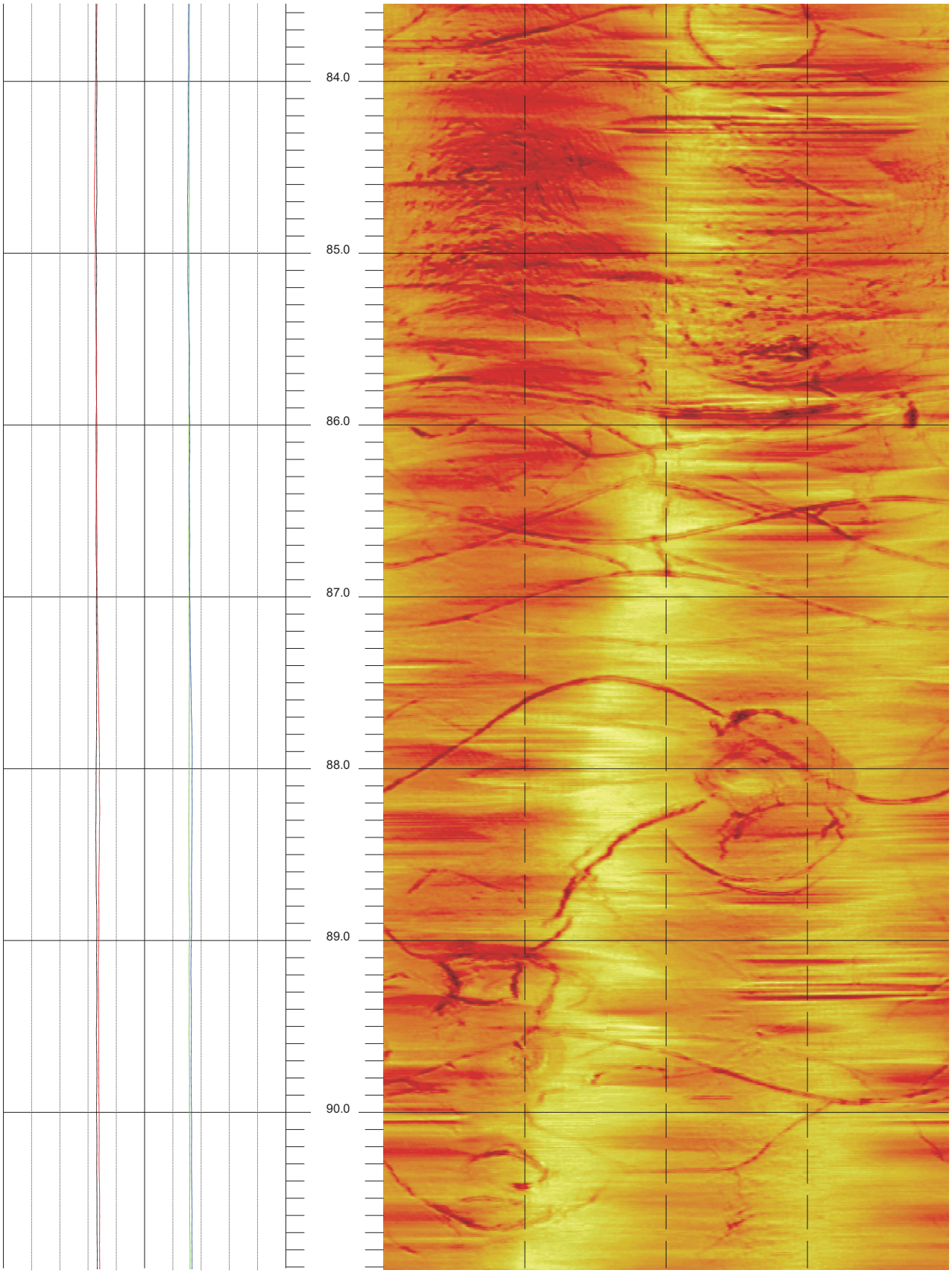

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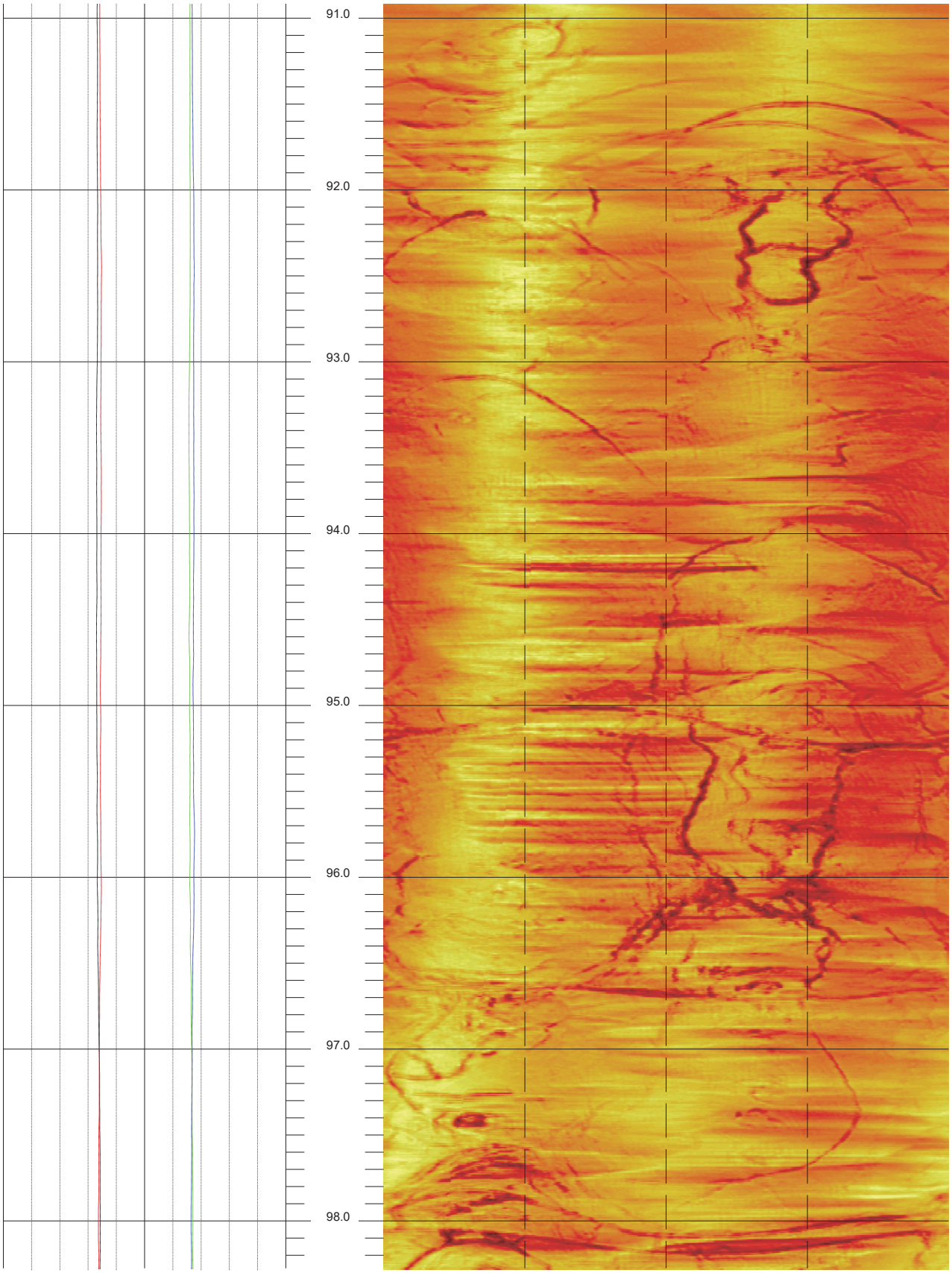

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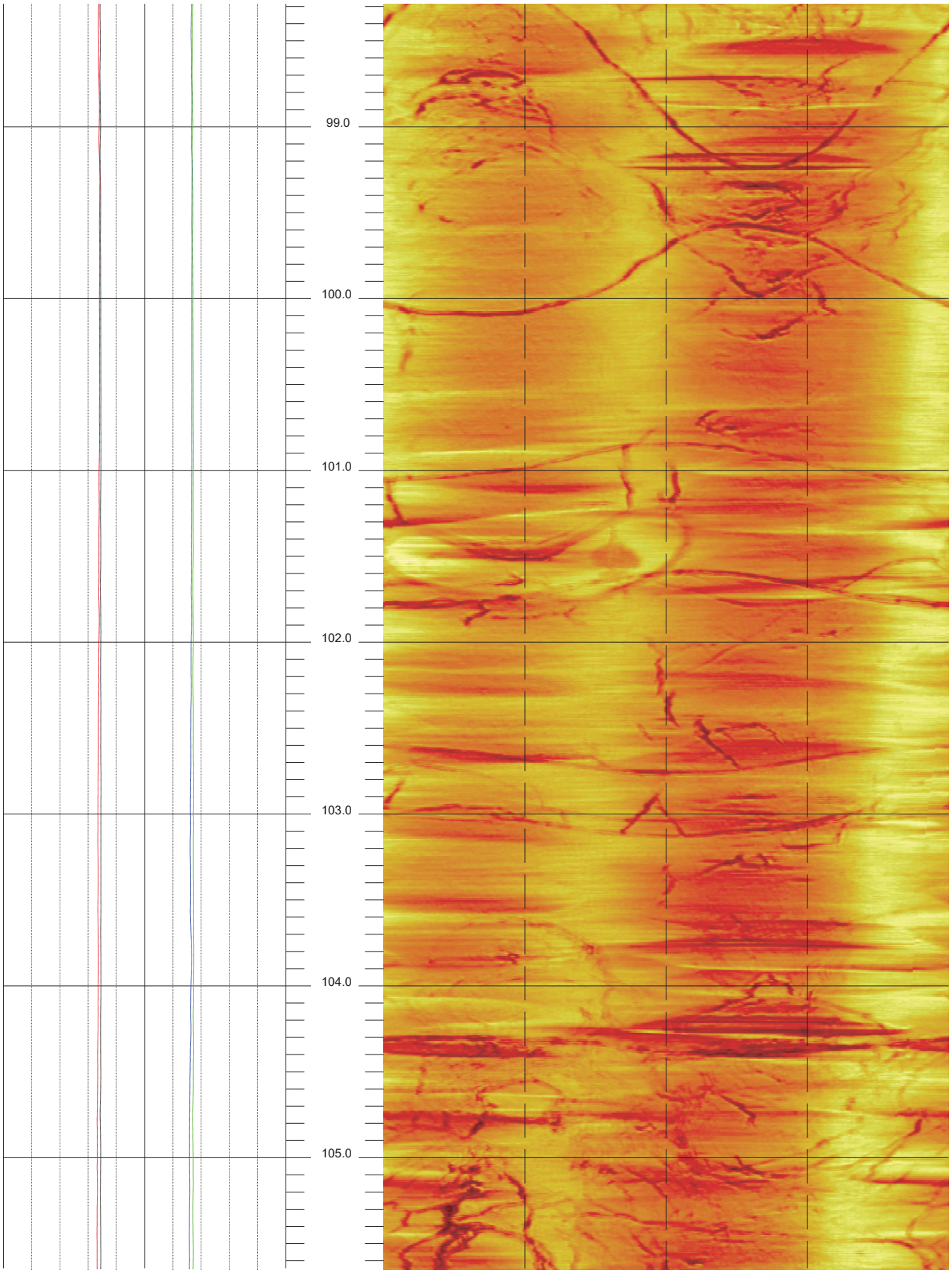

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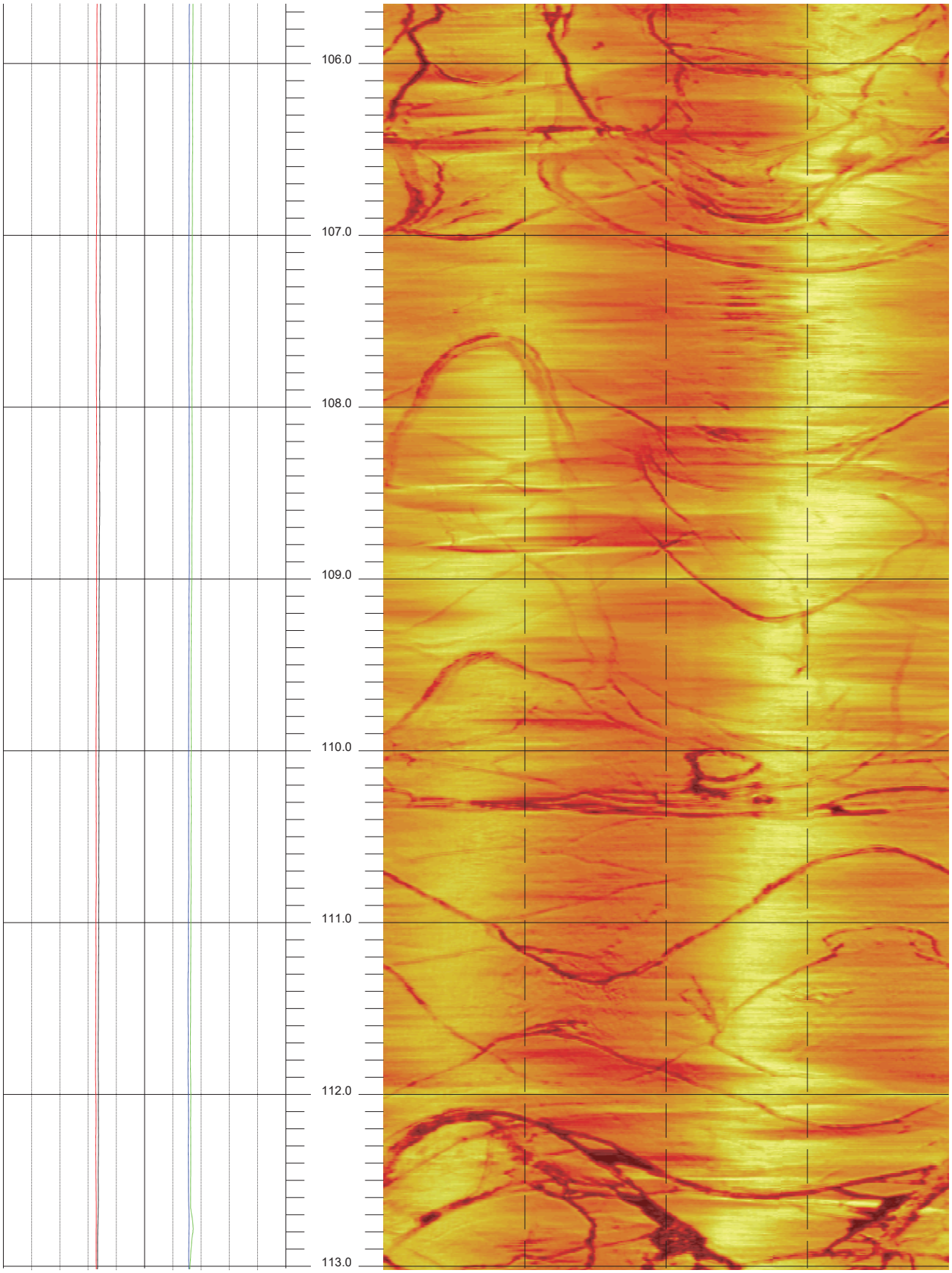

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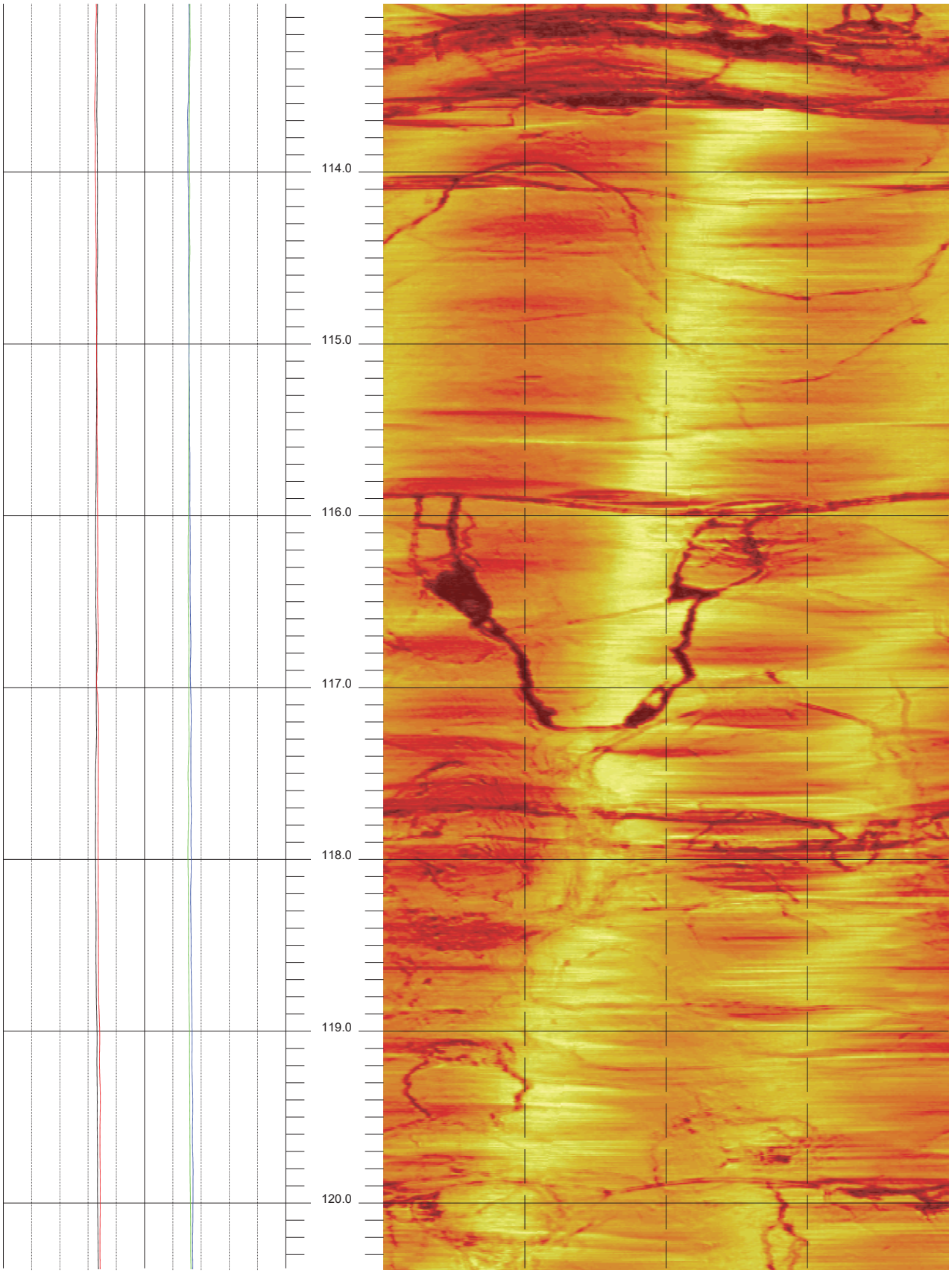

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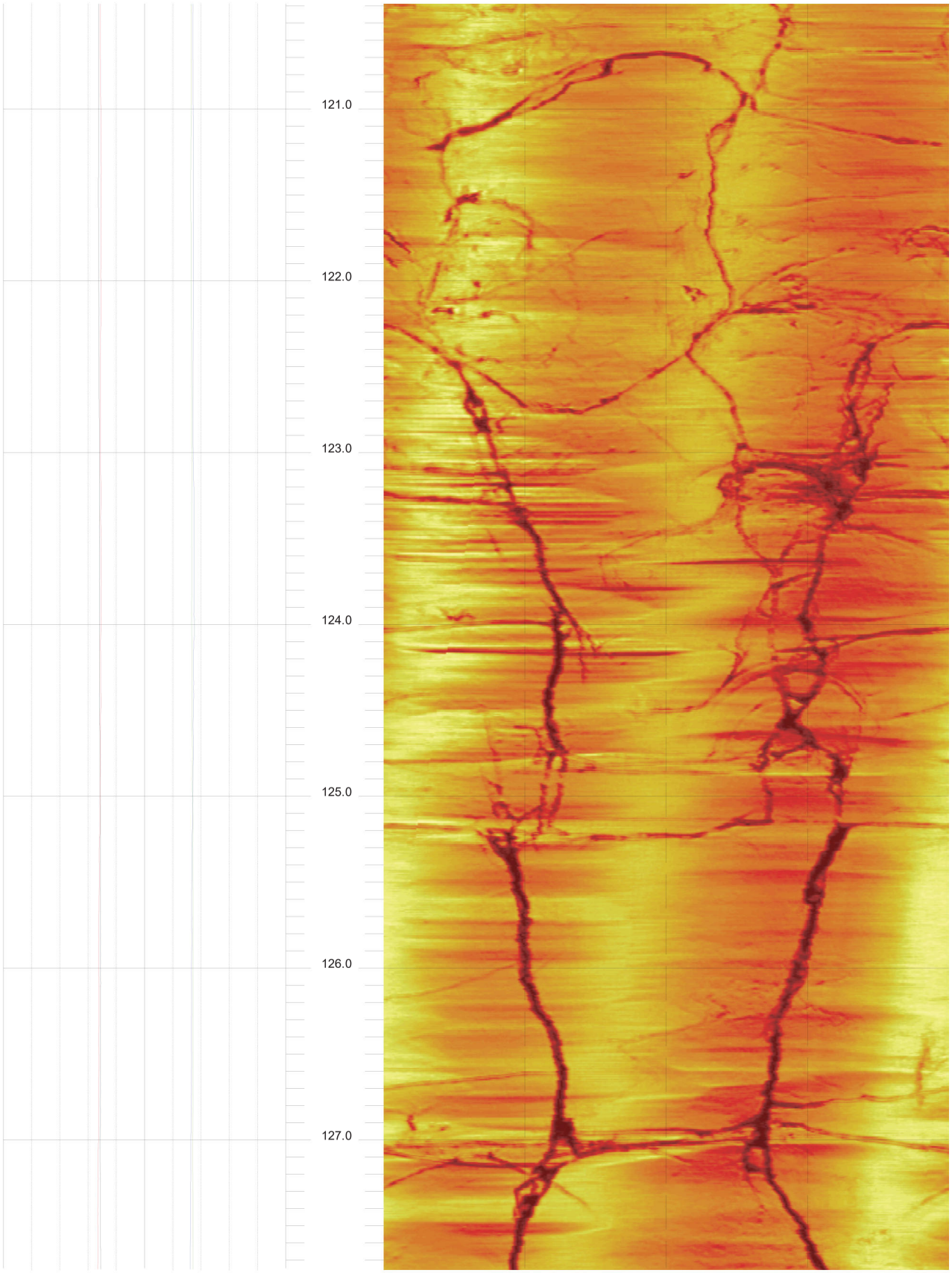

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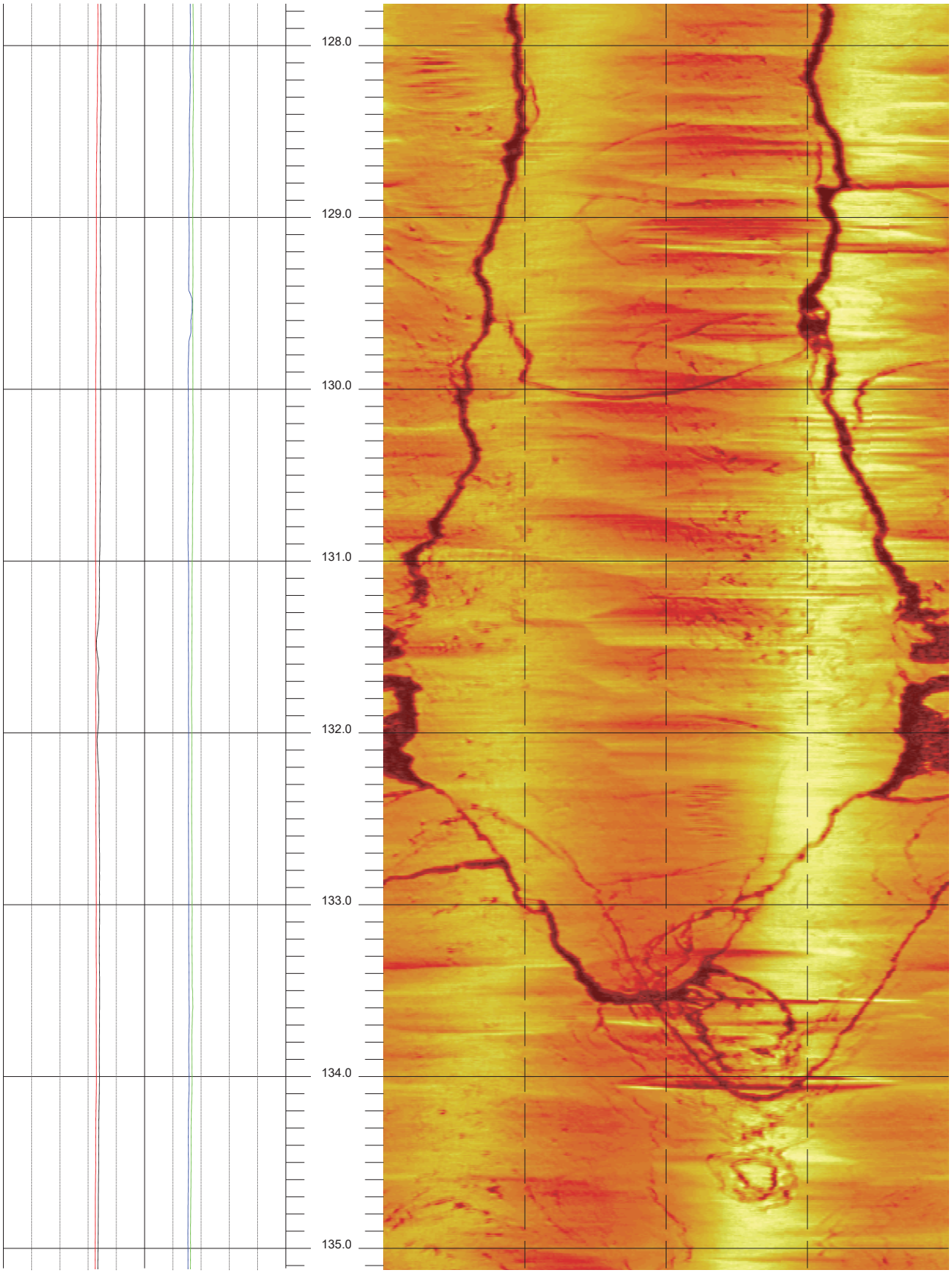

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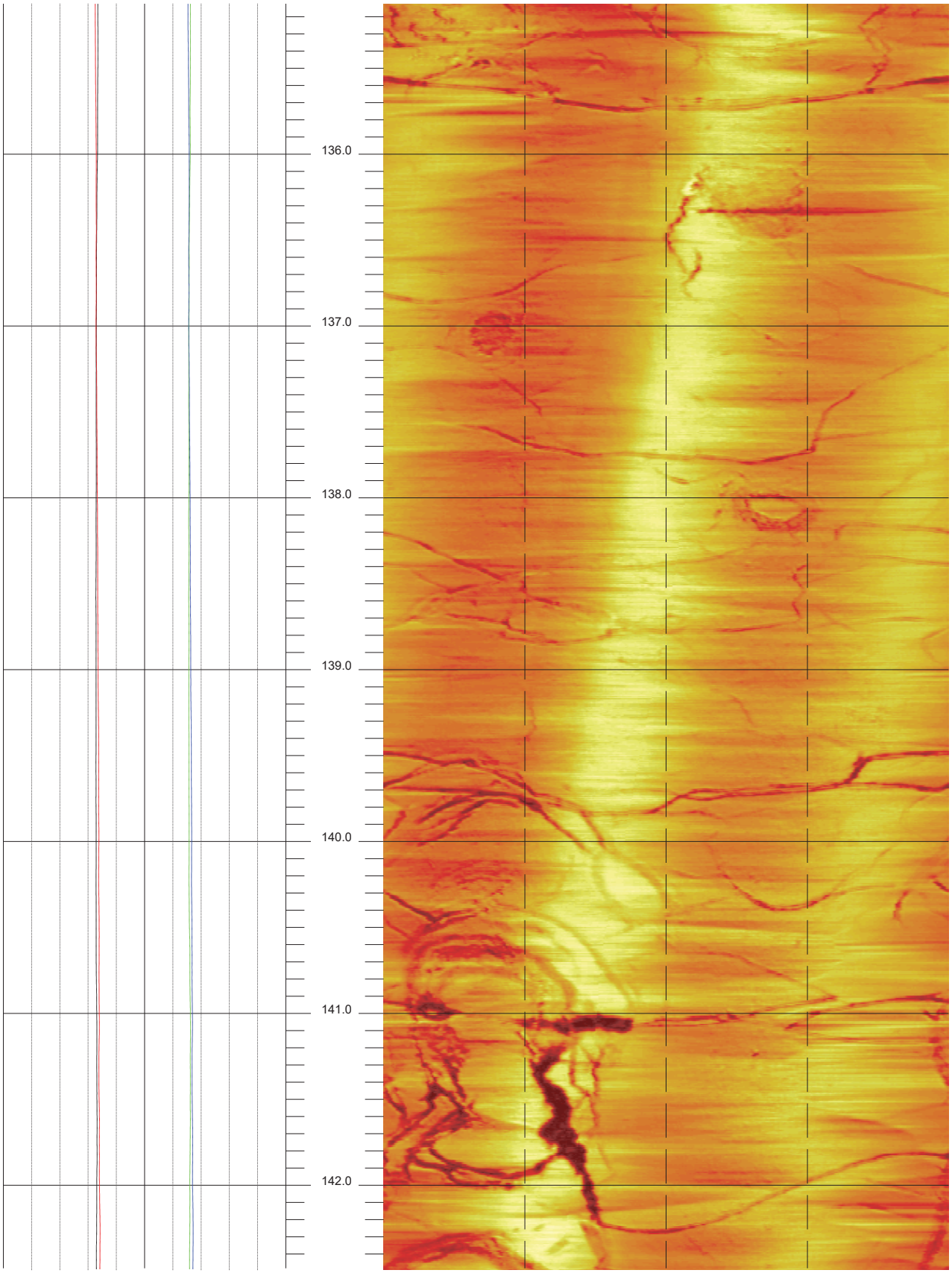

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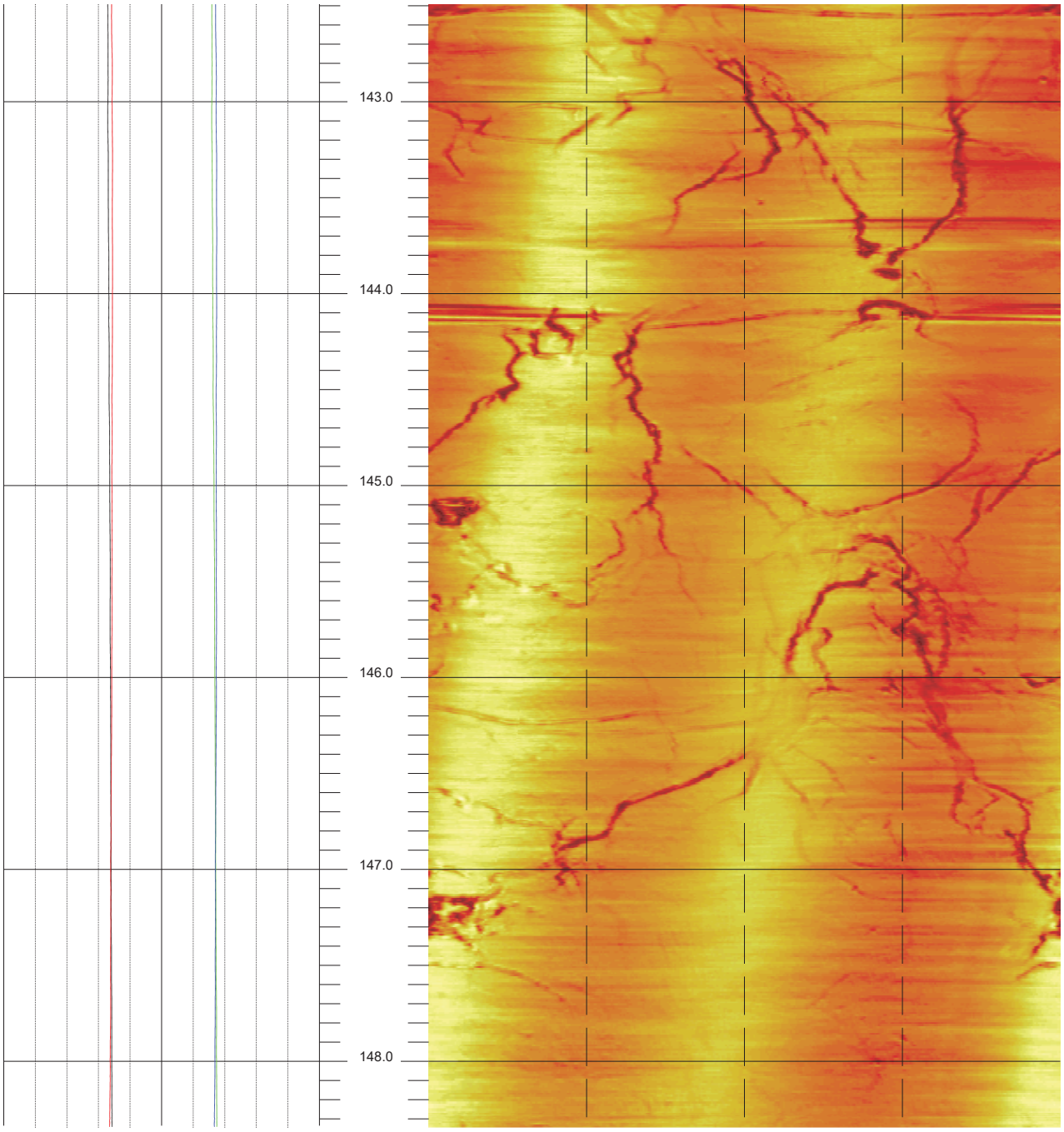

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148.0

BHTV DATA PROCESSING
RGLDIP vsn 6.2
ACOUSTIC CALIPER LOG

AECOM

Borehole: B-105

VAIL DAM

top of borehole.....
East: _
North:_
Elev: _

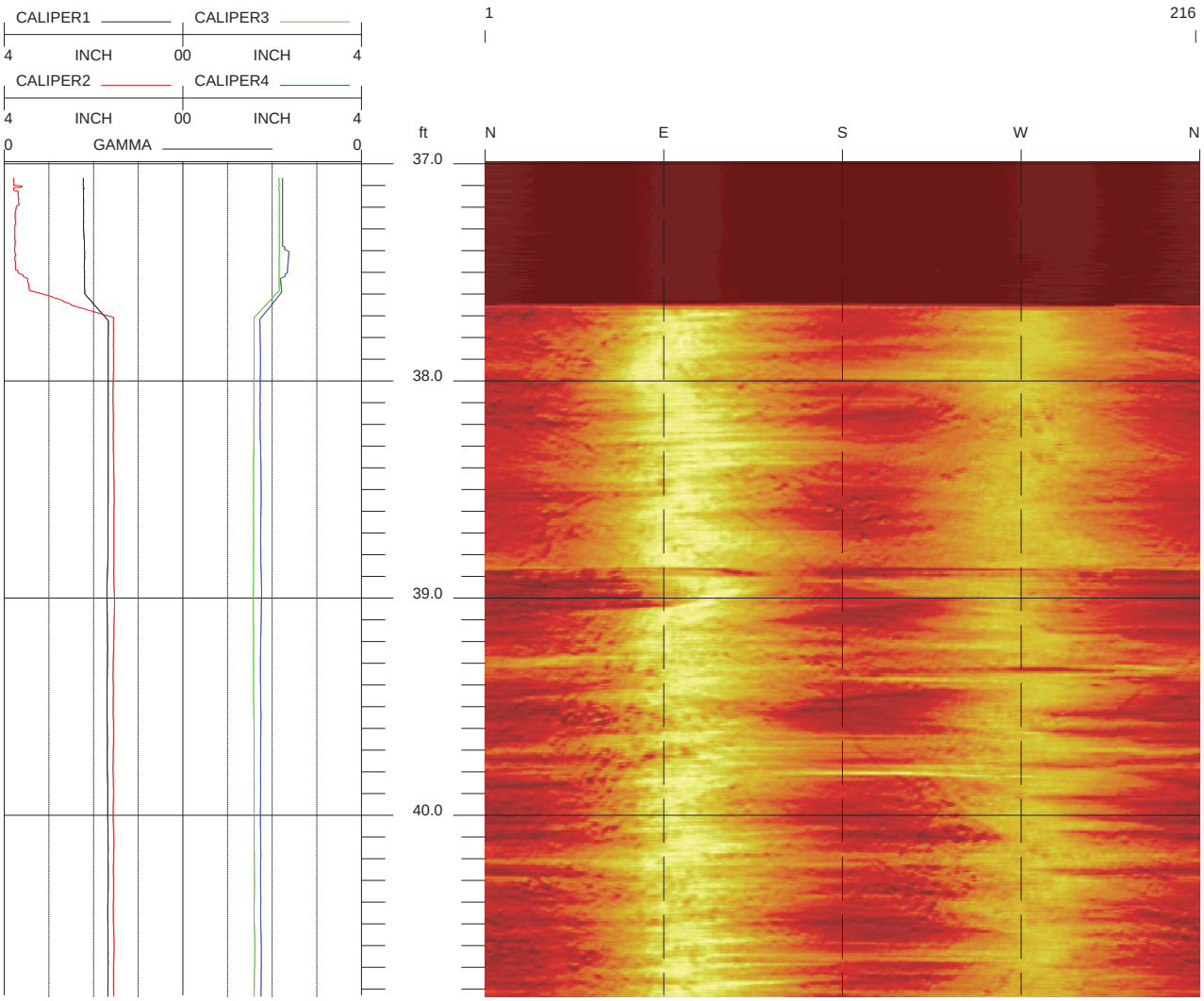
North ref. is true
Depth units are feet
Vertical scale: 1/10

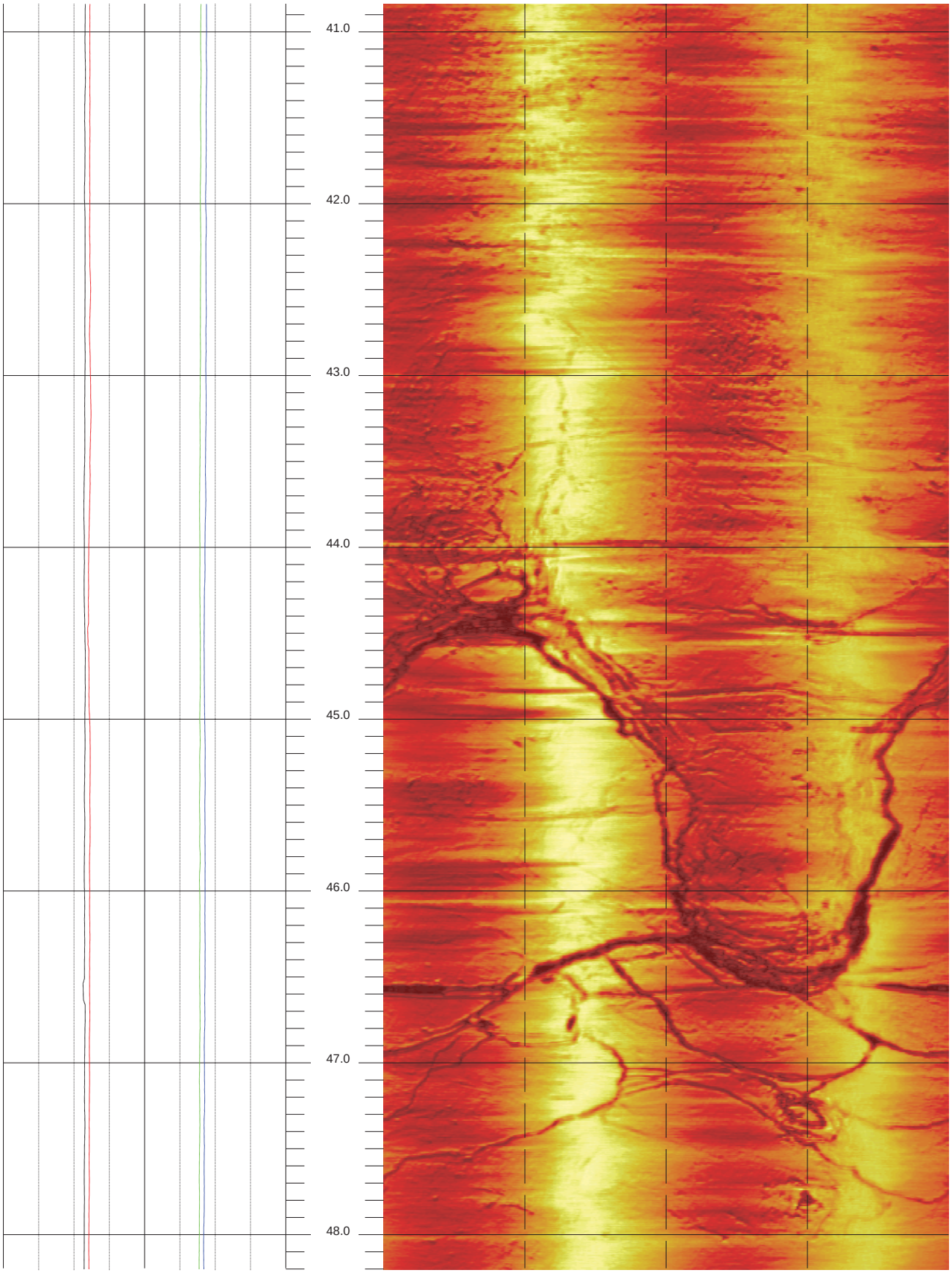
Zone from 100.060 to 36.992ft

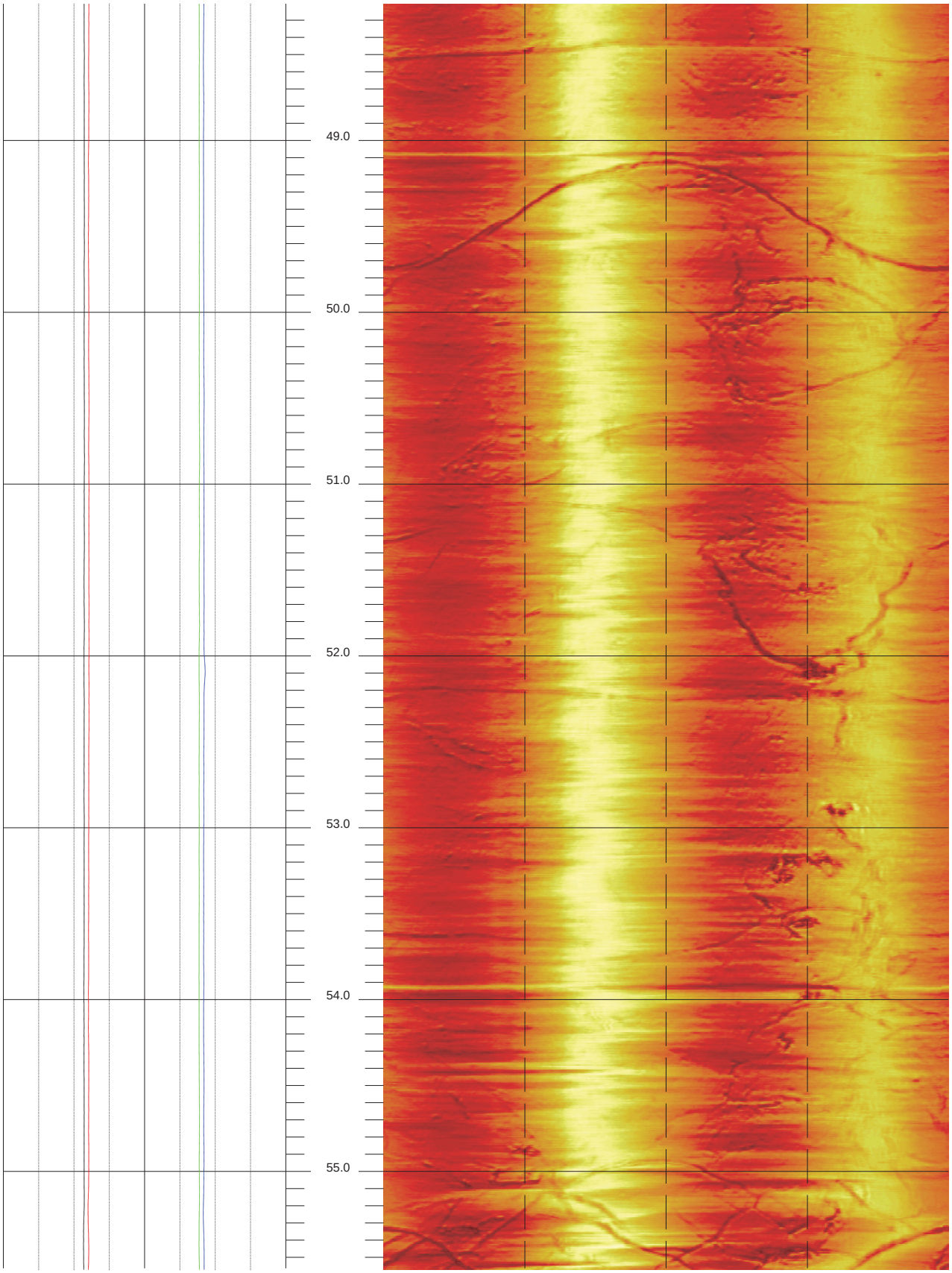
Borehole diam: 3.860inch
Vertical = borehole-axis
Image: Amplitude

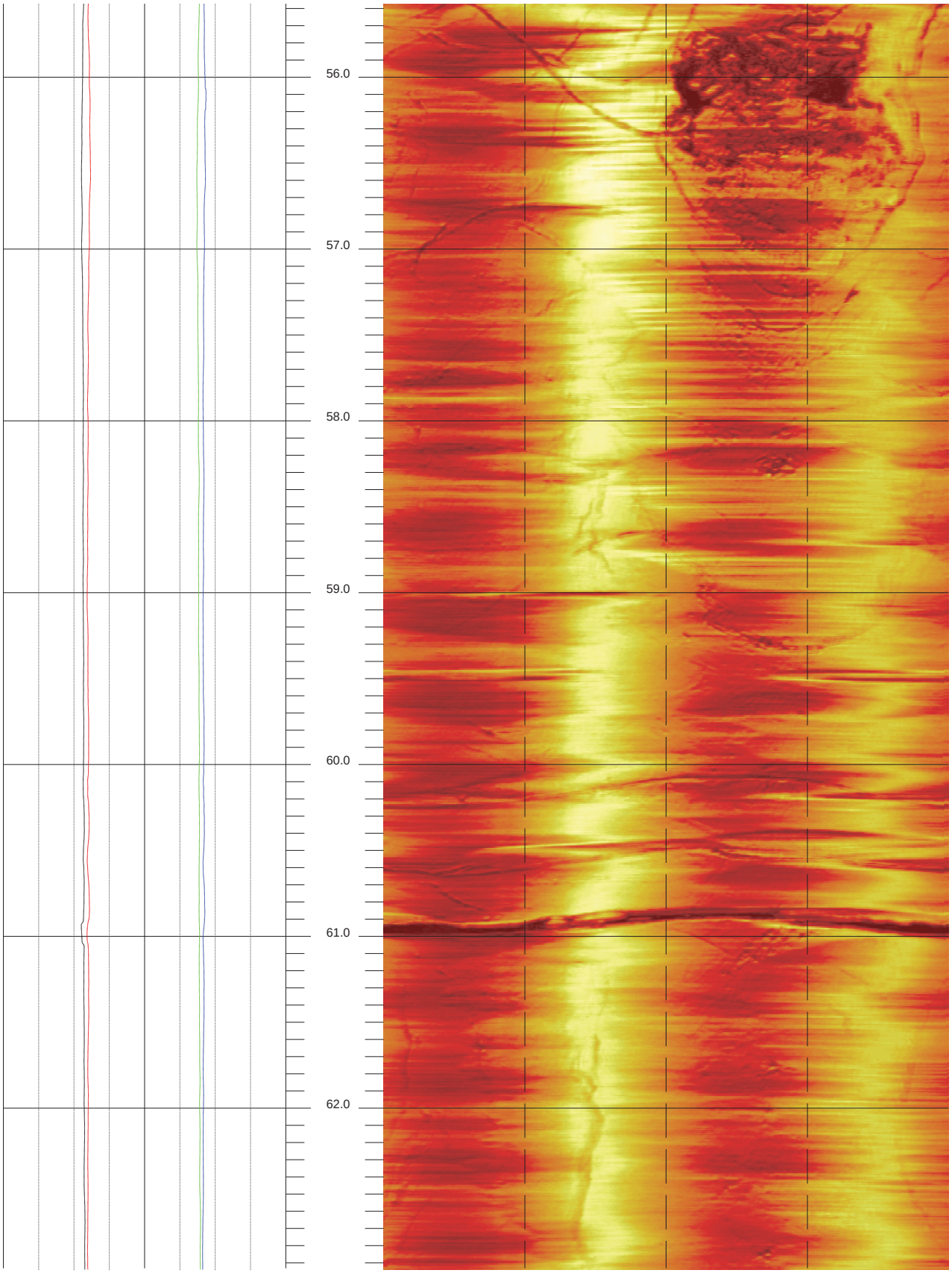
Depth interval 0.004ft, Filter length 0.124ft

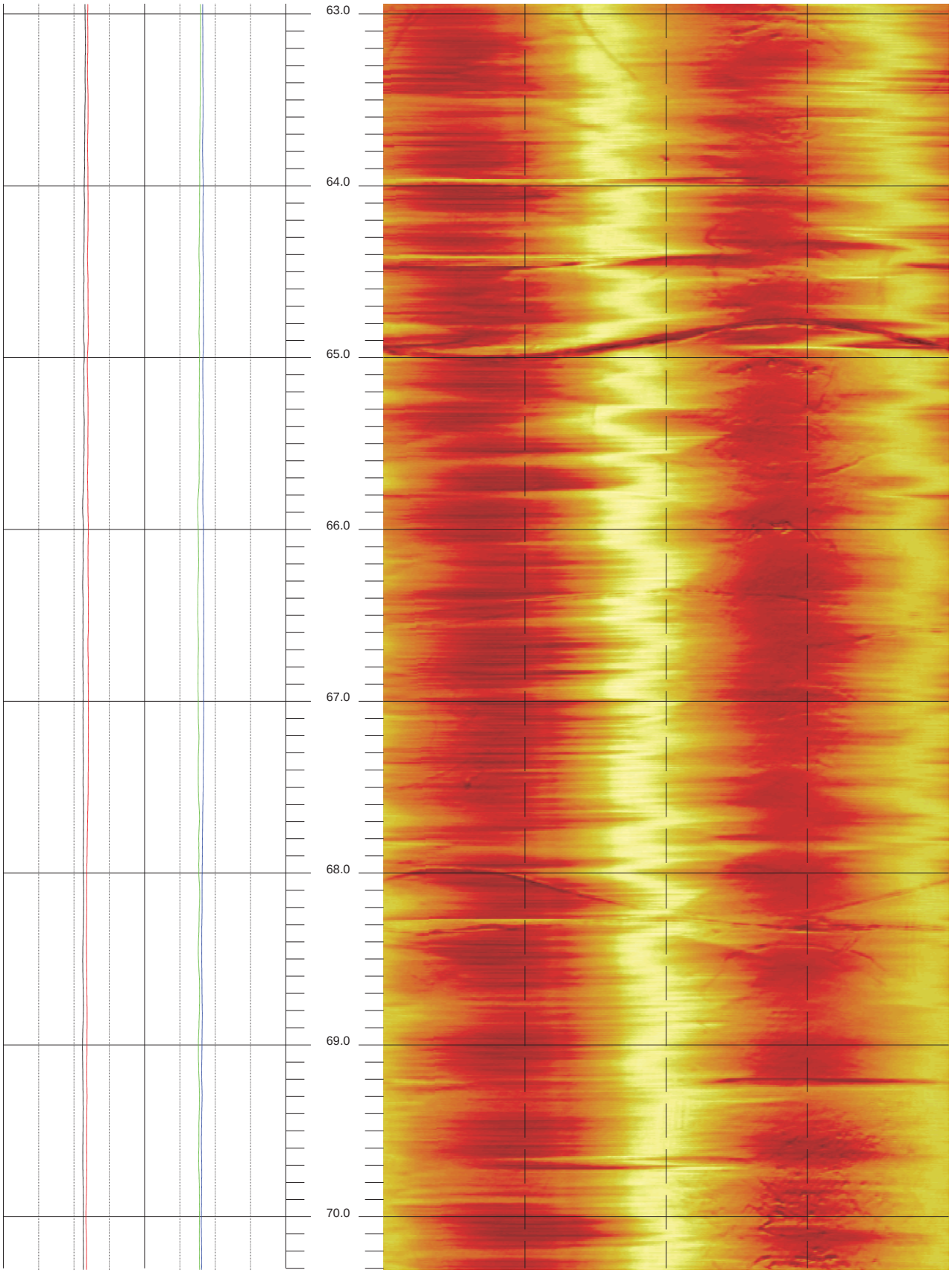
REFLECTANCE

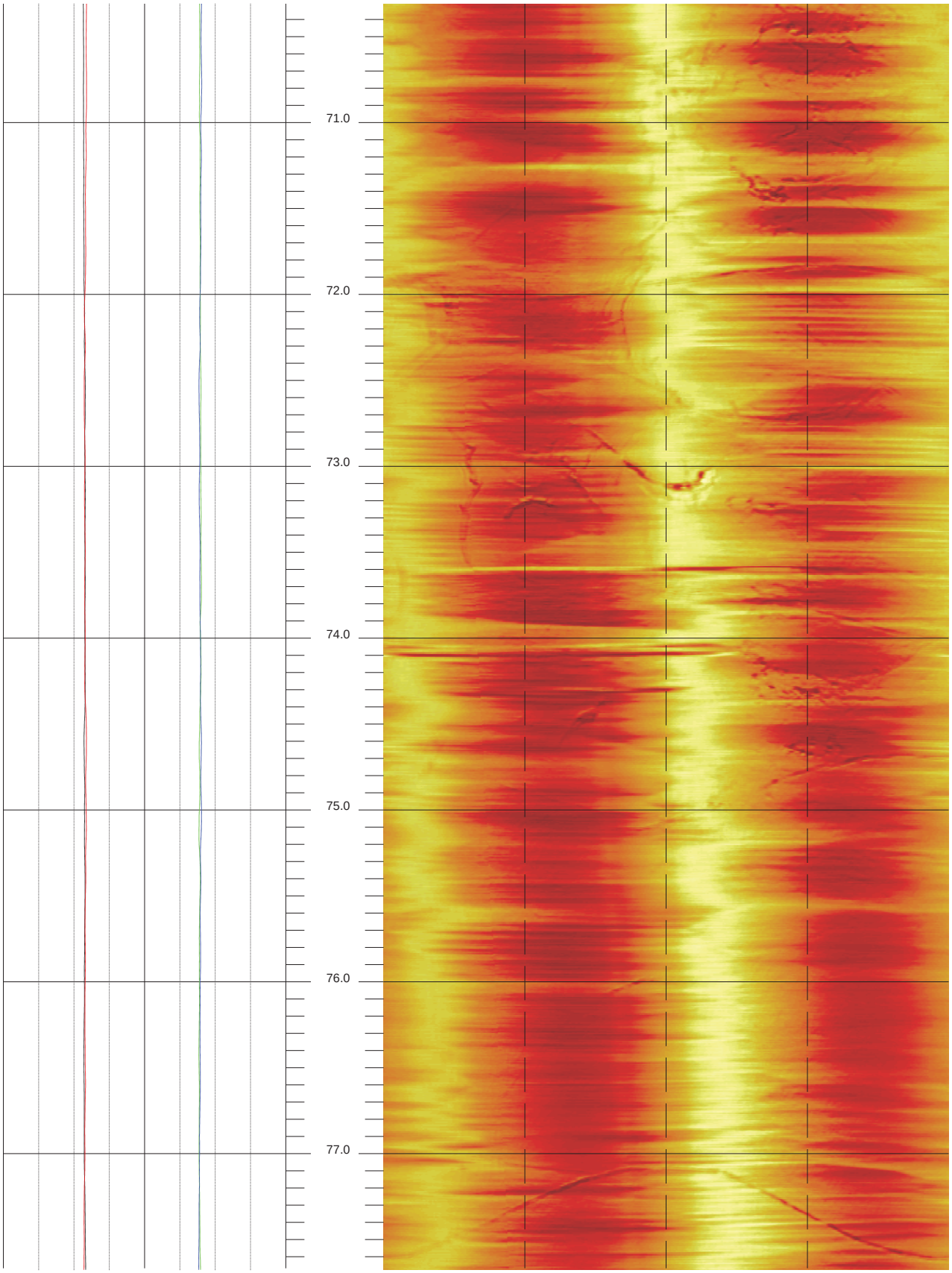


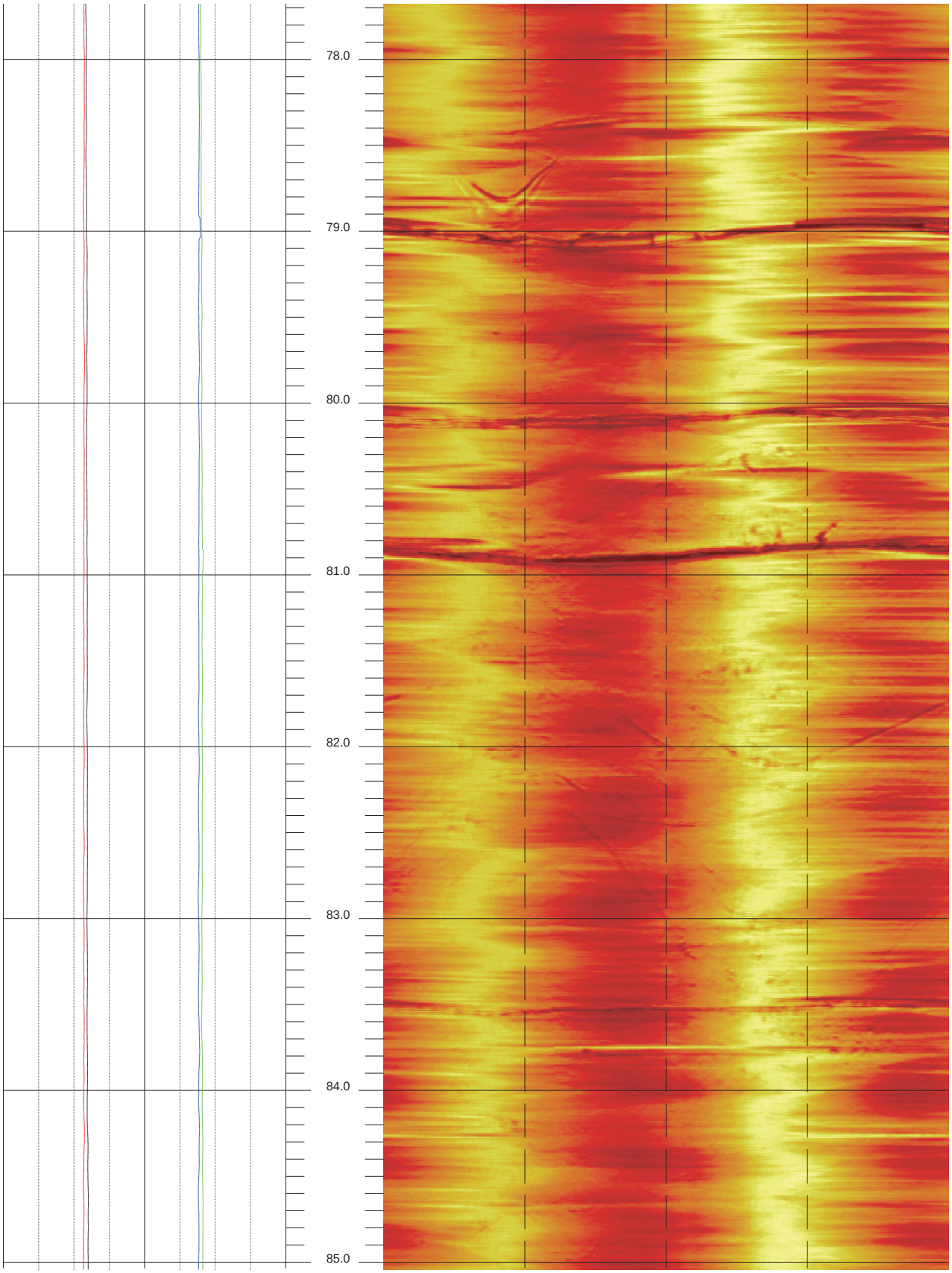

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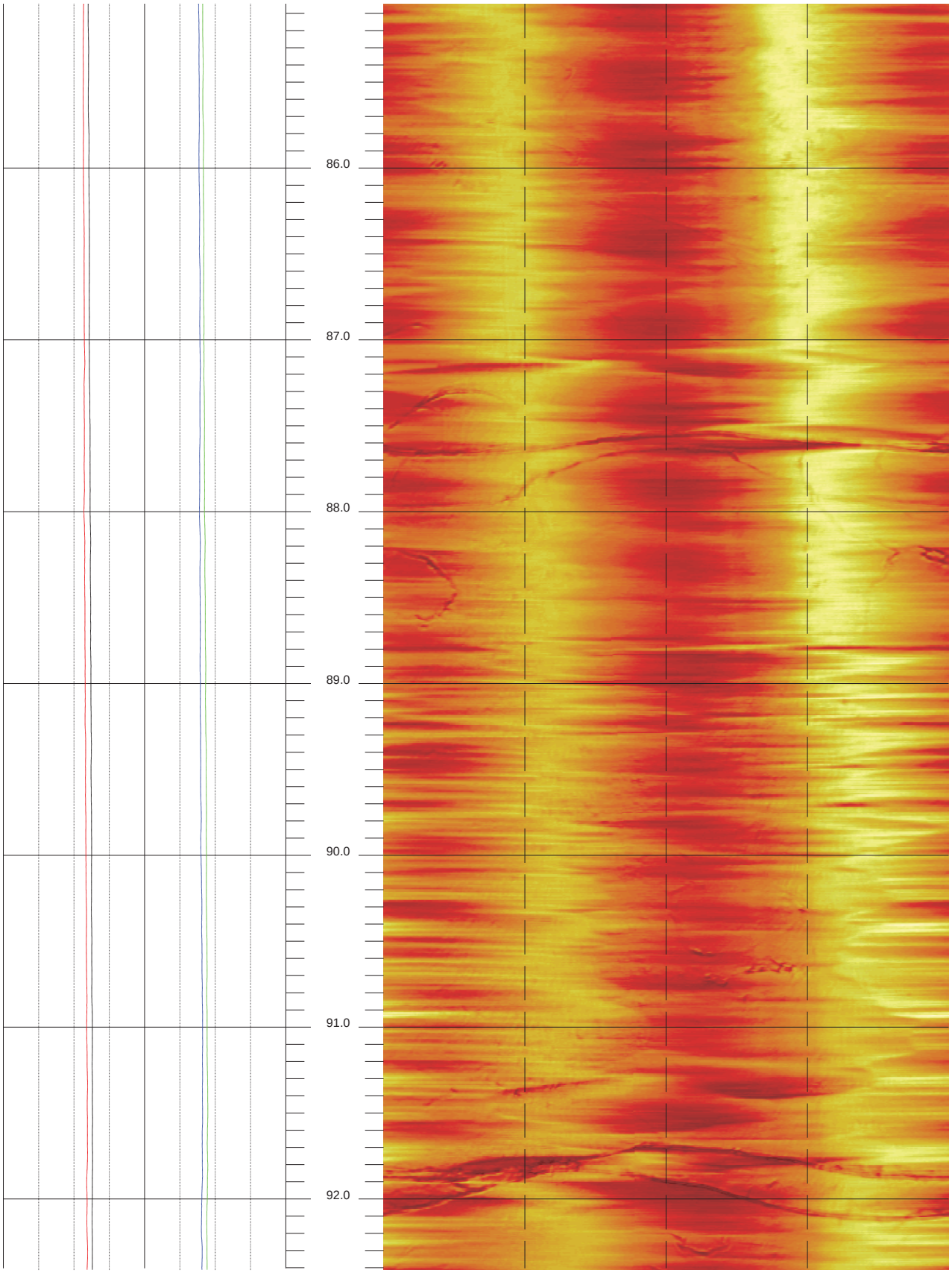

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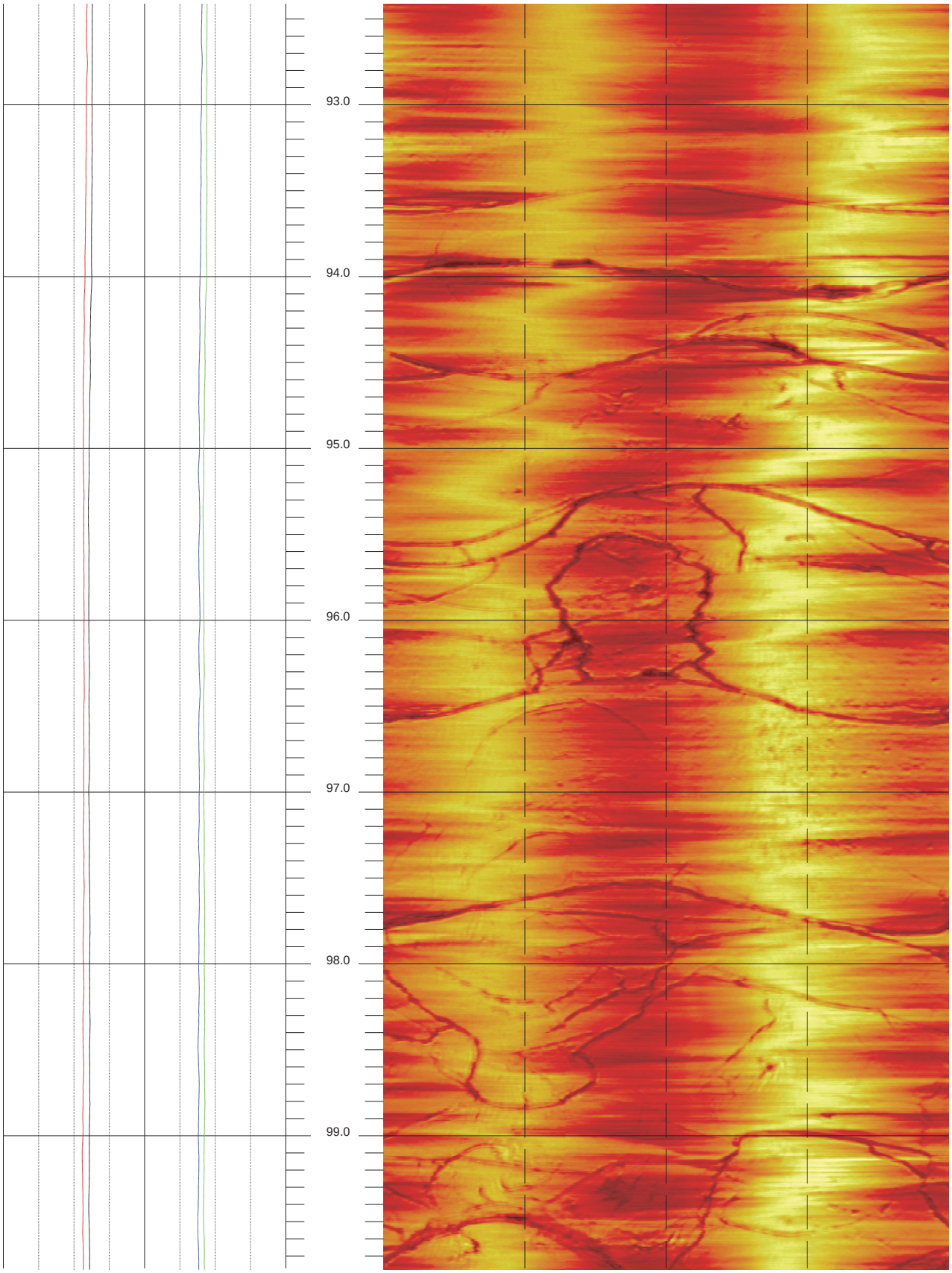

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100.0

BHTV DATA PROCESSING
RGLDIP vsn 6.2
ACOUSTIC CALIPER LOG

AECOM

Borehole: B-106 UPPER SECTION

VAIL DAM

top of borehole.....
East: _
North:_
Elev: _

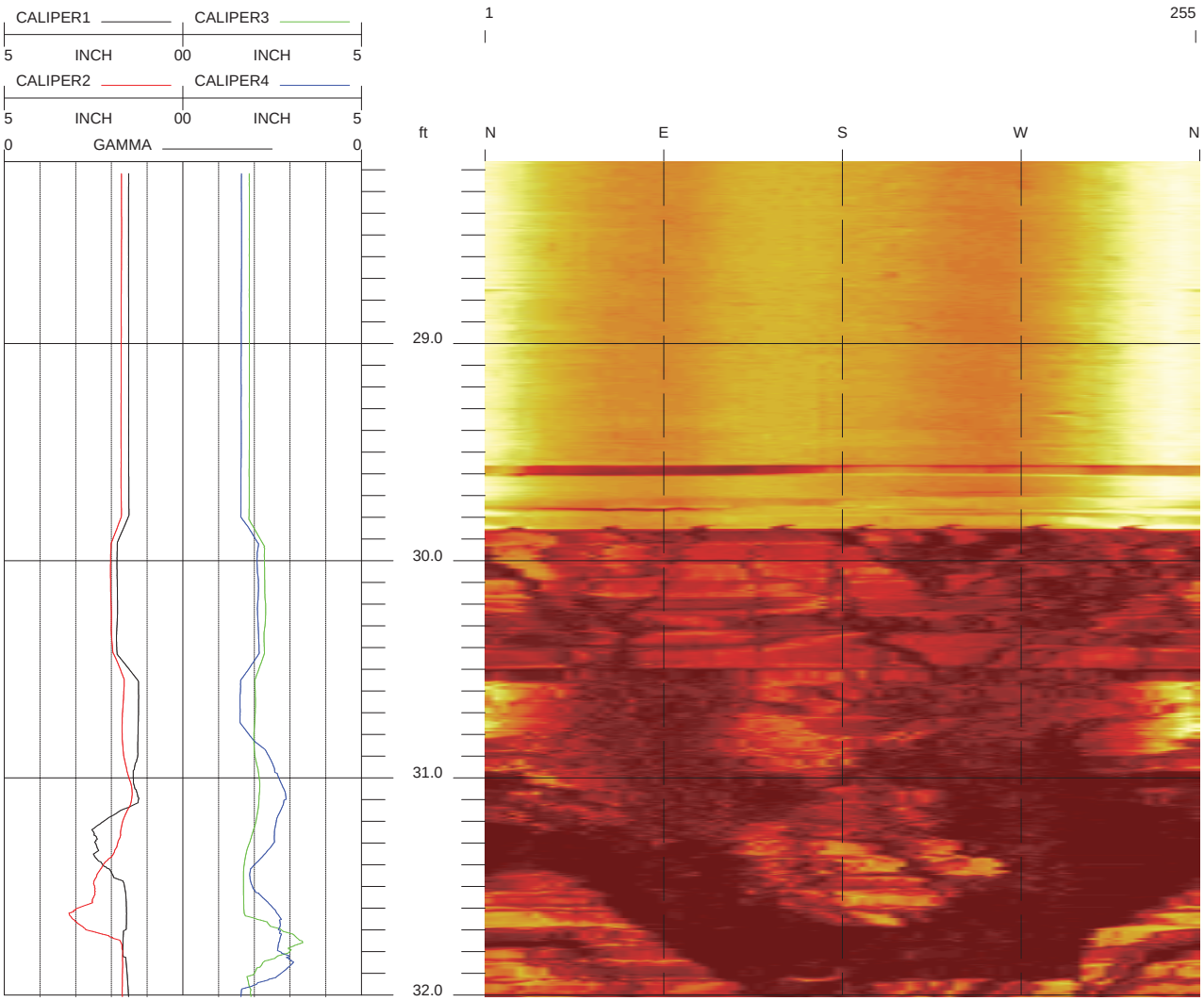
North ref. is true
Depth units are feet
Vertical scale: 1/10

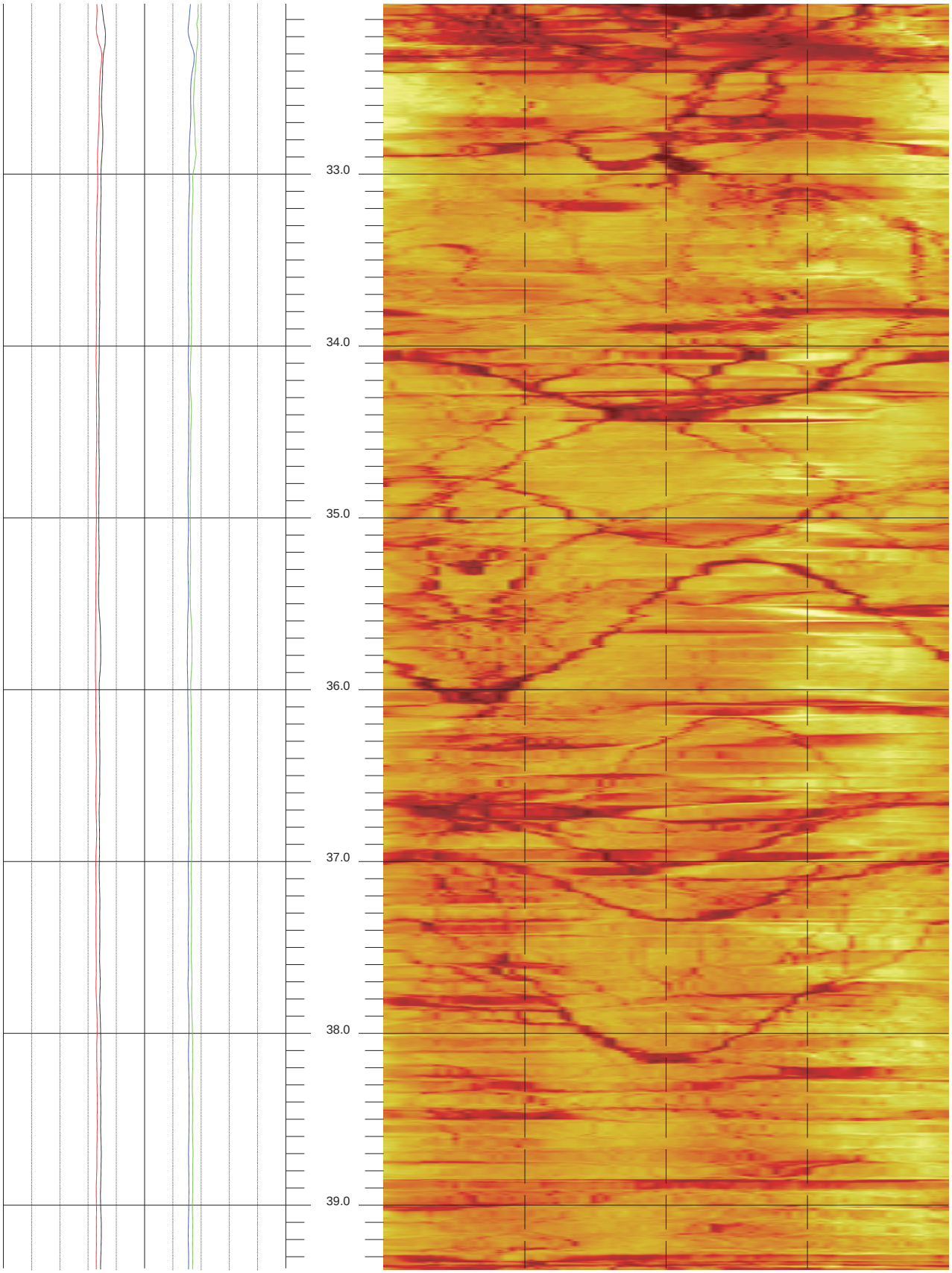
Zone from 62.656 to 28.164ft

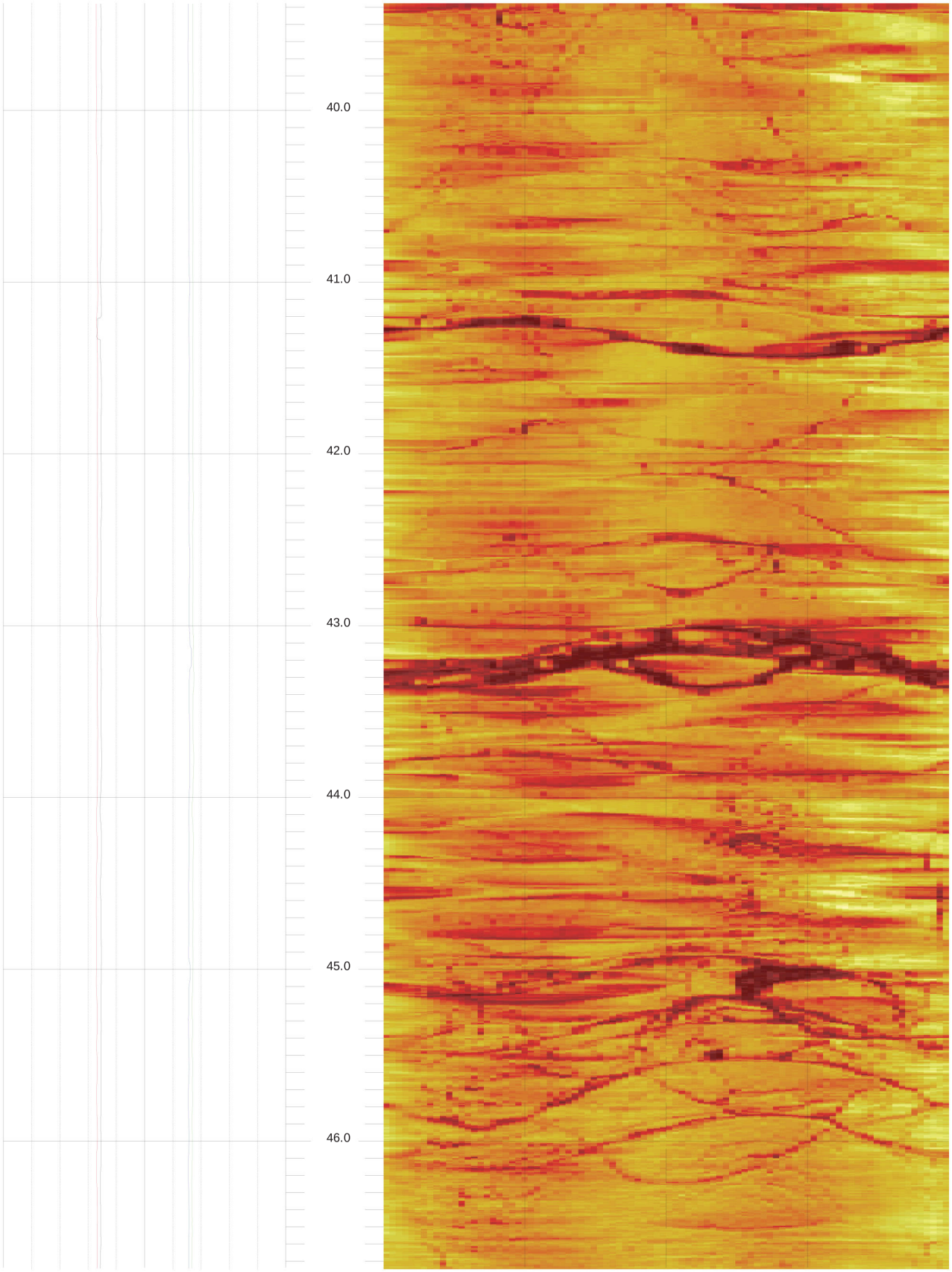
Borehole diam: 3.860inch
Vertical = borehole-axis
Image: Amplitude

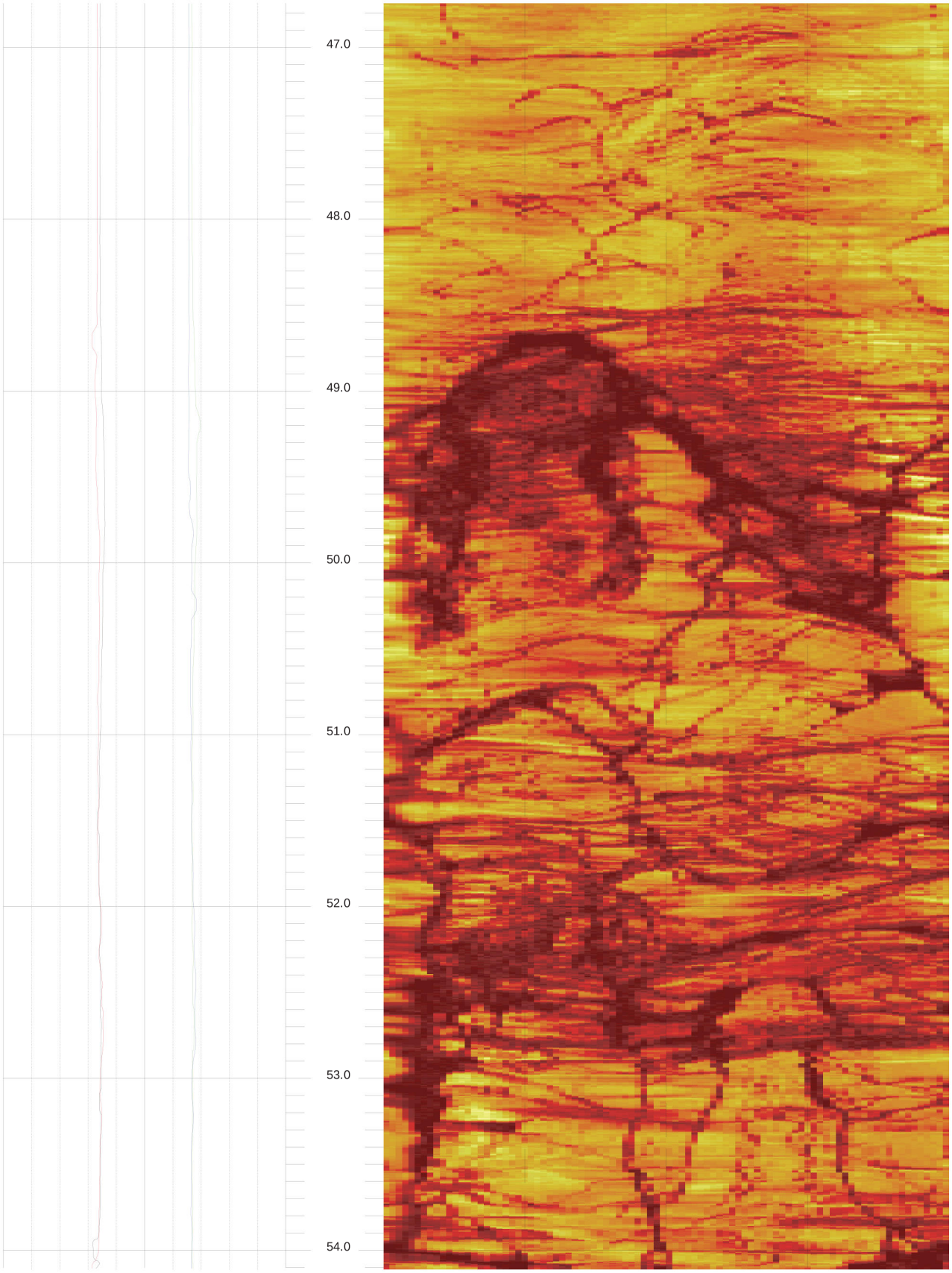
Depth interval 0.004ft, Filter length 0.124ft

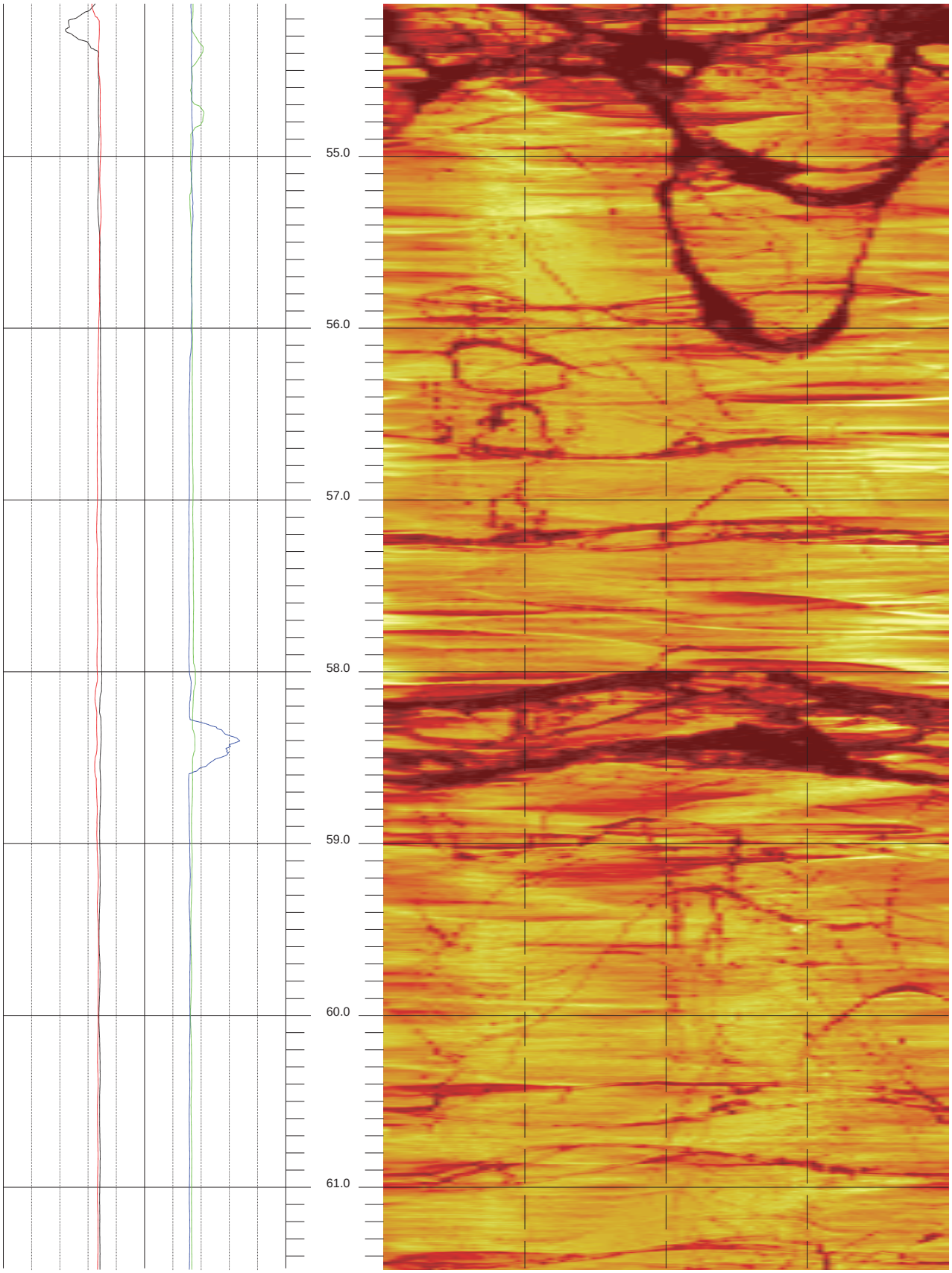
REFLECTANCE

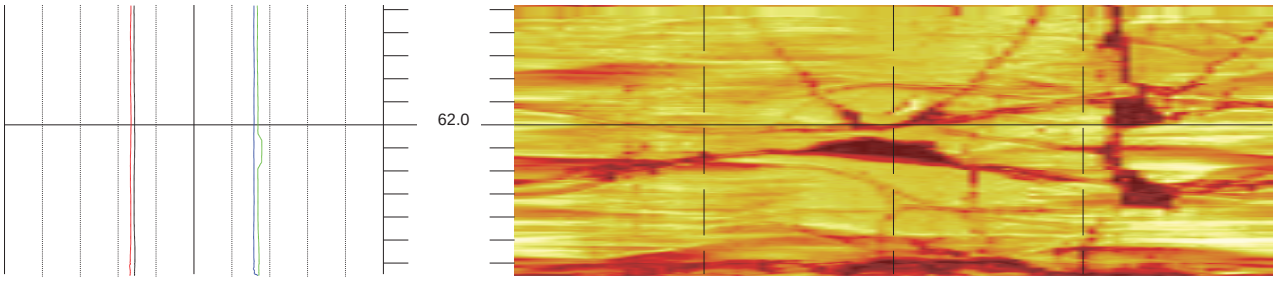



33.0
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59.0
60.0
61.0


62.0

BHTV DATA PROCESSING
RGLDIP vsn 6.2
ACOUSTIC CALIPER LOG

AECOM

Borehole: B-106 MIDDLE SECTION

VAIL DAM

top of borehole.....
East: _
North:_
Elev: _

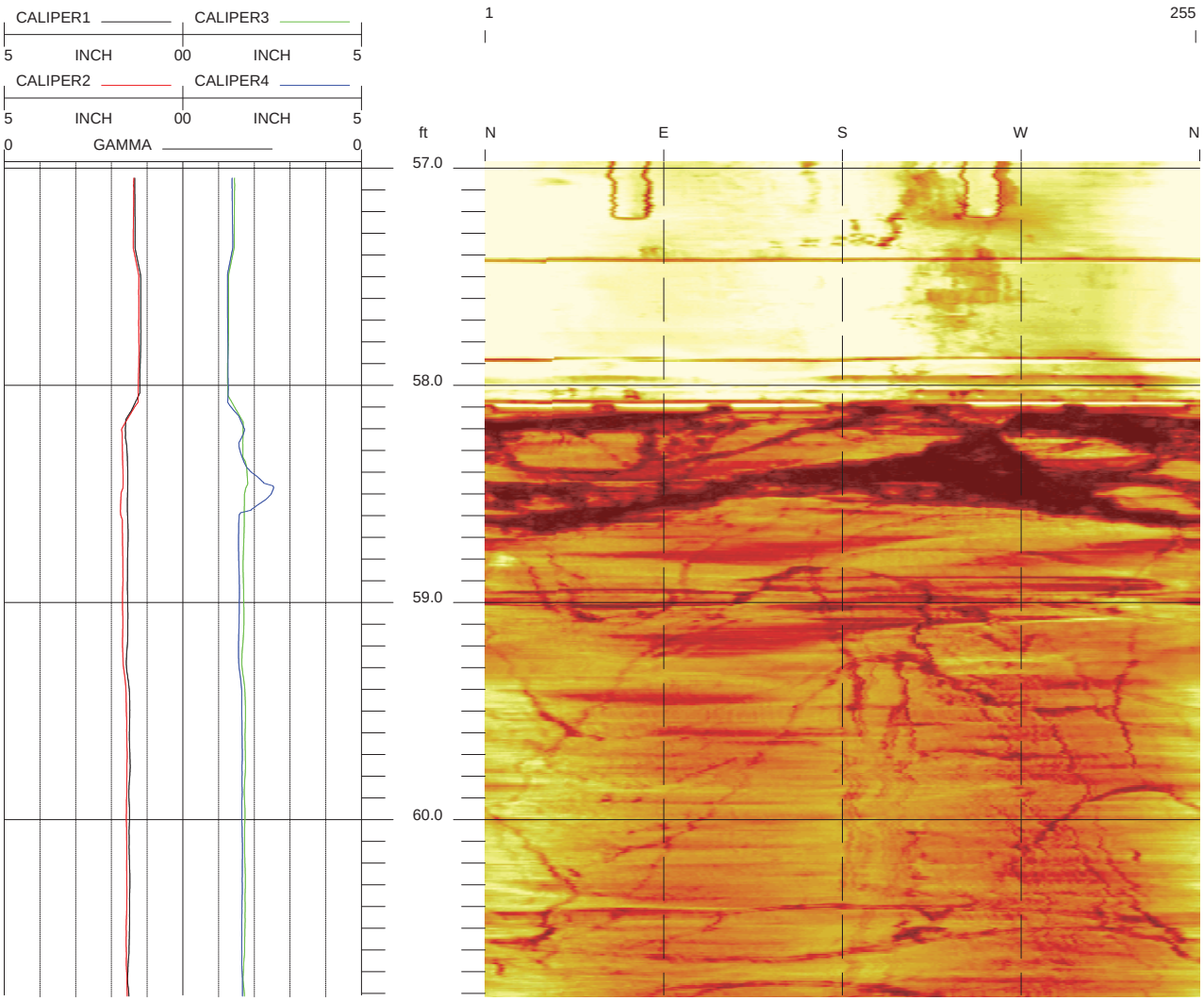
North ref. is true
Depth units are feet
Vertical scale: 1/10

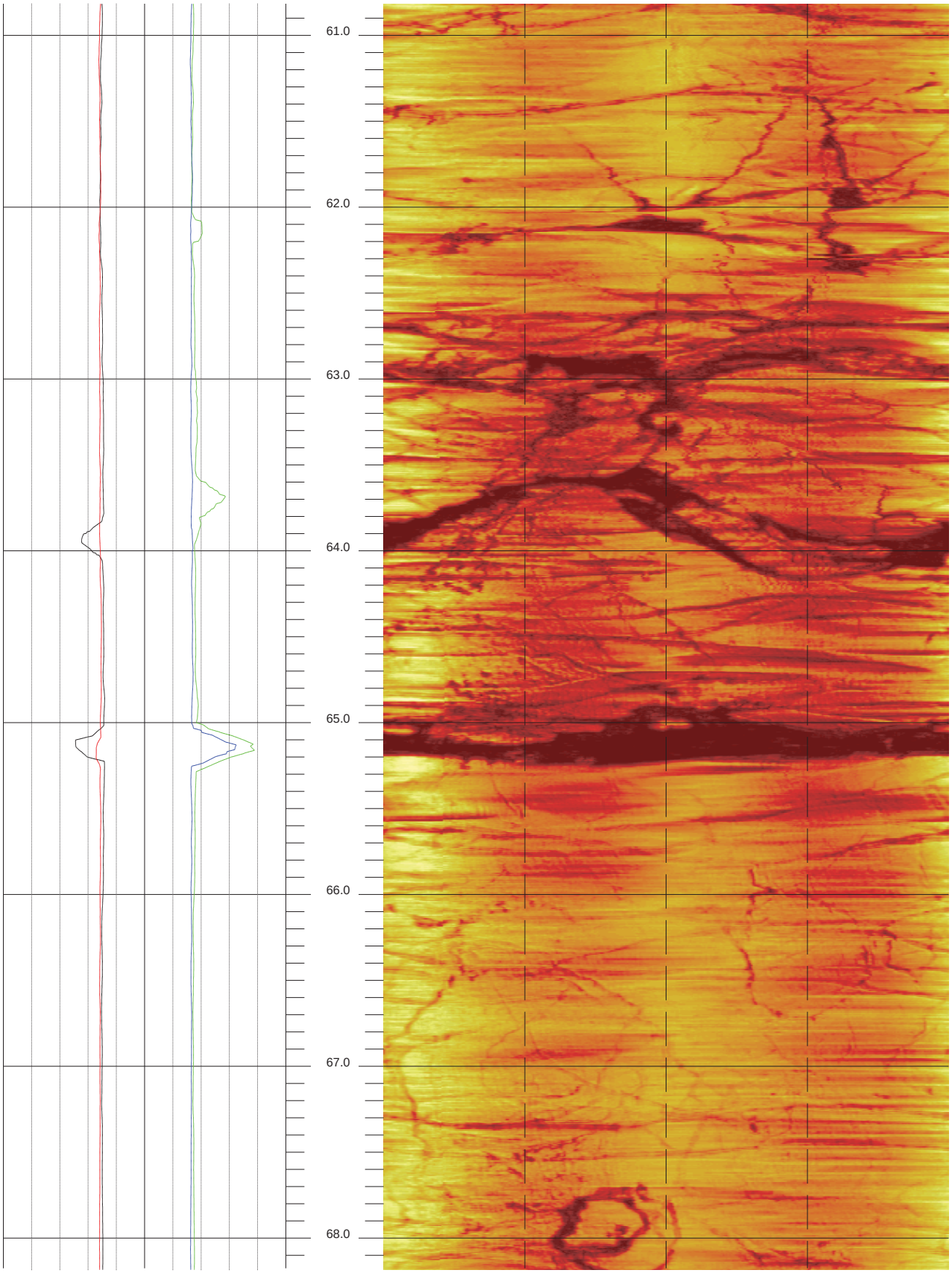
Zone from 82.880 to 56.972ft

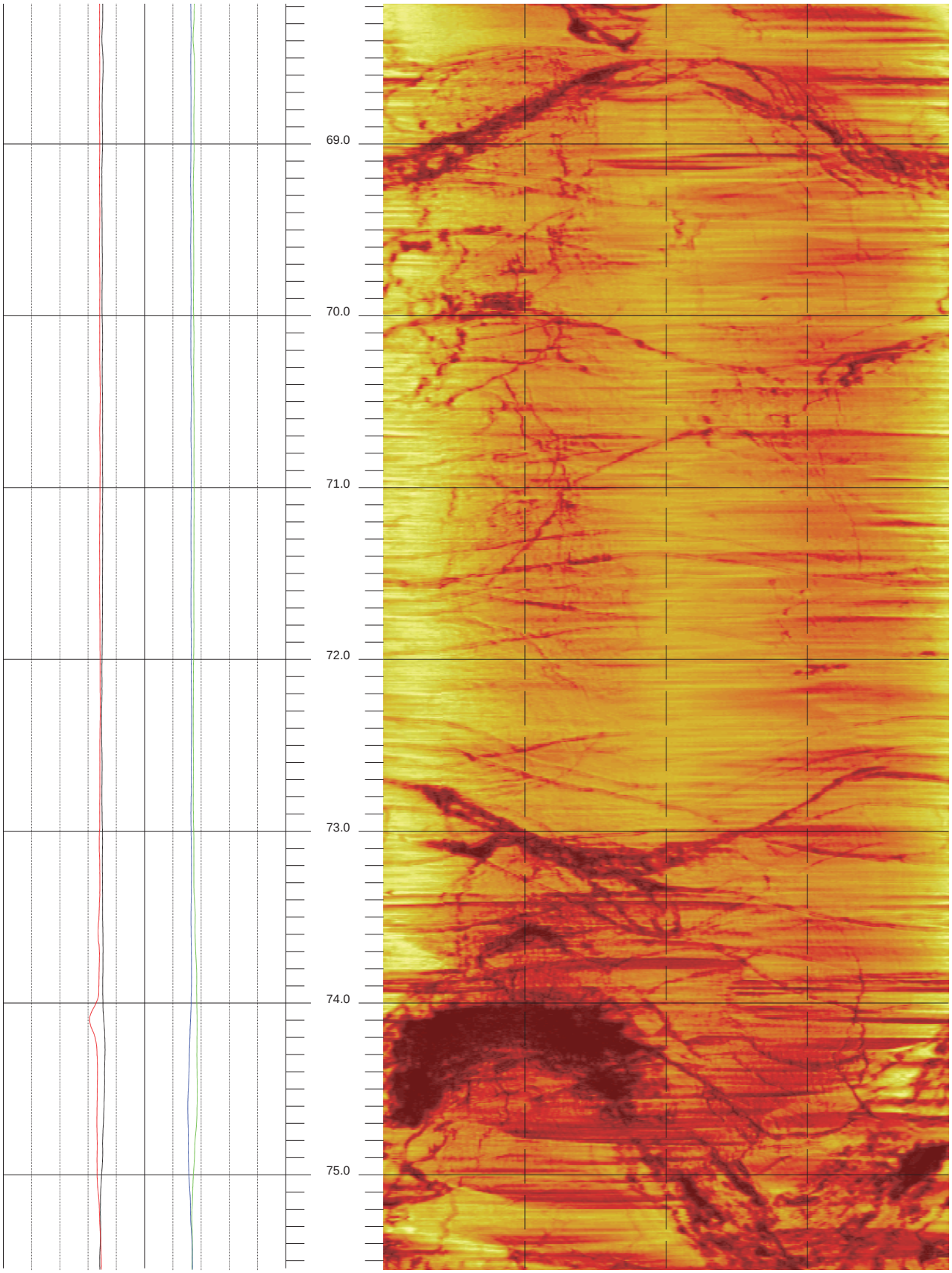
Borehole diam: 3.860inch
Vertical = borehole-axis
Image: Amplitude

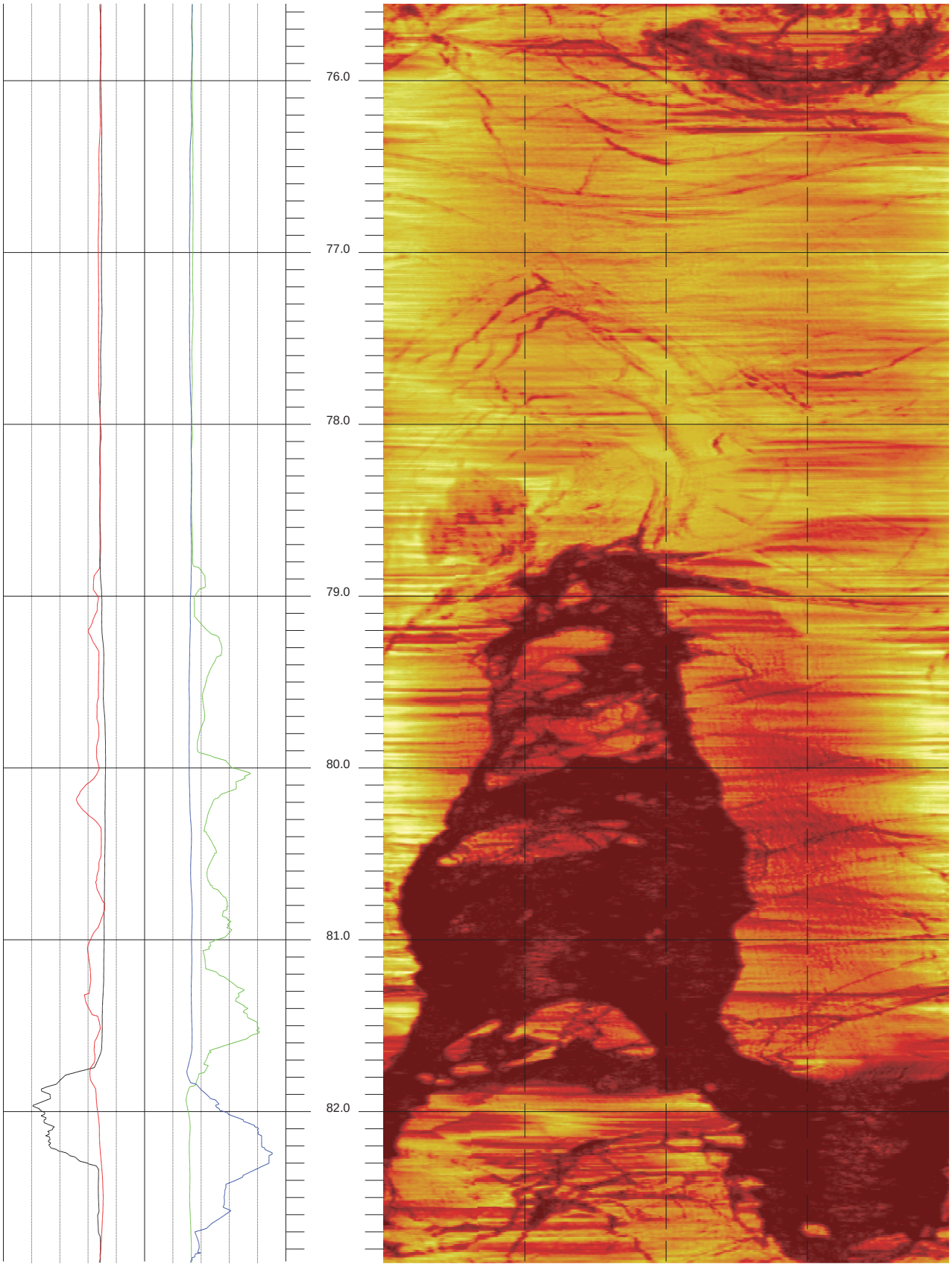
Depth interval 0.004ft, Filter length 0.124ft

REFLECTANCE




61.0
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64.0
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66.0
67.0
68.0


69.0
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71.0
72.0
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81.0
82.0

BHTV DATA PROCESSING
RGLDIP vsn 6.2
ACOUSTIC CALIPER LOG

AECOM

Borehole: B-106 LOWER SECTION

VAIL DAM

top of borehole.....
East: _
North:_
Elev: _

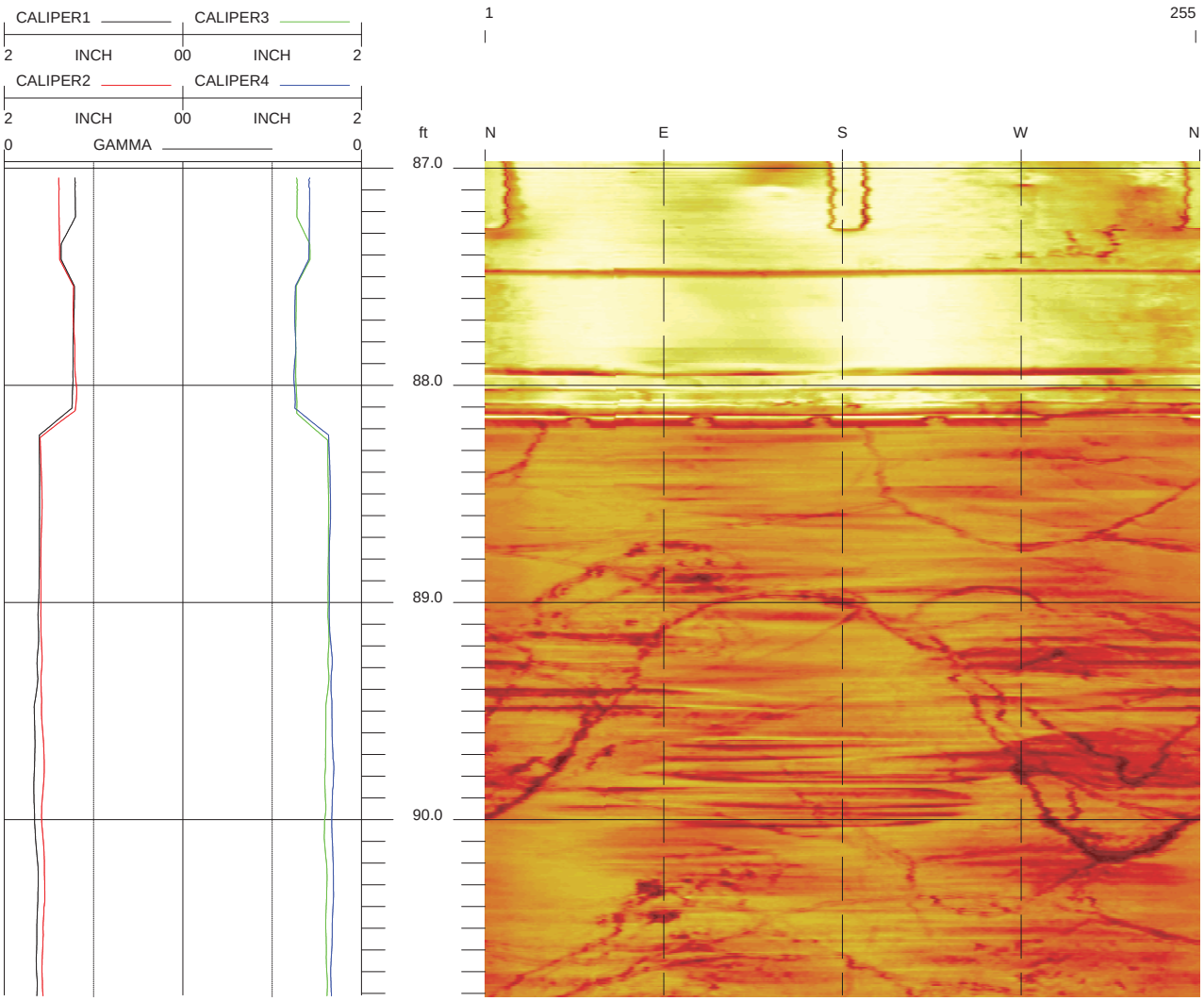
North ref. is true
Depth units are feet
Vertical scale: 1/10

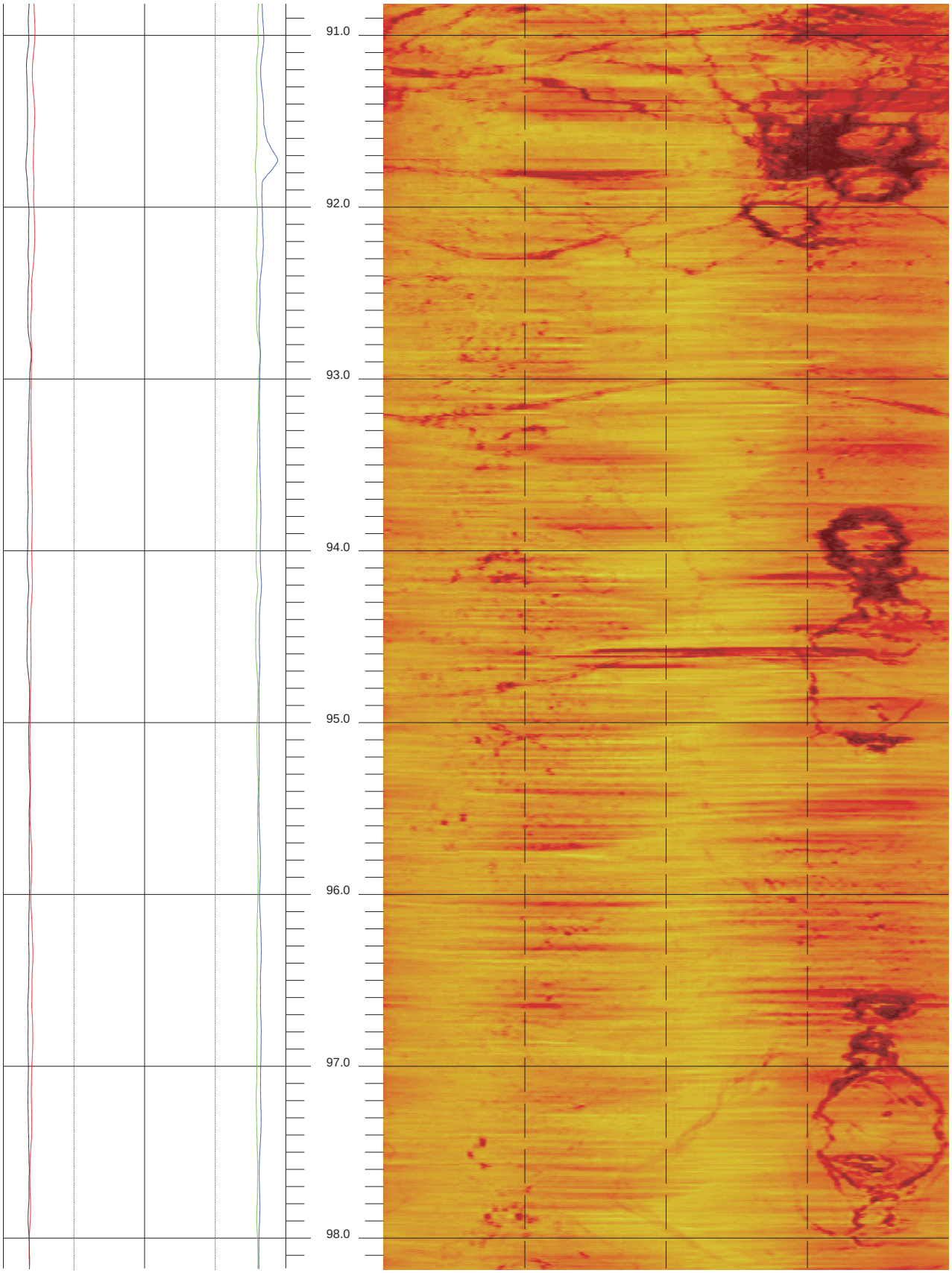
Zone from 99.604 to 86.972ft

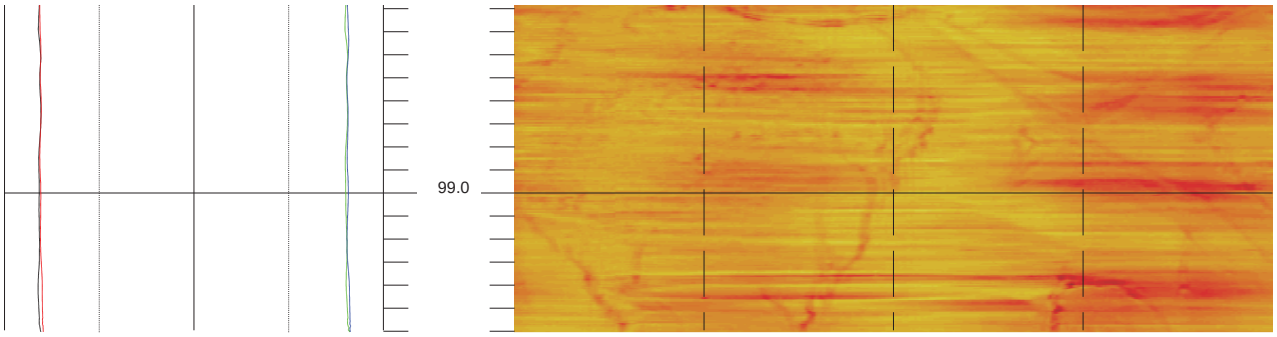
Borehole diam: 3.860inch
Vertical = borehole-axis
Image: Amplitude

Depth interval 0.004ft, Filter length 0.124ft

REFLECTANCE




91.0
92.0
93.0
94.0
95.0
96.0
97.0
98.0


99.0

APPENDIX C

TELEVIEWER FEATURES

GEOVision Televiewer Feature Notes and Picking Criteria:

All televiewer feature classifications are done as a best estimate, using information from the televiewer images, complemented by other geophysical logs, if available. Information from core logs may be used to inform the feature classifications as well, if they are available.

Generally, feature classifications from core data are more conclusive than classifications derived from televiewer images, though this may not be true in cases of friable or fractured rock that does not produce an intact core. Fractured rock may produce larger apertures in the boring wall than would be found in an undisturbed environment, so a group of adjacent hairline fractures may coalesce into what appears to be an open fracture in the televiewer image. Spalling or plucking of the borehole wall adjacent to a single hairline fracture may also produce a feature that appears to be a larger open fracture.

Most televiewer features fall into these classifications:

Bedding features:

- Exhibits a change in material or texture across the feature
- Conforms to the dip magnitude and azimuth of other bedding features in the borehole (or zone of the borehole)

Hairline fractures:

- Does not exhibit an open aperture for the full circumference of the borehole
- May not be visible for the full circumference of the borehole, but visible portion matches feature sinusoid well
- May have open segments, or be open for the full circumference of the borehole due to spalling, plucking or other drilling induced damage of the borehole wall. Review of the feature structure at a larger radius, when visible, is used to support this classification

Open fractures:

- Exhibits an open aperture for the full circumference of the borehole
- Has open aperture at the maximum radius of televiewer imaging
- Aperture may not be obvious for the full circumference of the borehole due to borehole damage or intersecting features, but shape of visible portion matches feature sinusoid well
- Often is present at the intersection of multiple hairline fractures

Voids:

- Features with vertical and radial extent of several inches or more, so no televiewer image is present to define the radial extent of the feature.
- Often the lower limit of the televiewer log, due to concerns over probe loss

GEOVision geophysical services

BHTV DATA PROCESSING
RGLDIP vsn 6.2
INTERPRETED BHTV DIPS LOG

AECOM

Borehole: B-101

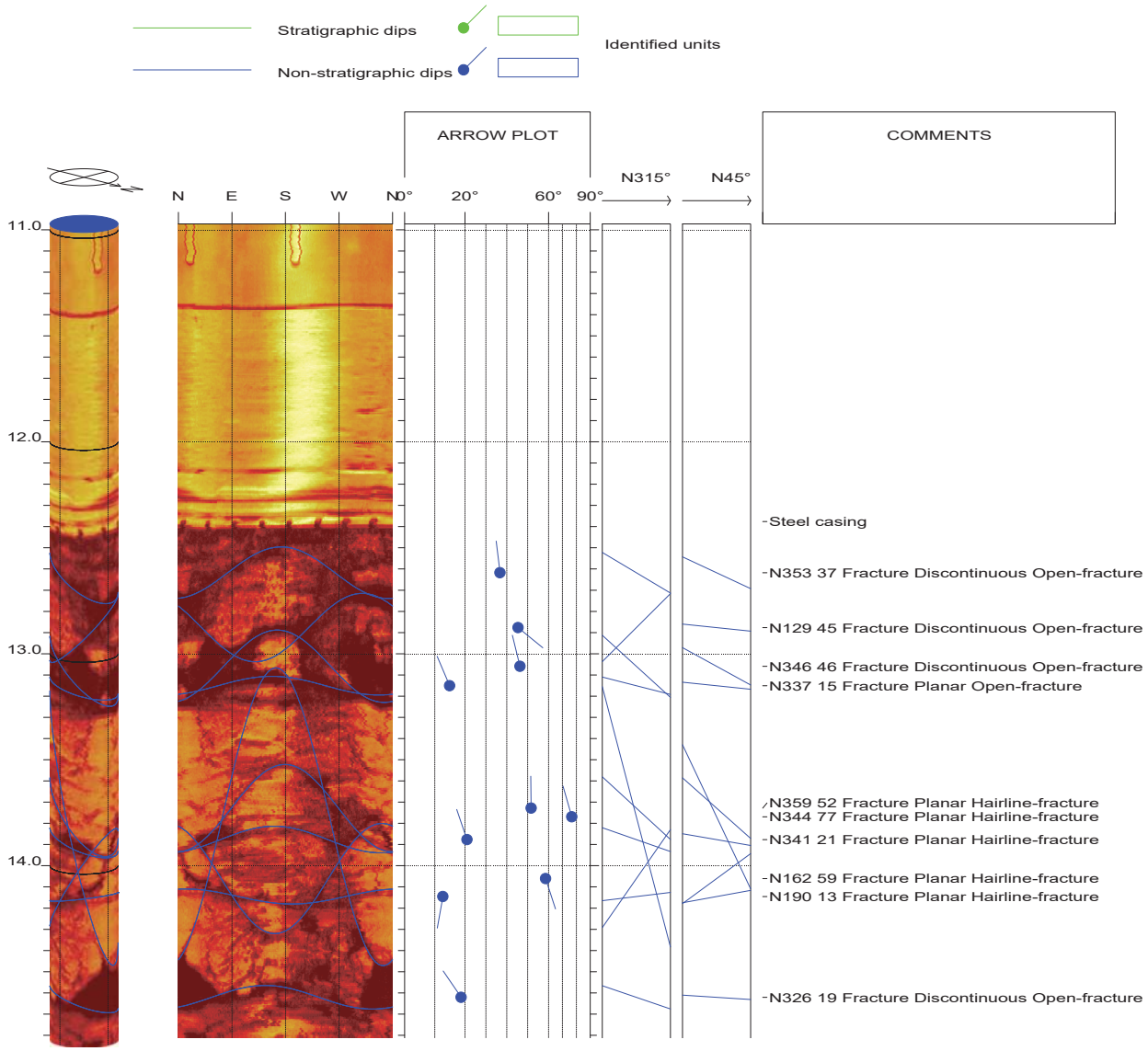
VAIL DAM

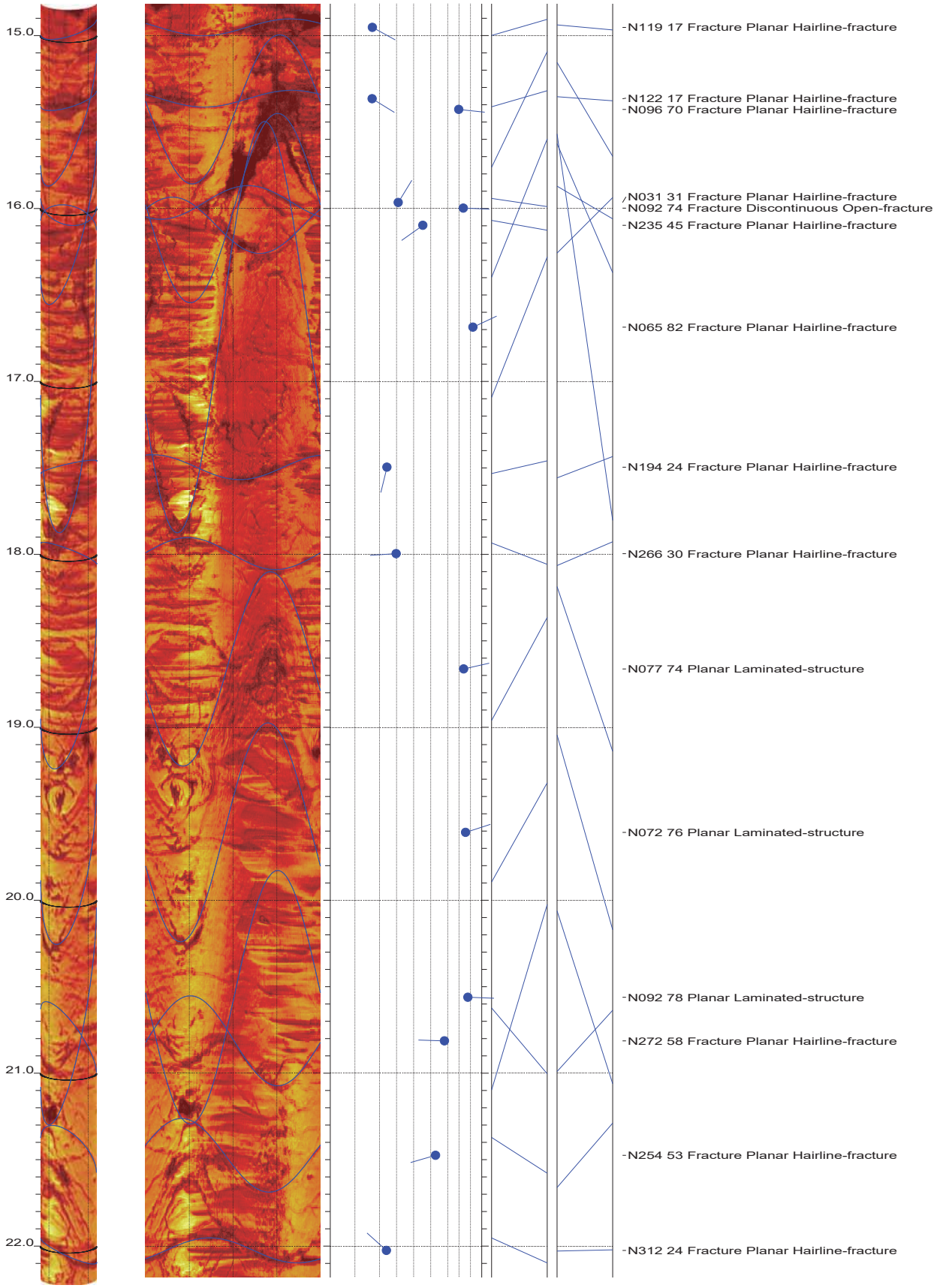
top of borehole.....
East: _
North:_
Elev: _

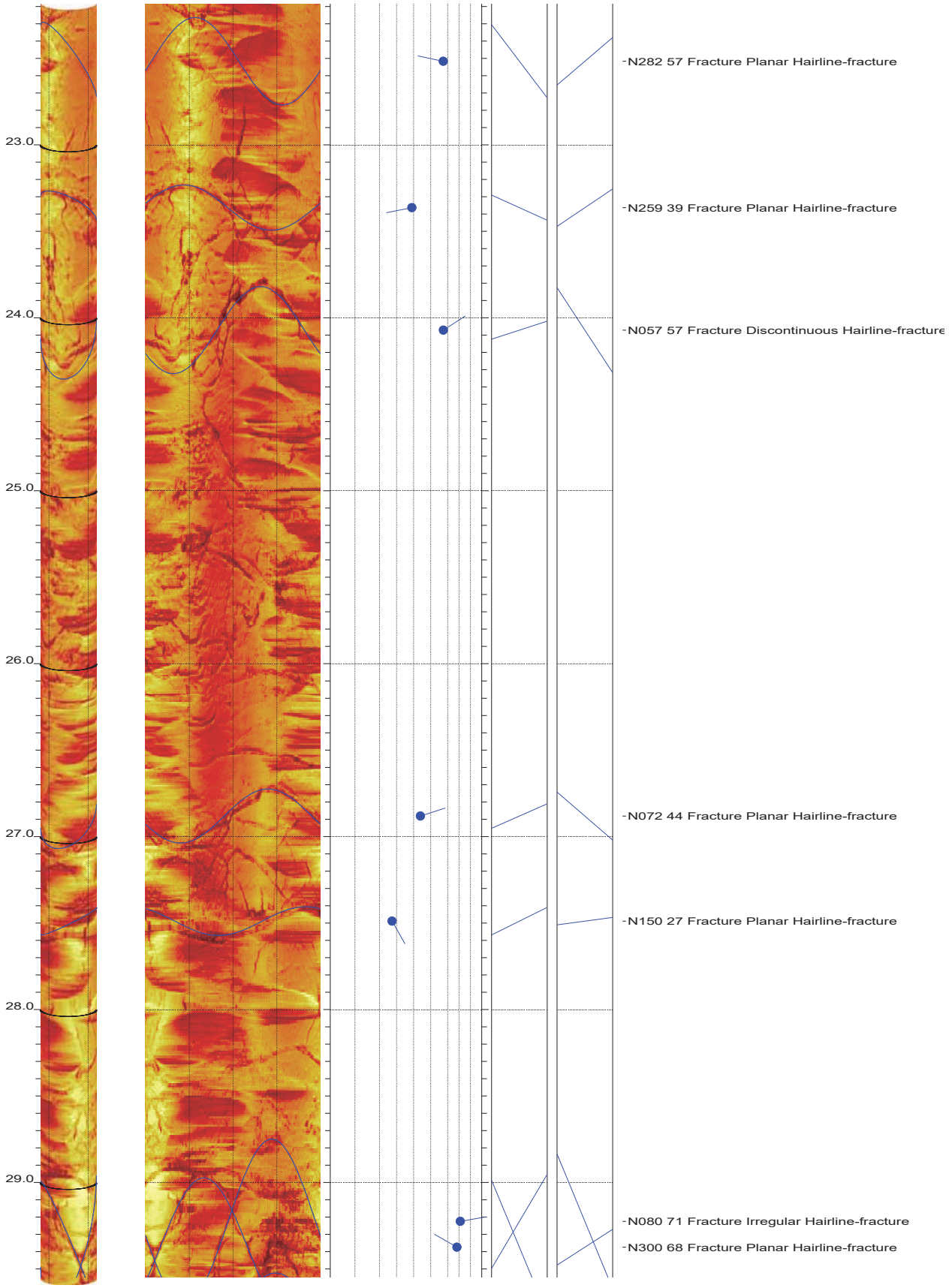
North ref. is true
Depth units are feet
Vertical scale: 1/10
Horiz scale = 1.00x Vert scale

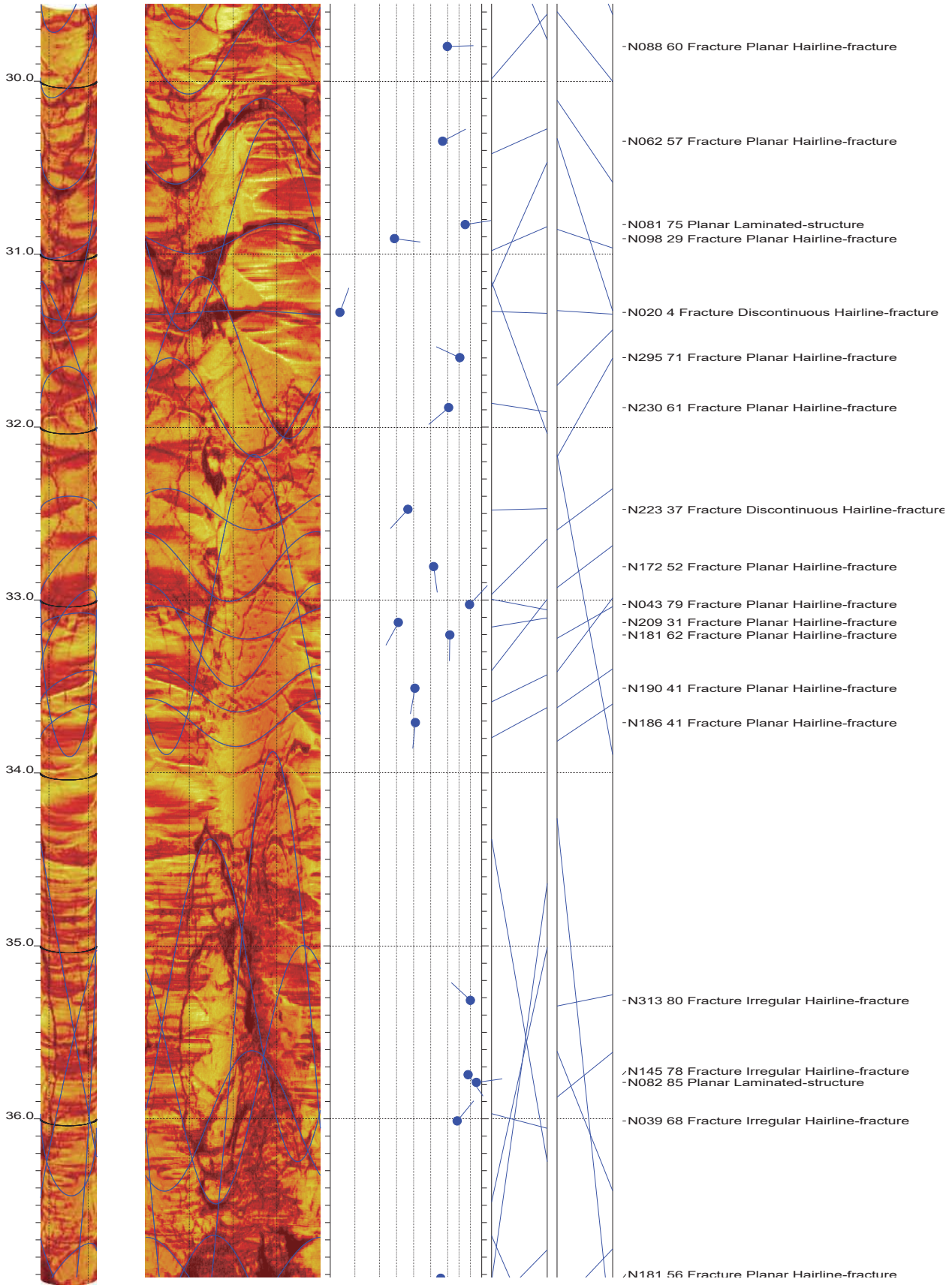
Zone from 149.828 to 10.972ft
Format: BHTV-NESWN

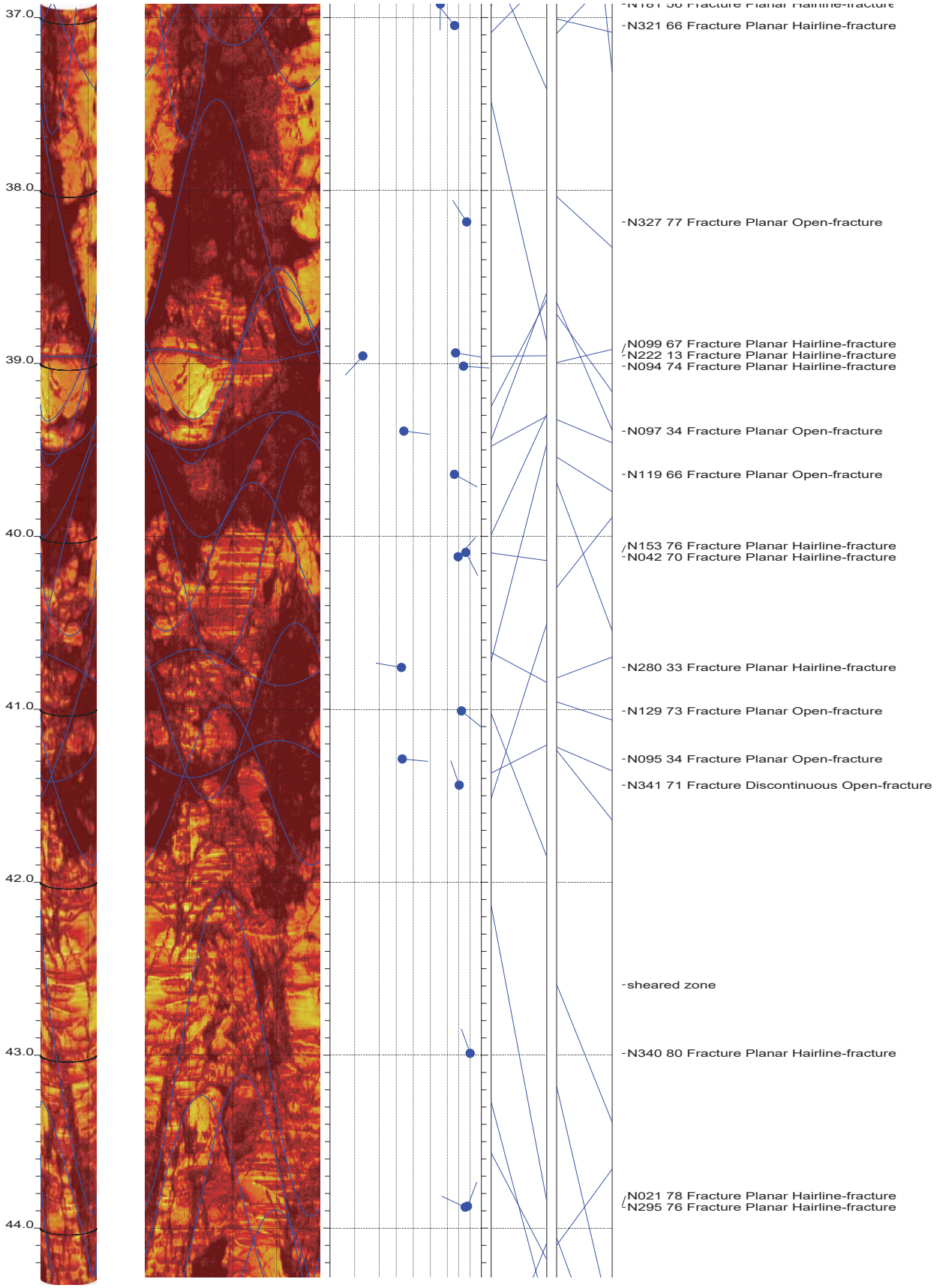
Borehole diam: 3.860inch
Vertical = borehole-axis
Image: Amplitude

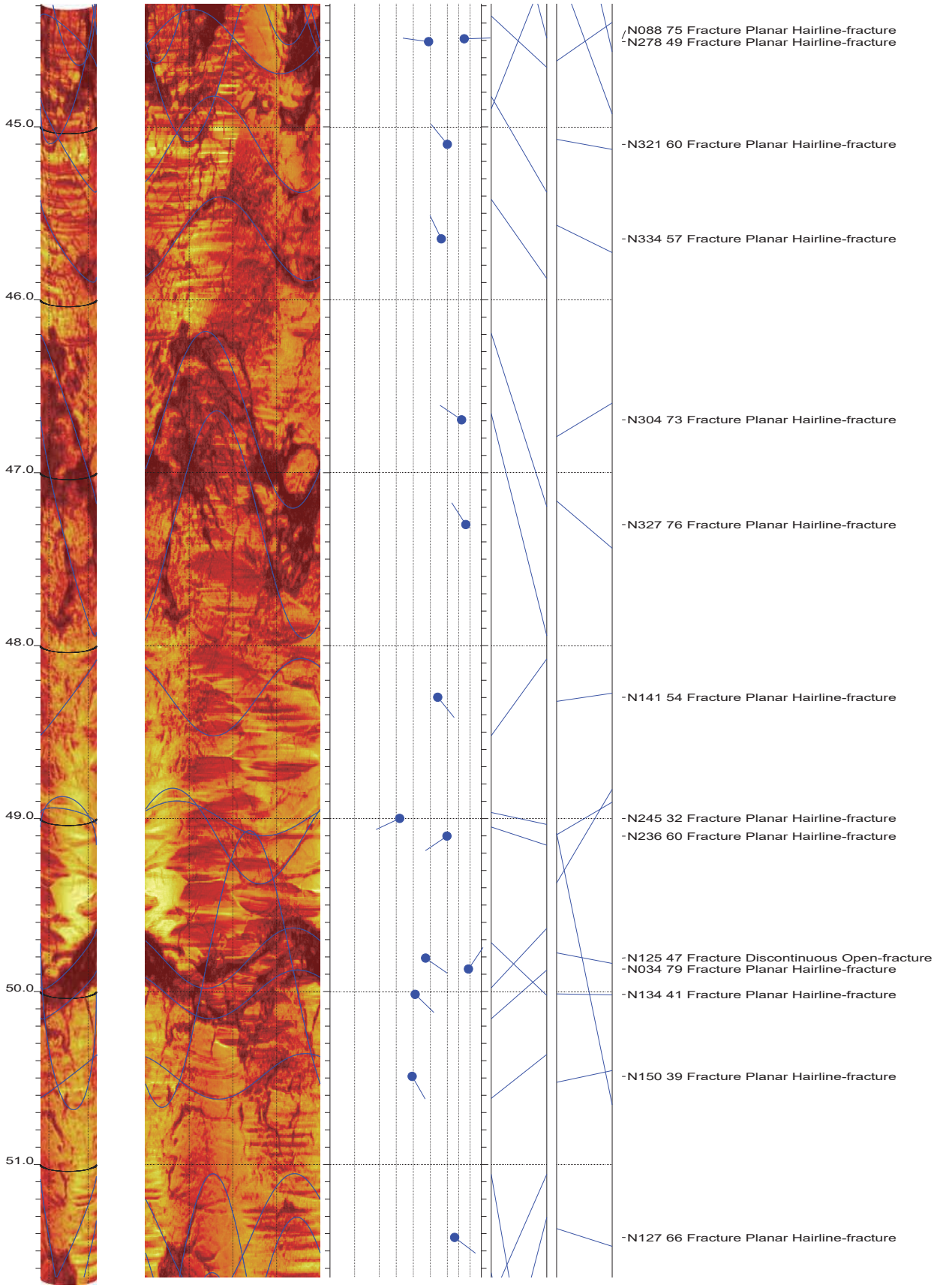


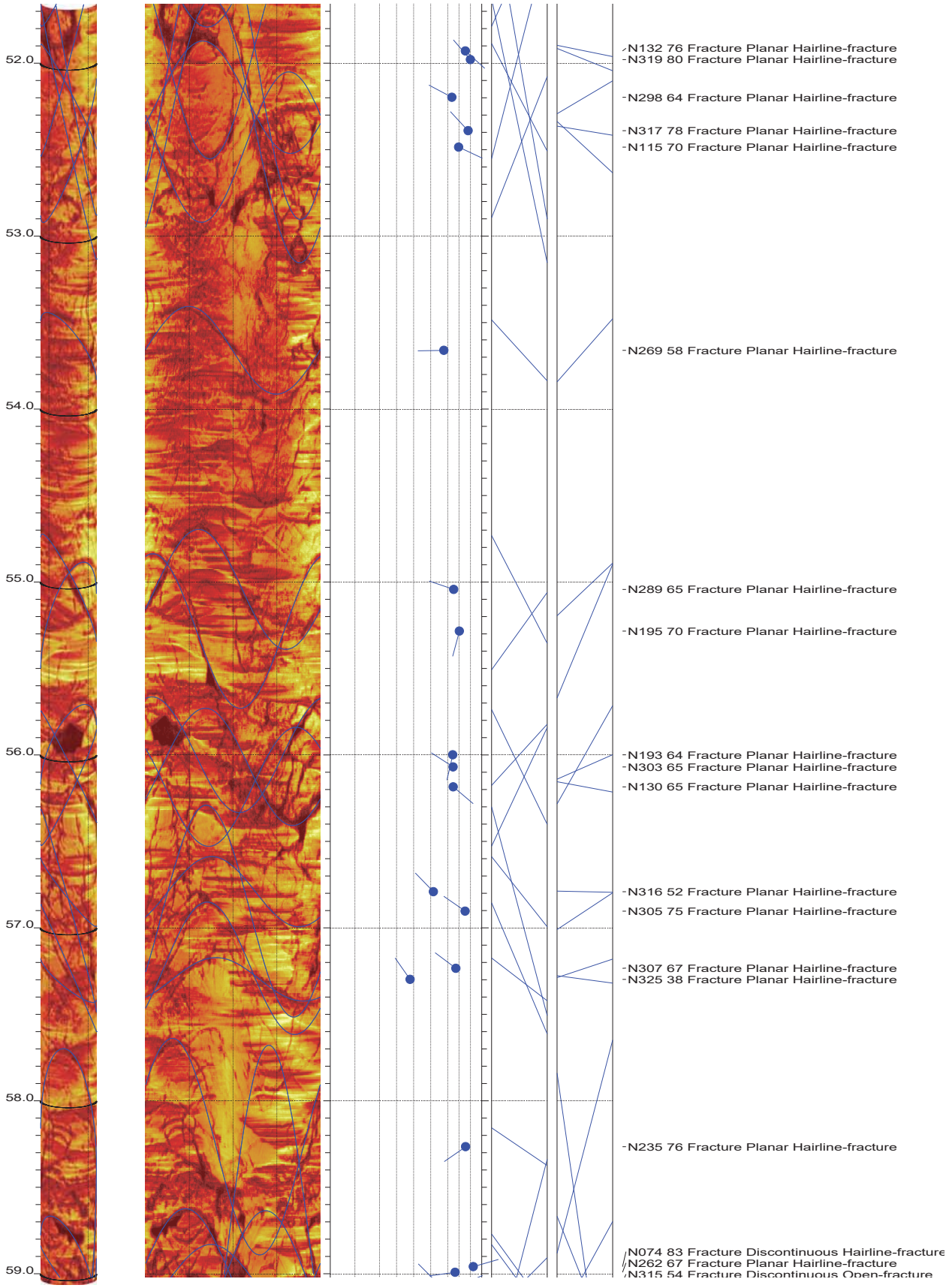

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N122 17 Fracture Planar Hairline-fracture
N096 70 Fracture Planar Hairline-fracture
N031 31 Fracture Planar Hairline-fracture
N092 74 Fracture Discontinuous Open-fracture
N235 45 Fracture Planar Hairline-fracture
N065 82 Fracture Planar Hairline-fracture
N194 24 Fracture Planar Hairline-fracture
N266 30 Fracture Planar Hairline-fracture
N077 74 Planar Laminated-structure
N072 76 Planar Laminated-structure
N092 78 Planar Laminated-structure
N272 58 Fracture Planar Hairline-fracture
N254 53 Fracture Planar Hairline-fracture
N312 24 Fracture Planar Hairline-fracture

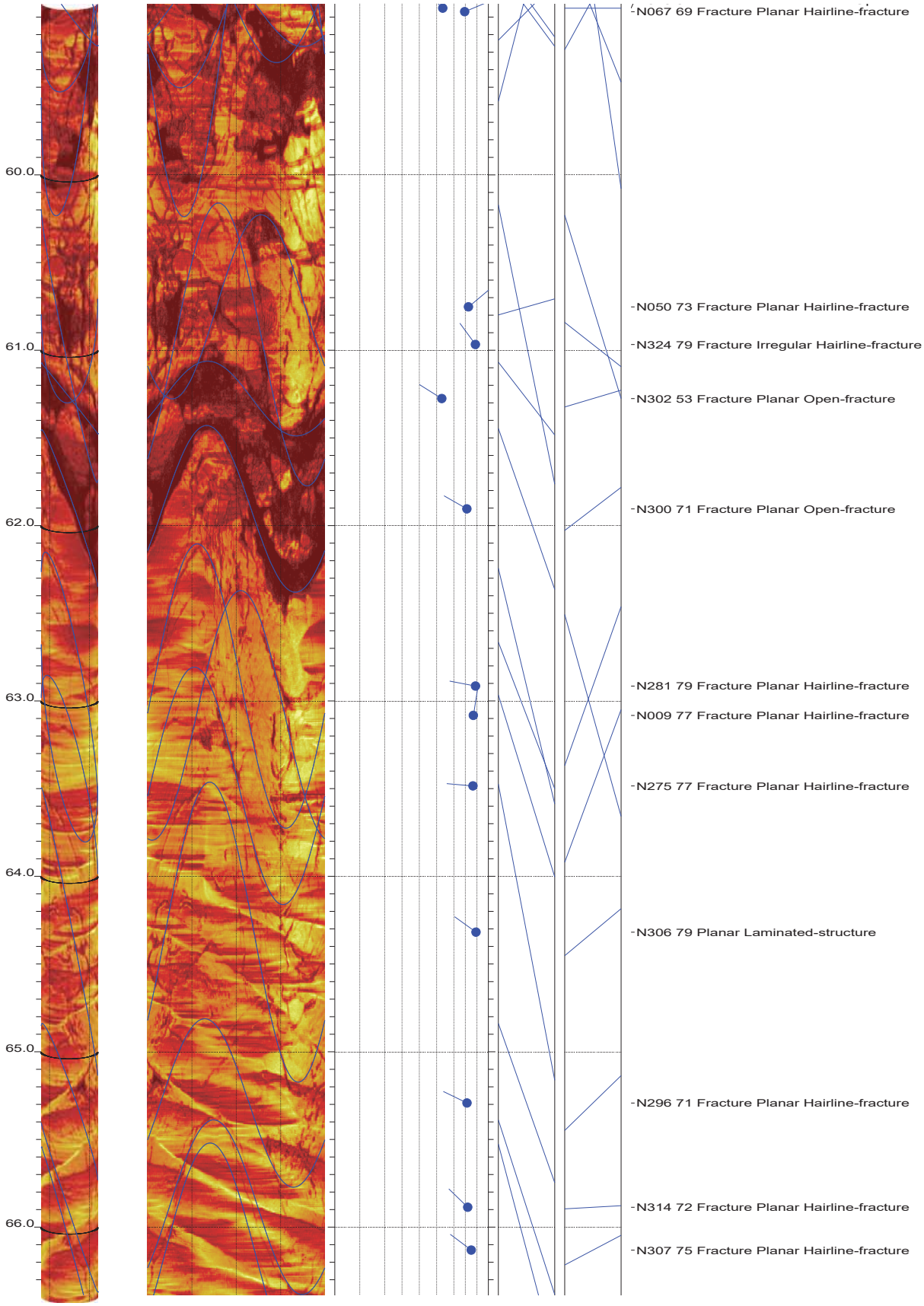

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-N057 57 Fracture Discontinuous Hairline-fracture
-N072 44 Fracture Planar Hairline-fracture
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-N300 68 Fracture Planar Hairline-fracture

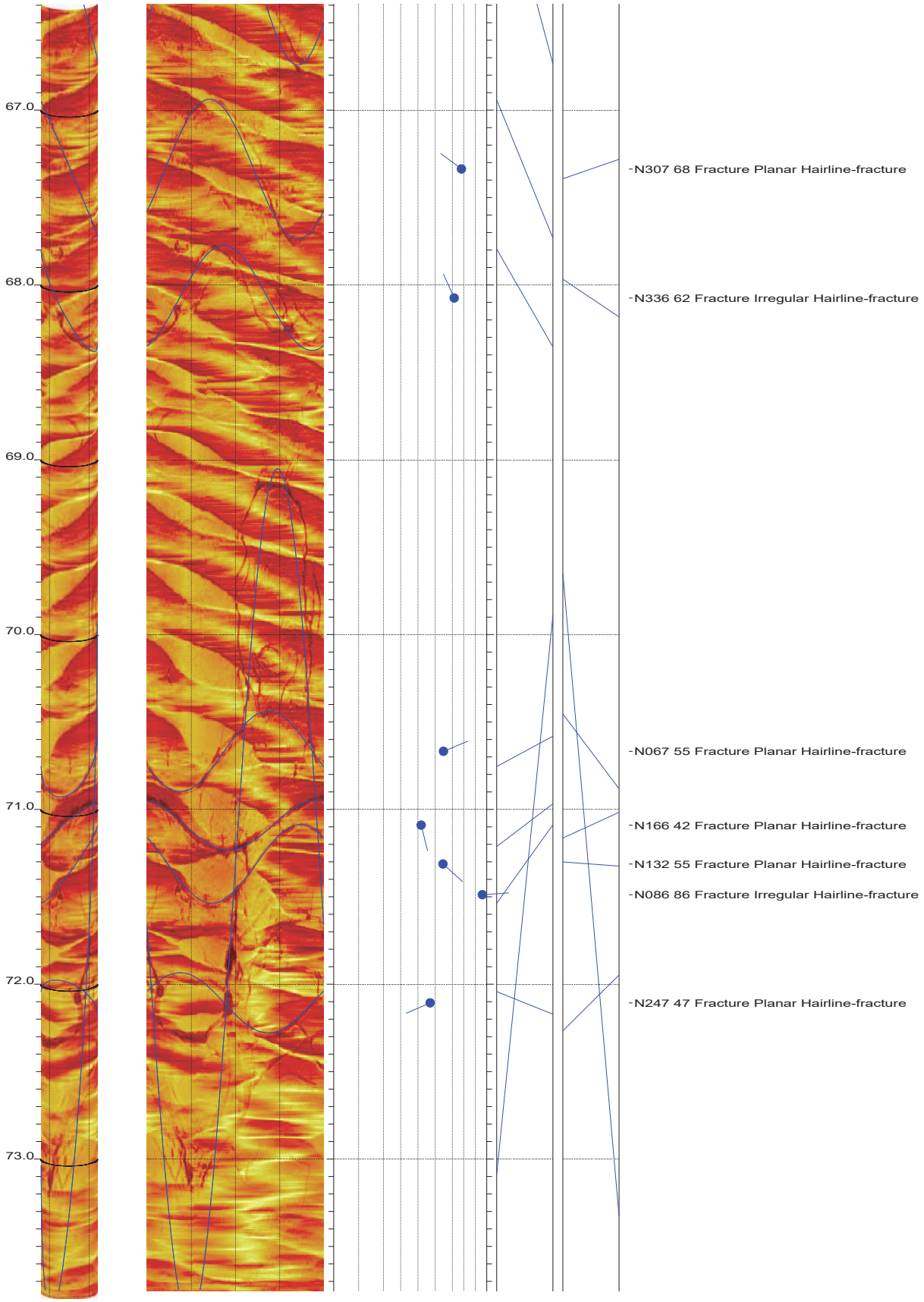

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N098 29 Fracture Planar Hairline-fracture
N020 4 Fracture Discontinuous Hairline-fracture
N295 71 Fracture Planar Hairline-fracture
N230 61 Fracture Planar Hairline-fracture
N223 37 Fracture Discontinuous Hairline-fracture
N172 52 Fracture Planar Hairline-fracture
N043 79 Fracture Planar Hairline-fracture
N209 31 Fracture Planar Hairline-fracture
N181 62 Fracture Planar Hairline-fracture
N190 41 Fracture Planar Hairline-fracture
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N313 80 Fracture Irregular Hairline-fracture
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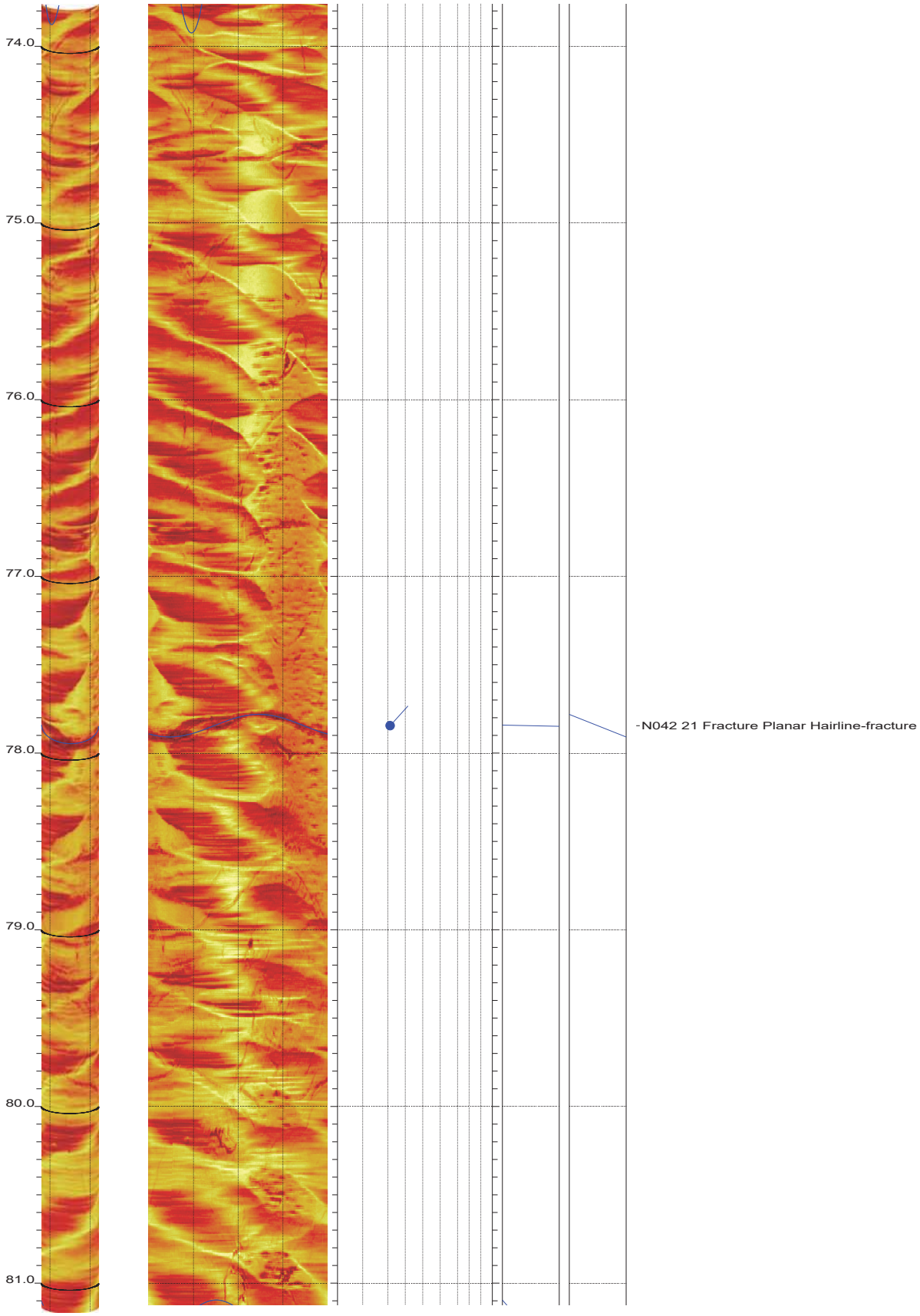

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N094 74 Fracture Planar Hairline-fracture
N097 34 Fracture Planar Open-fracture
N119 66 Fracture Planar Open-fracture
N153 76 Fracture Planar Hairline-fracture
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N280 33 Fracture Planar Hairline-fracture
N129 73 Fracture Planar Open-fracture
N095 34 Fracture Planar Open-fracture
N341 71 Fracture Discontinuous Open-fracture
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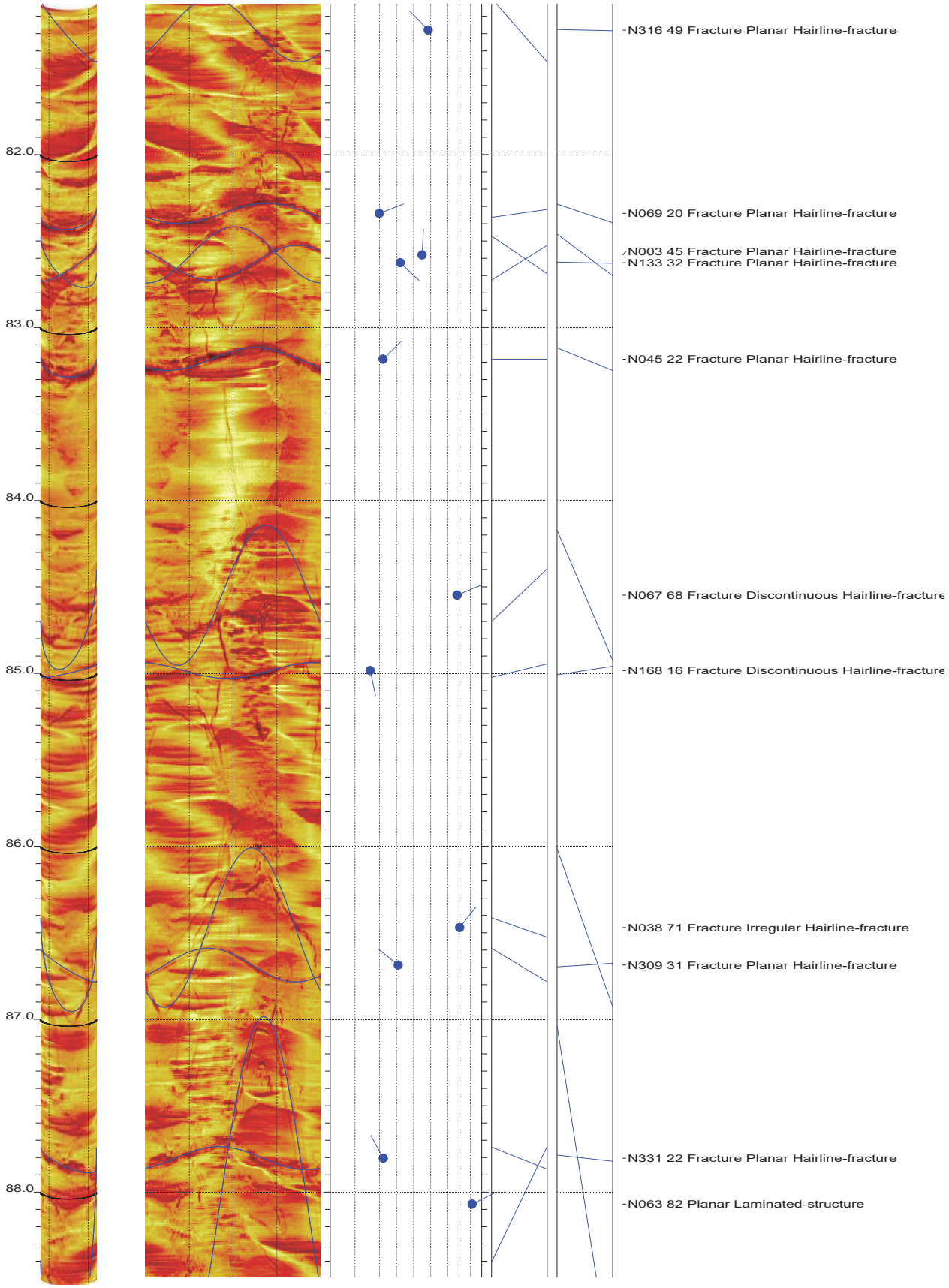

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N236 60 Fracture Planar Hairline-fracture
N125 47 Fracture Discontinuous Open-fracture
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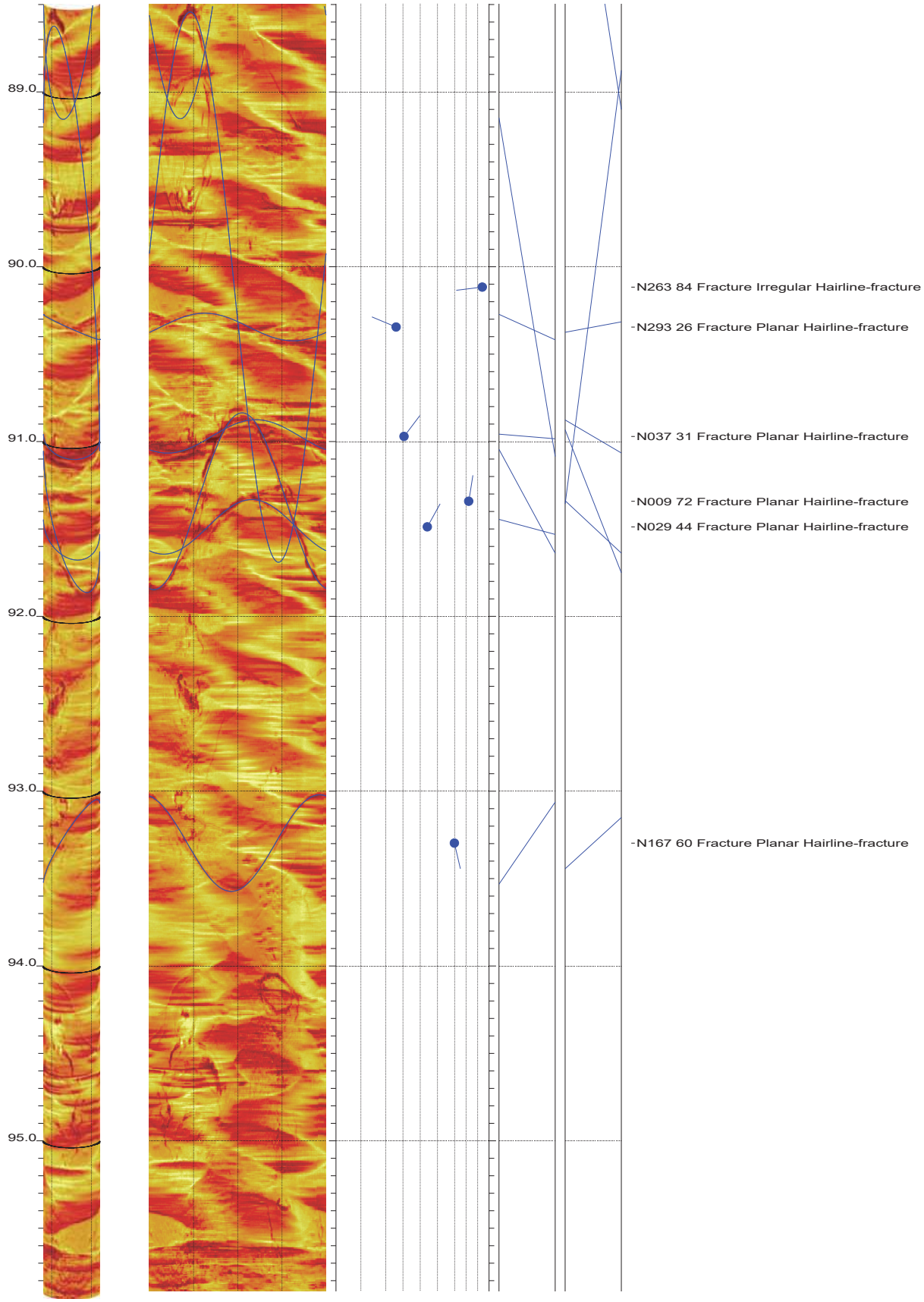

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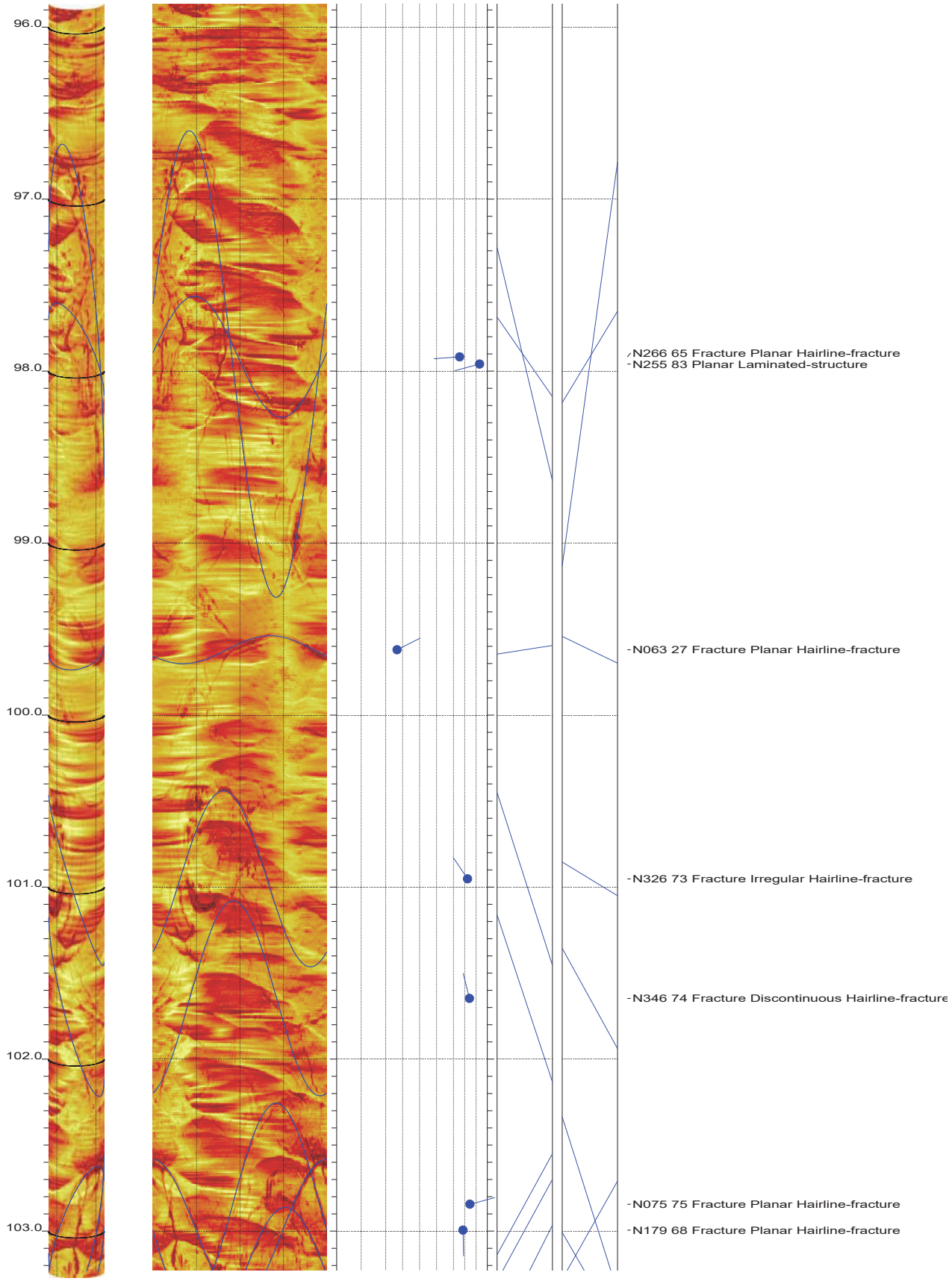

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N302 53 Fracture Planar Open-fracture
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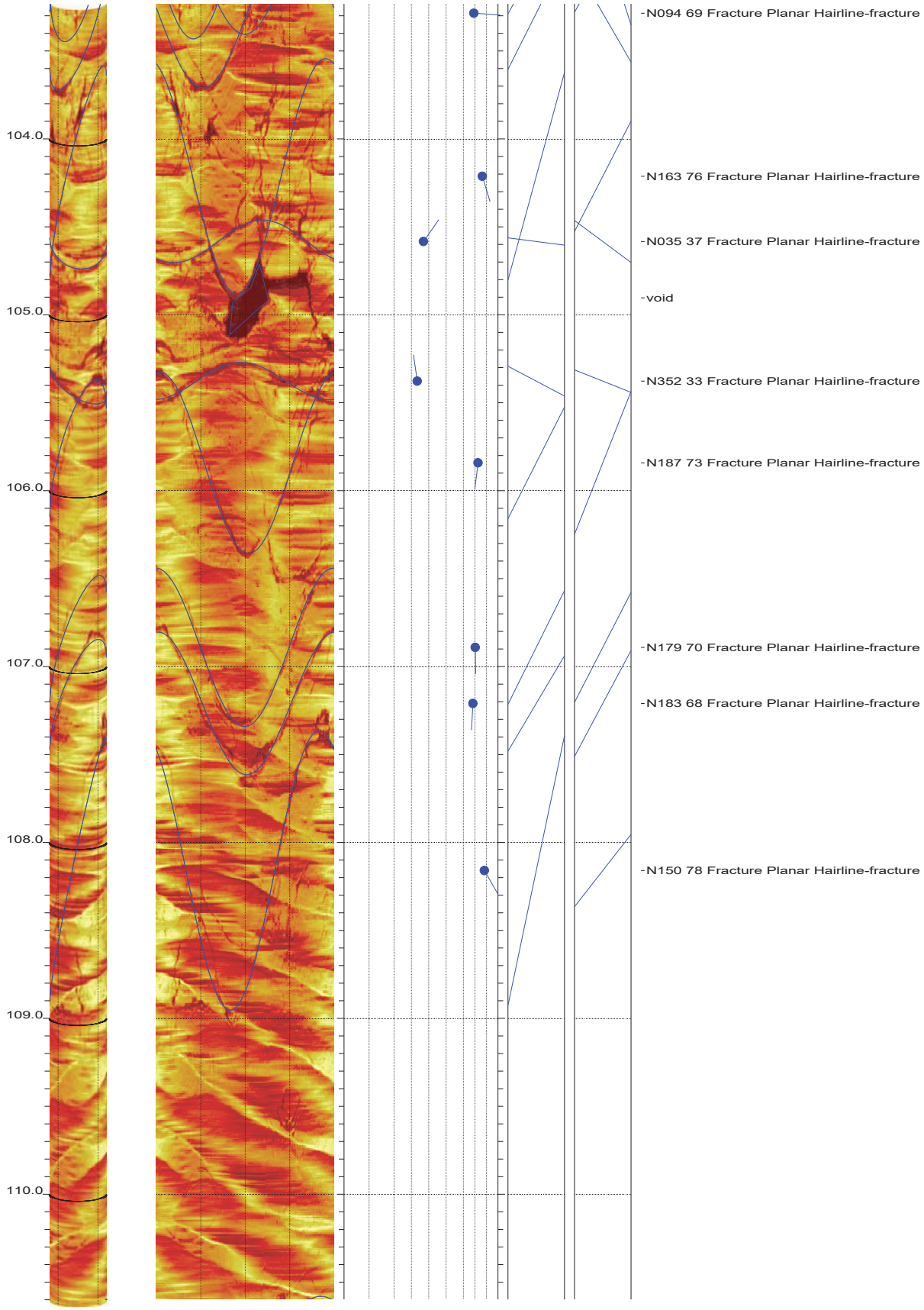

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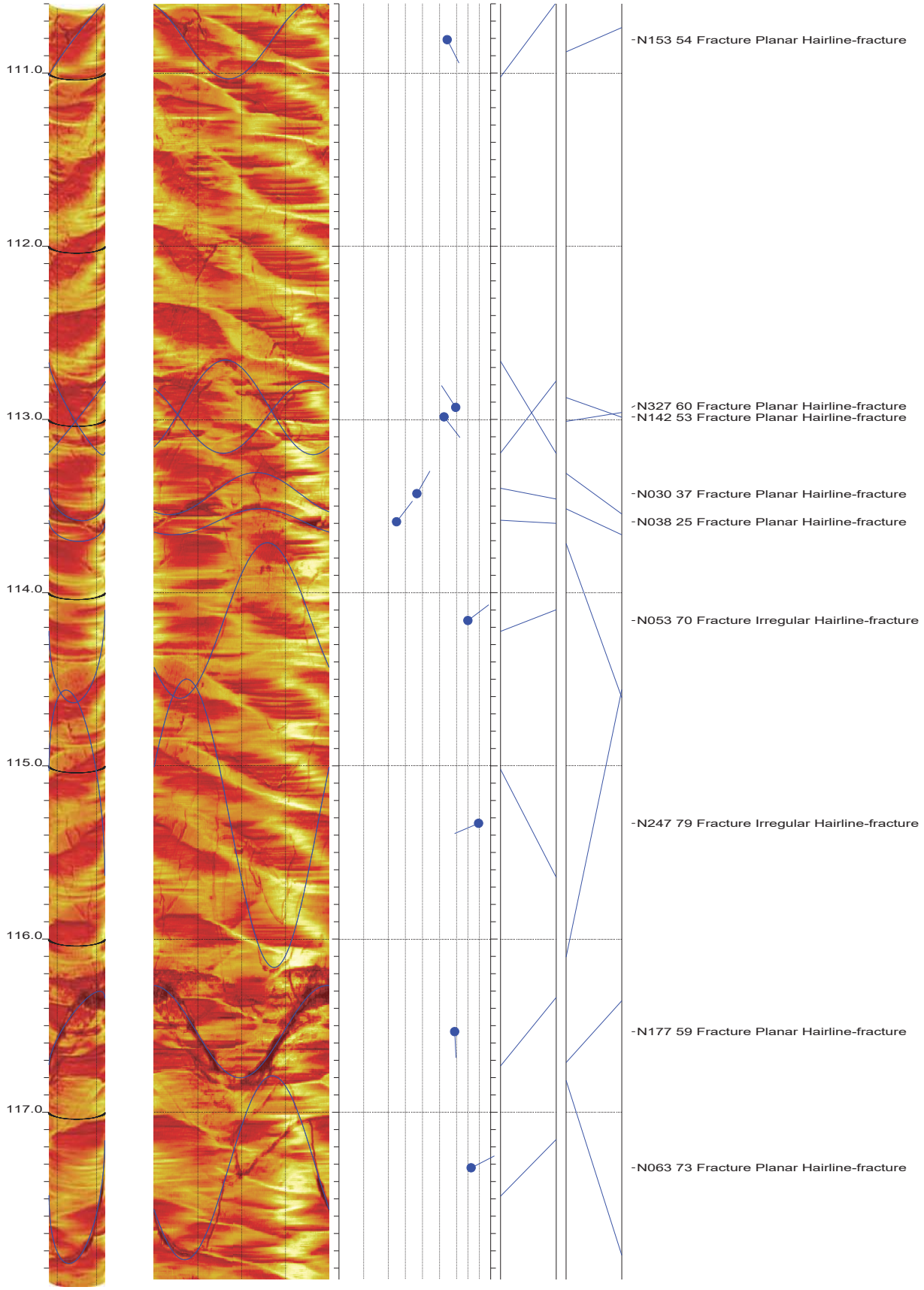

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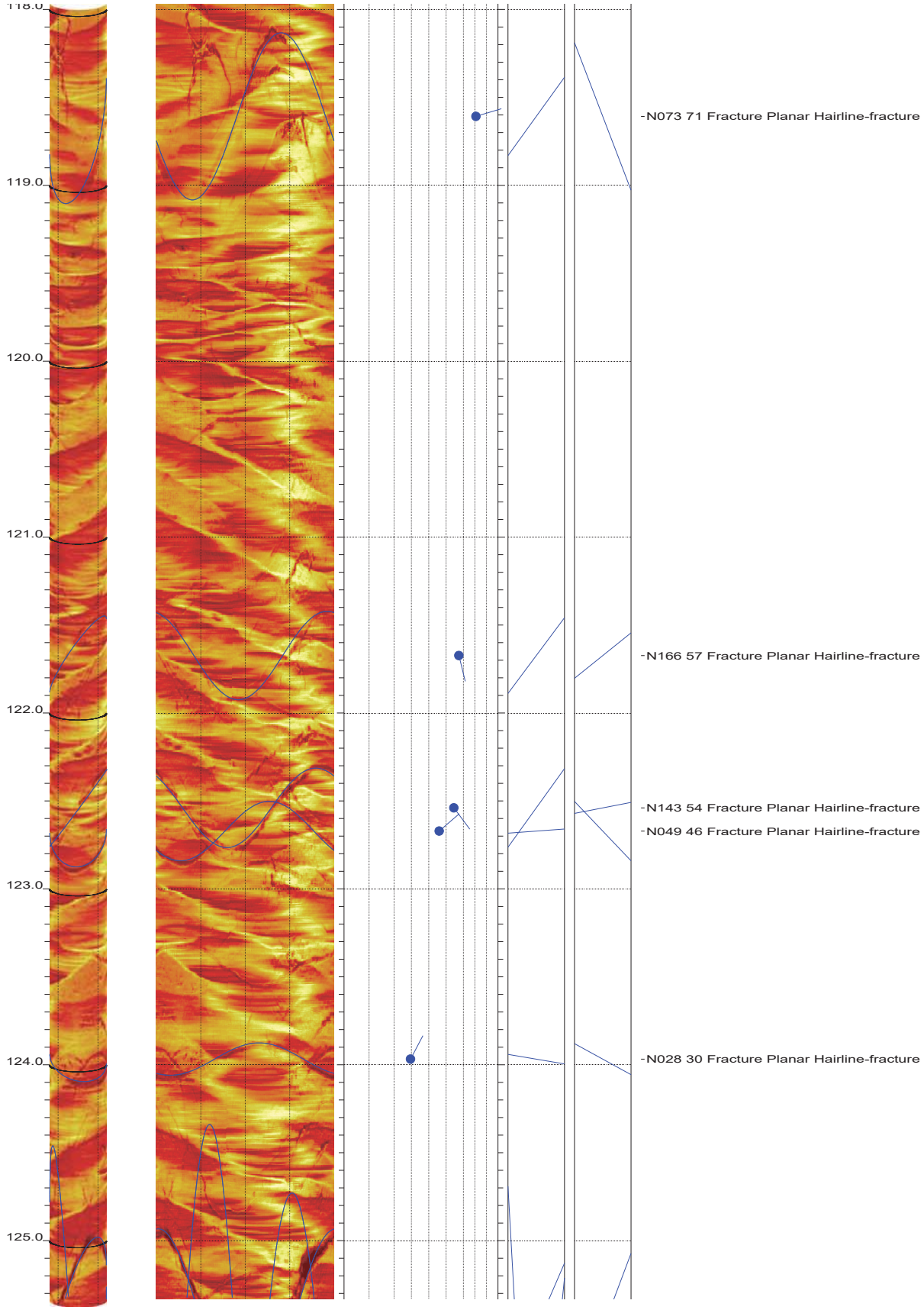

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N168 16 Fracture Discontinuous Hairline-fracture
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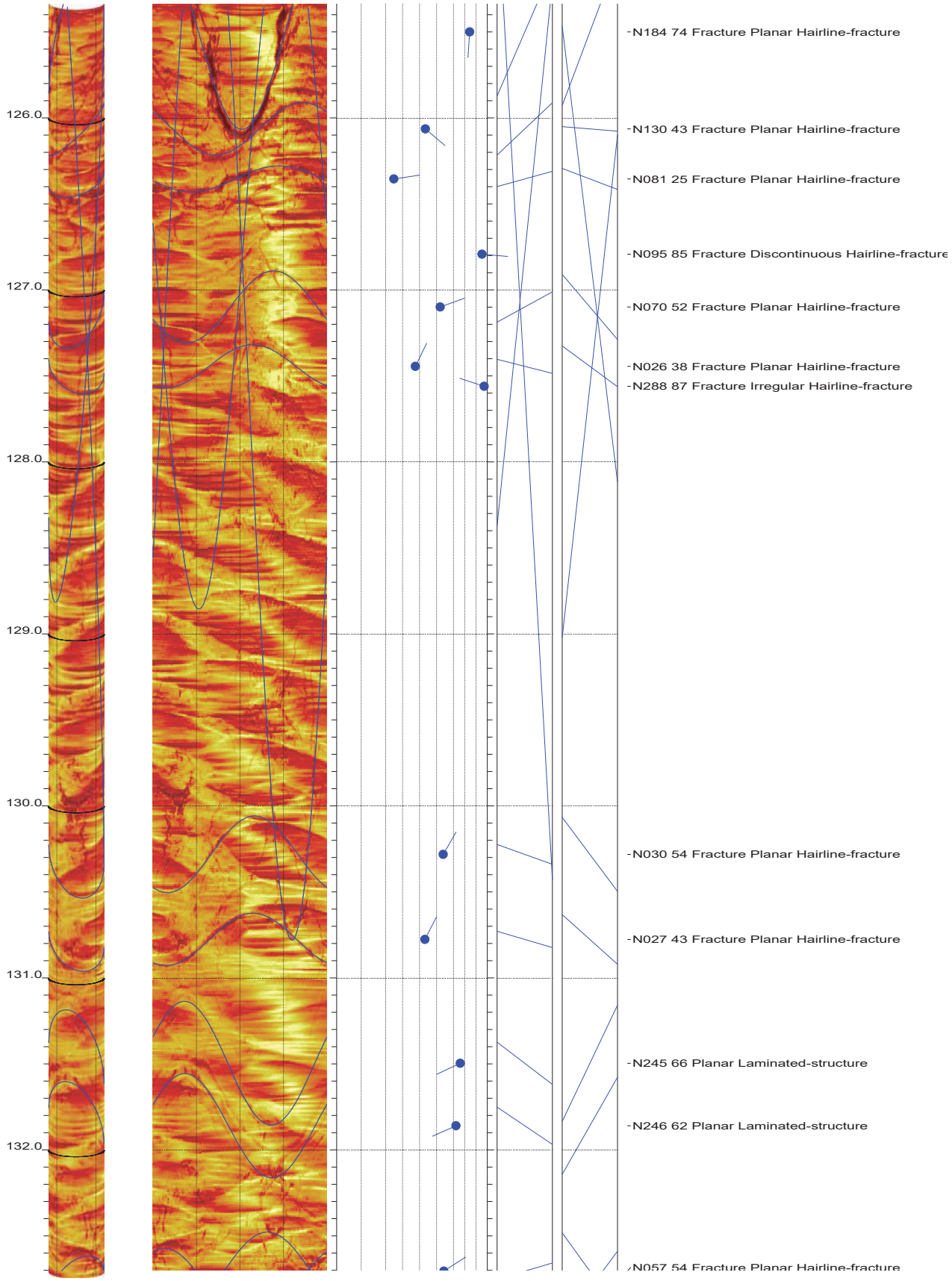

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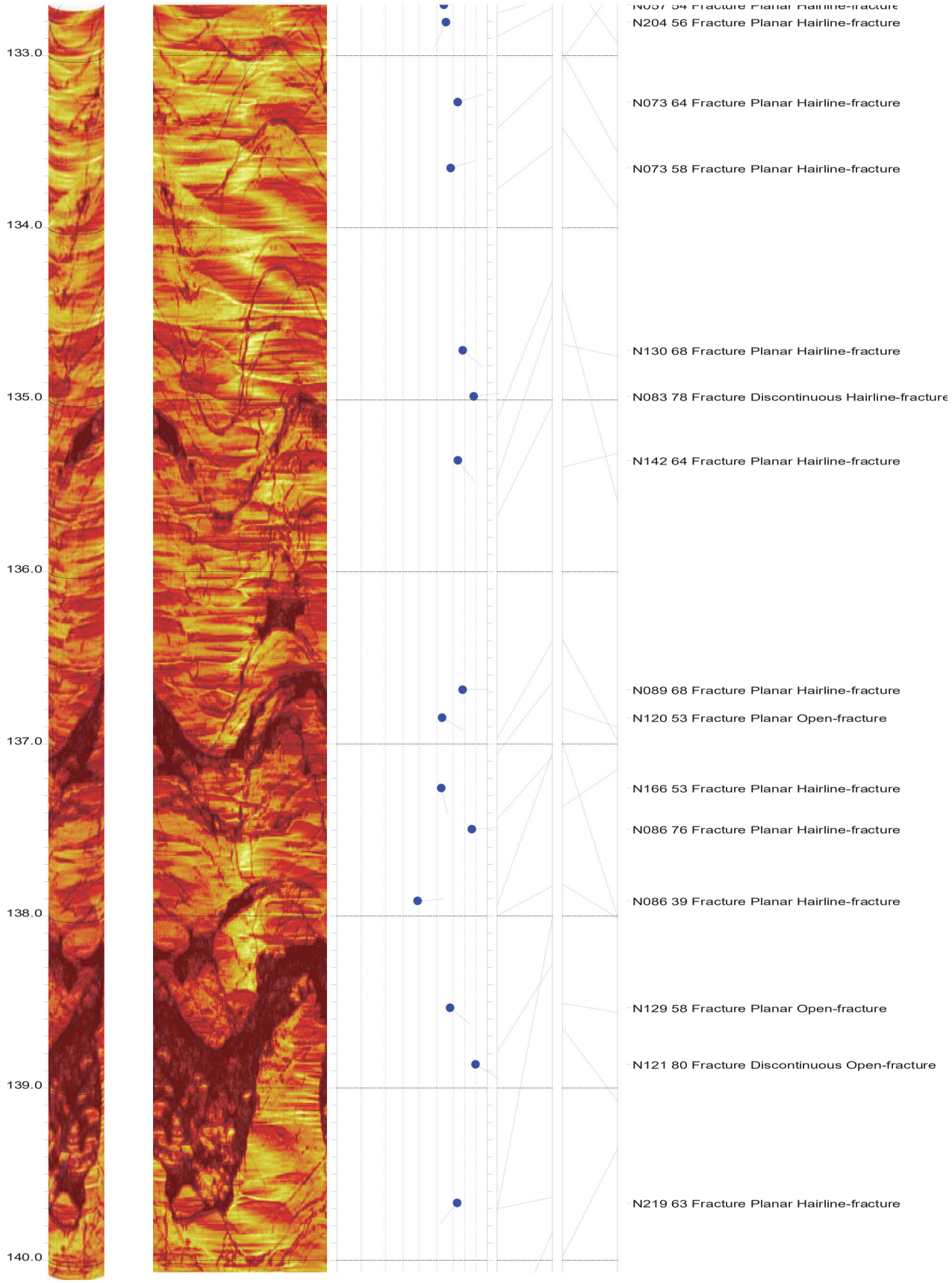

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N063 27 Fracture Planar Hairline-fracture
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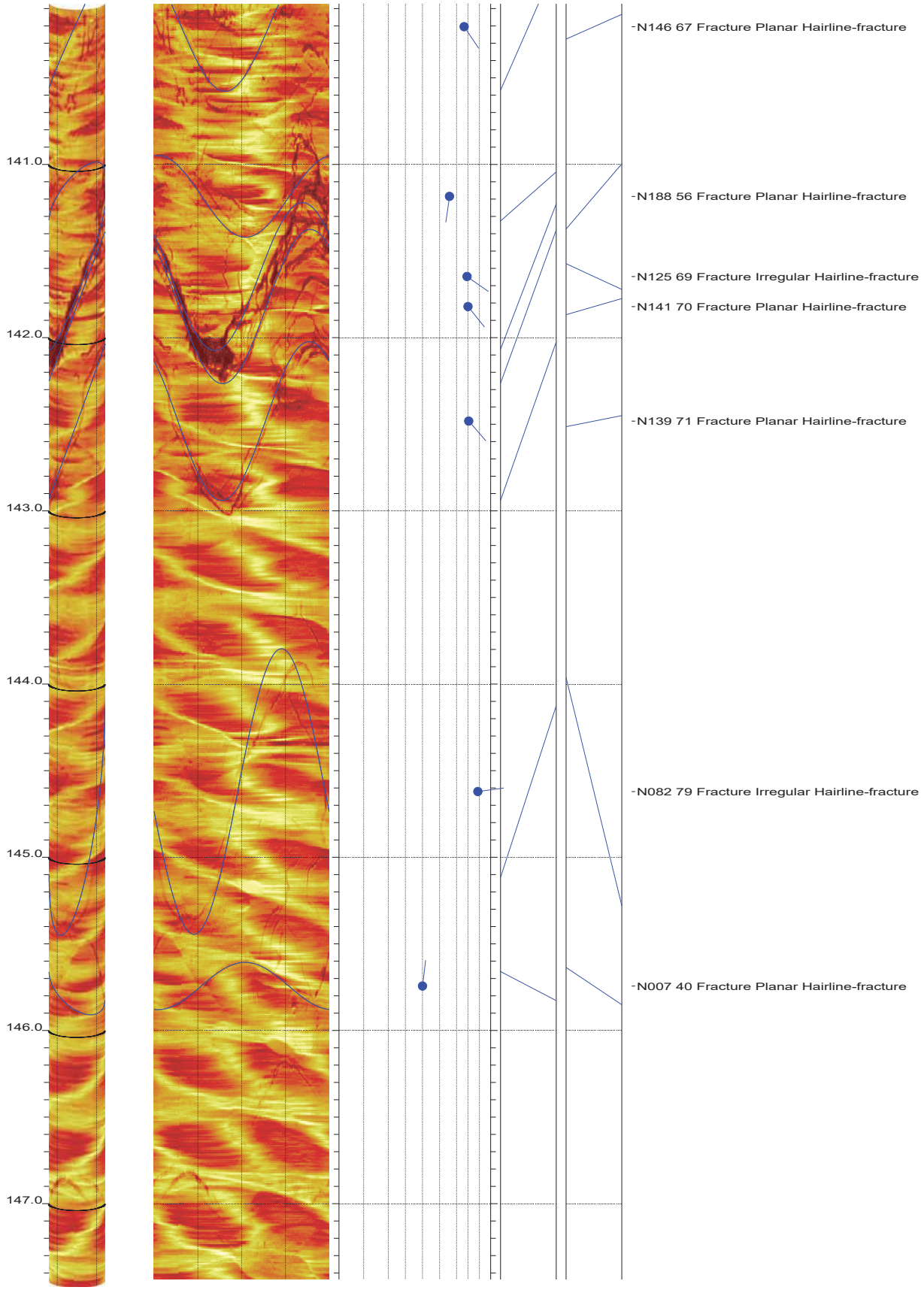

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-void
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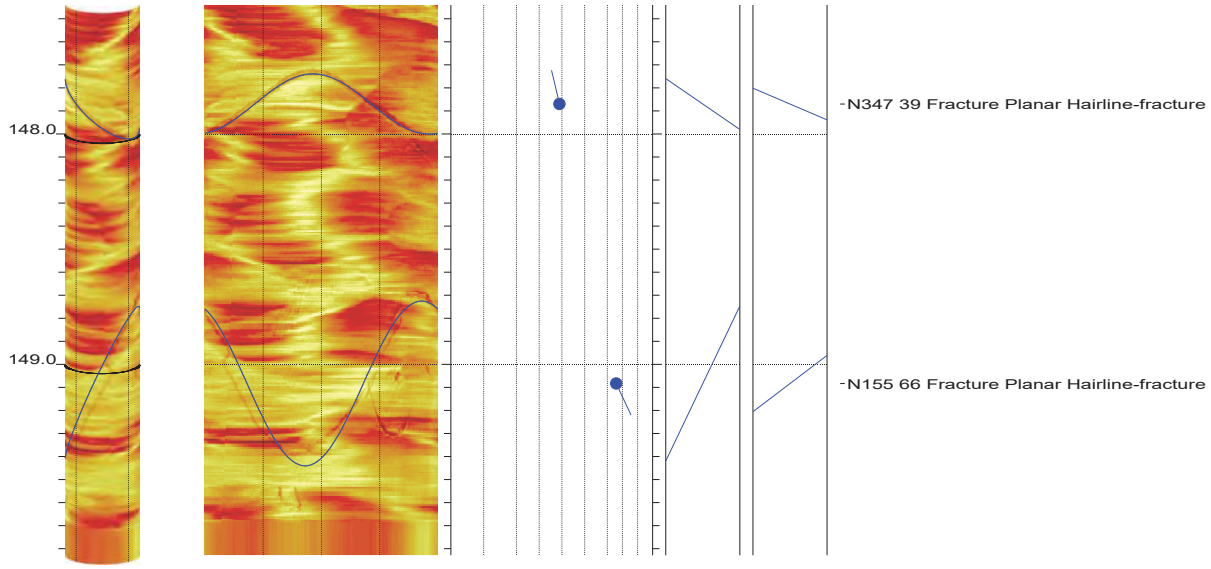

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N177 59 Fracture Planar Hairline-fracture
N063 73 Fracture Planar Hairline-fracture


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-N166 57 Fracture Planar Hairline-fracture
-N143 54 Fracture Planar Hairline-fracture
-N049 46 Fracture Planar Hairline-fracture
-N028 30 Fracture Planar Hairline-fracture


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N081 25 Fracture Planar Hairline-fracture
N095 85 Fracture Discontinuous Hairline-fracture
N070 52 Fracture Planar Hairline-fracture
N026 38 Fracture Planar Hairline-fracture
N288 87 Fracture Irregular Hairline-fracture
N030 54 Fracture Planar Hairline-fracture
N027 43 Fracture Planar Hairline-fracture
N245 66 Planar Laminated-structure
N246 62 Planar Laminated-structure
N057 54 Fracture Planar Hairline-fracture


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N083 78 Fracture Discontinuous Hairline-fracture
N142 64 Fracture Planar Hairline-fracture
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GEOVision geophysical services

BHTV DATA PROCESSING
RGLDIP vsn 6.2
INTERPRETED BHTV DIPS LOG

AECOM

Borehole: B-102

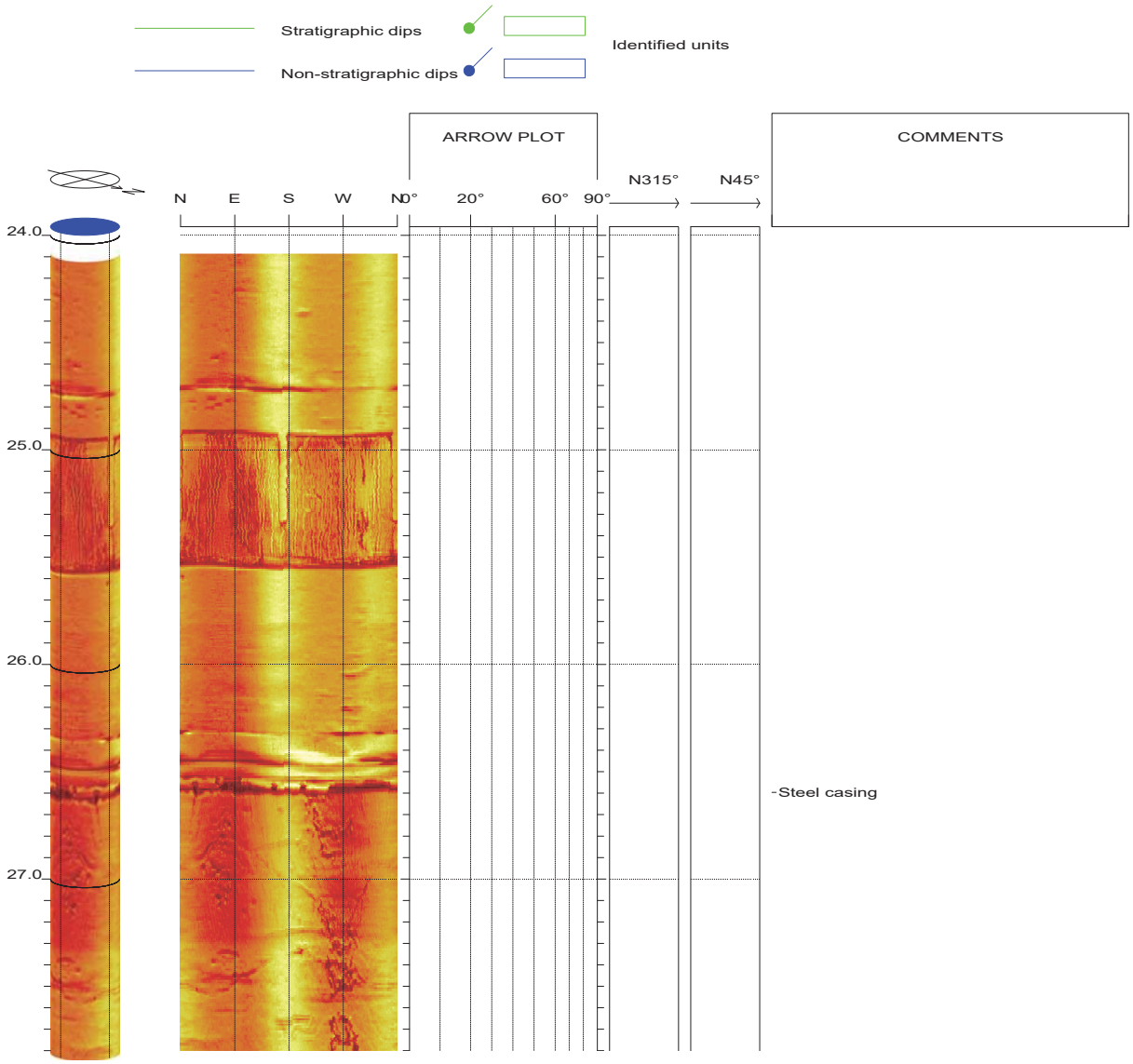
VAIL DAM

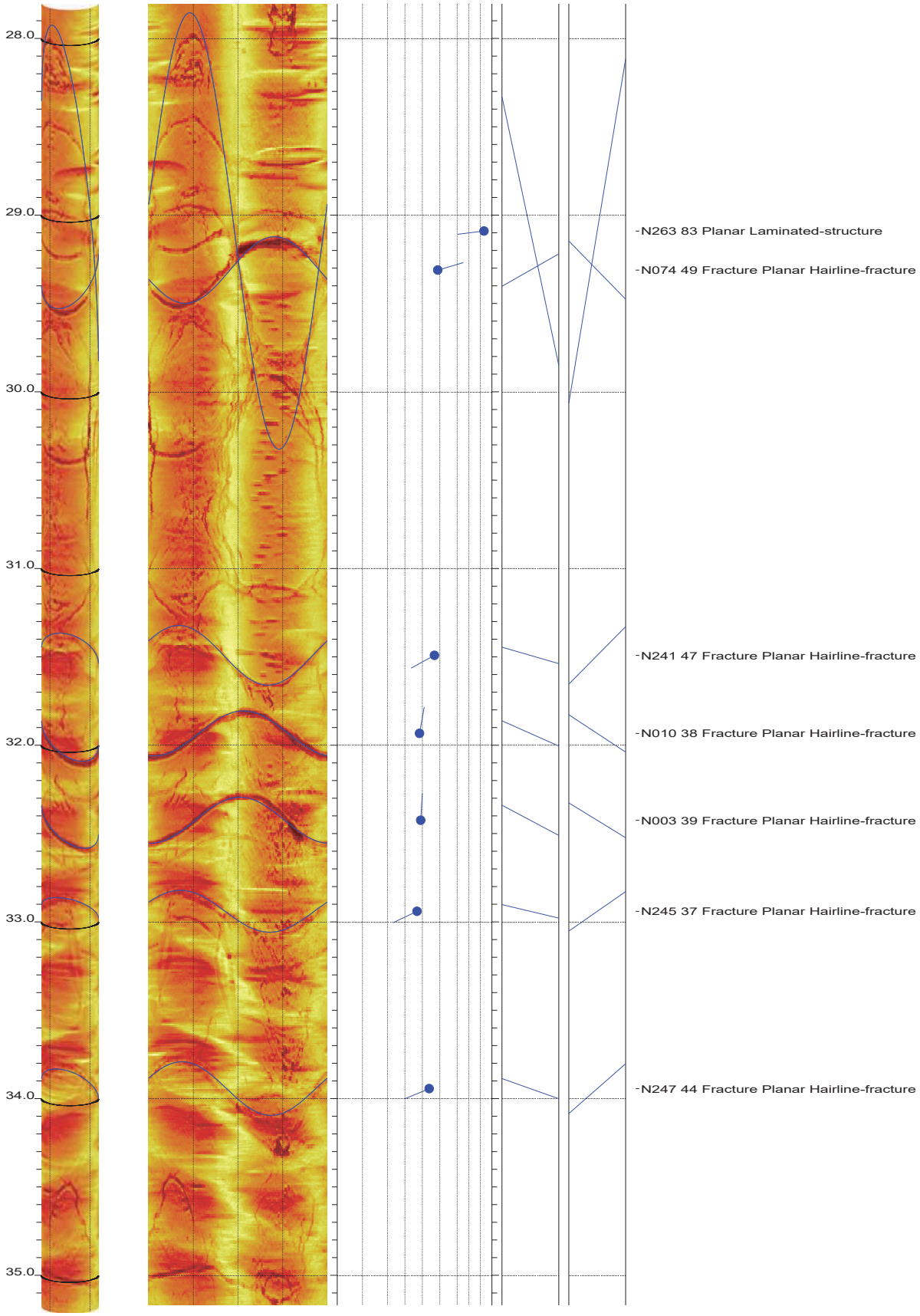
top of borehole.....
East: _
North:_
Elev: _

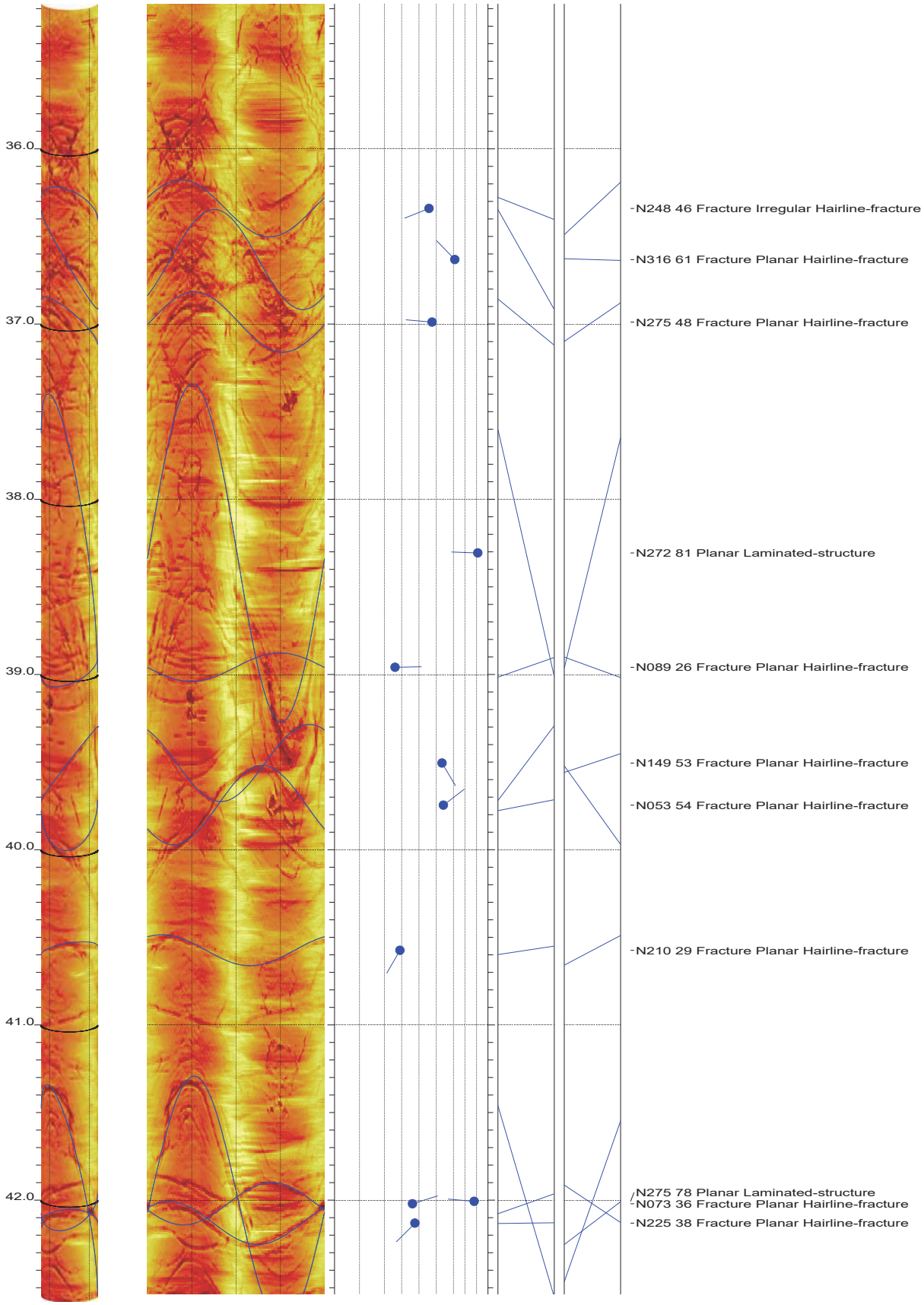
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Depth units are feet
Vertical scale: 1/10
Horiz scale = 1.00x Vert scale

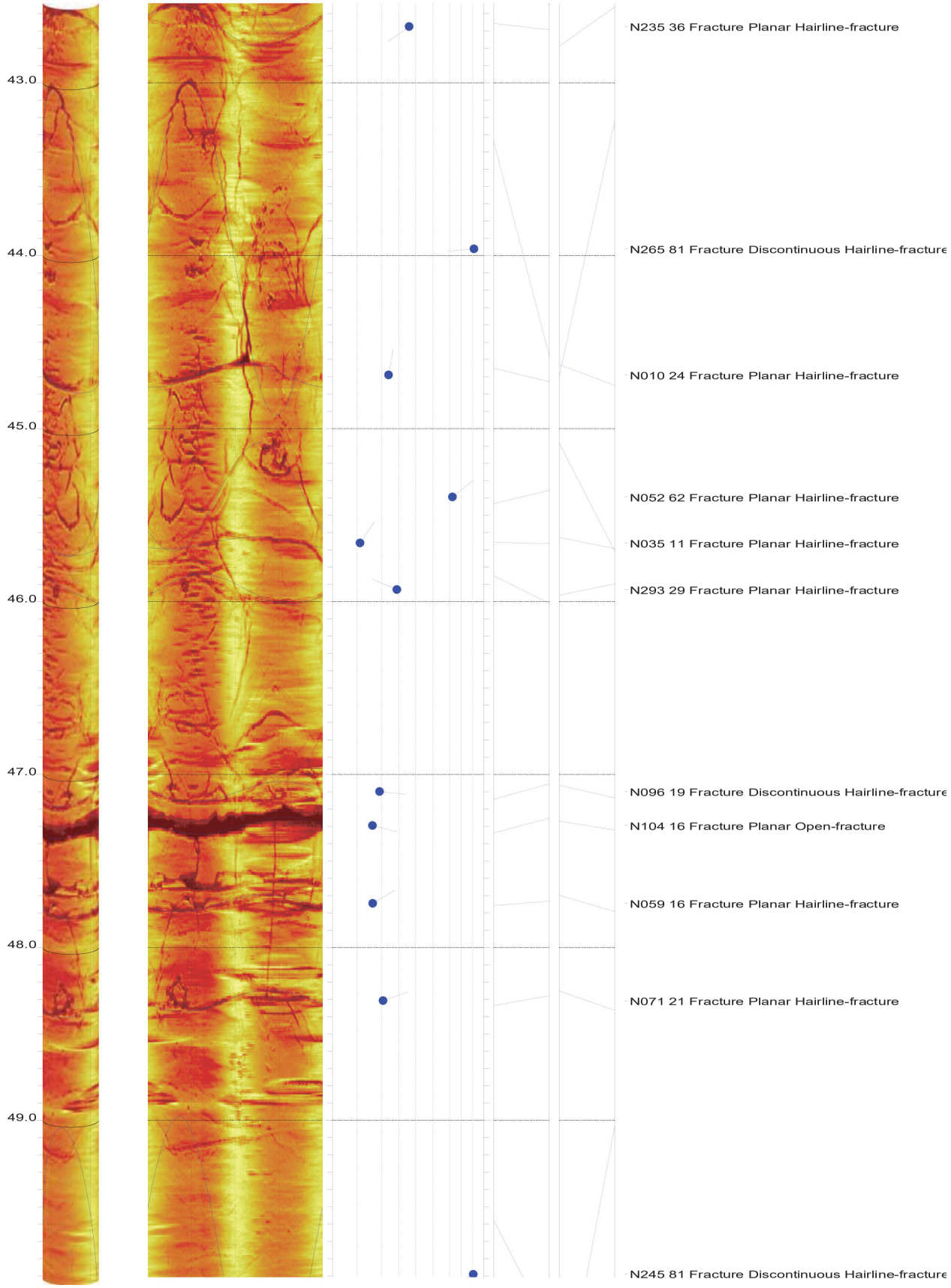
Zone from 198.448 to 23.960ft
Format: BHTV-NESWN

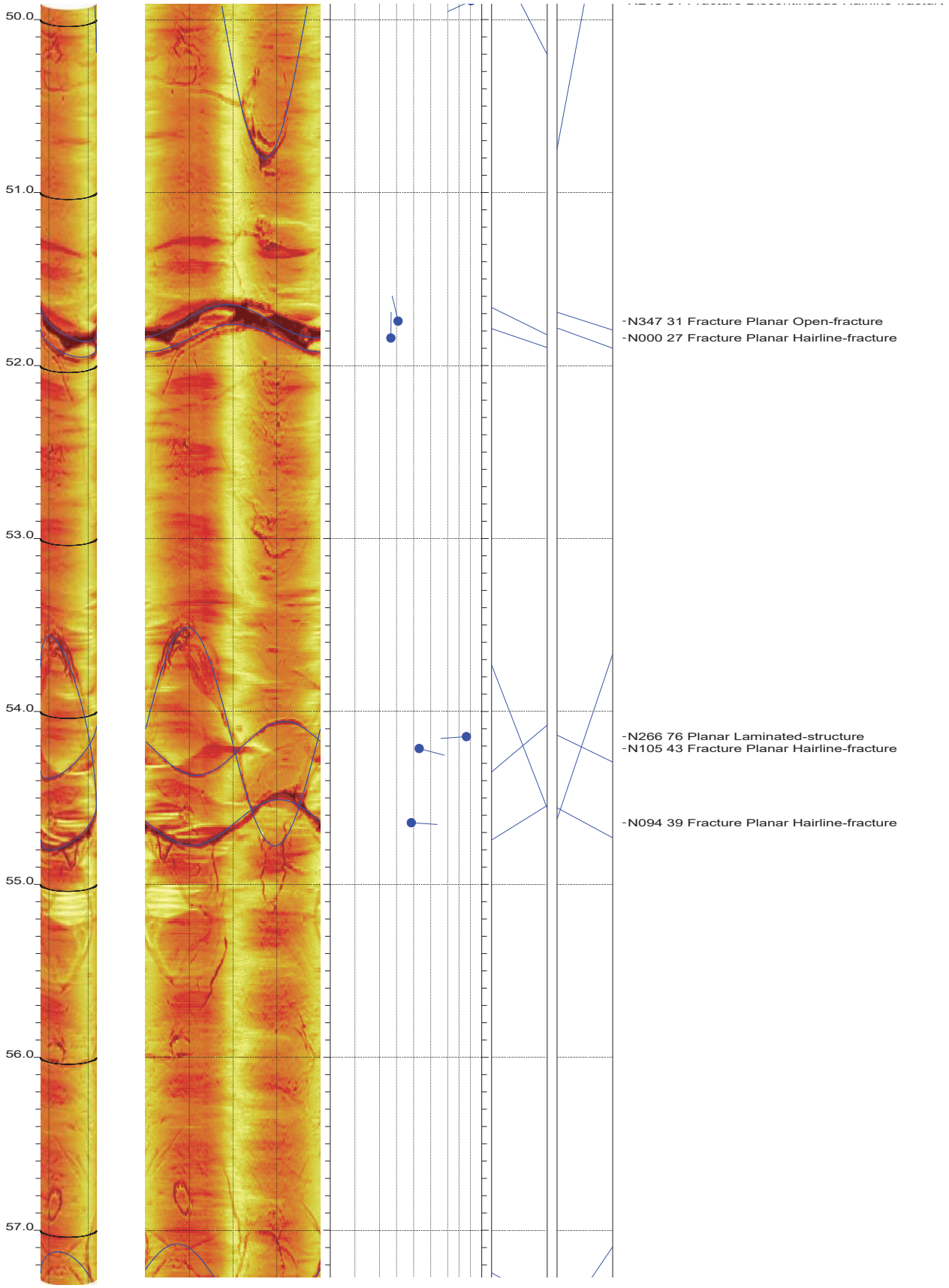
Borehole diam: 3.860inch
Vertical = borehole-axis
Image: Amplitude

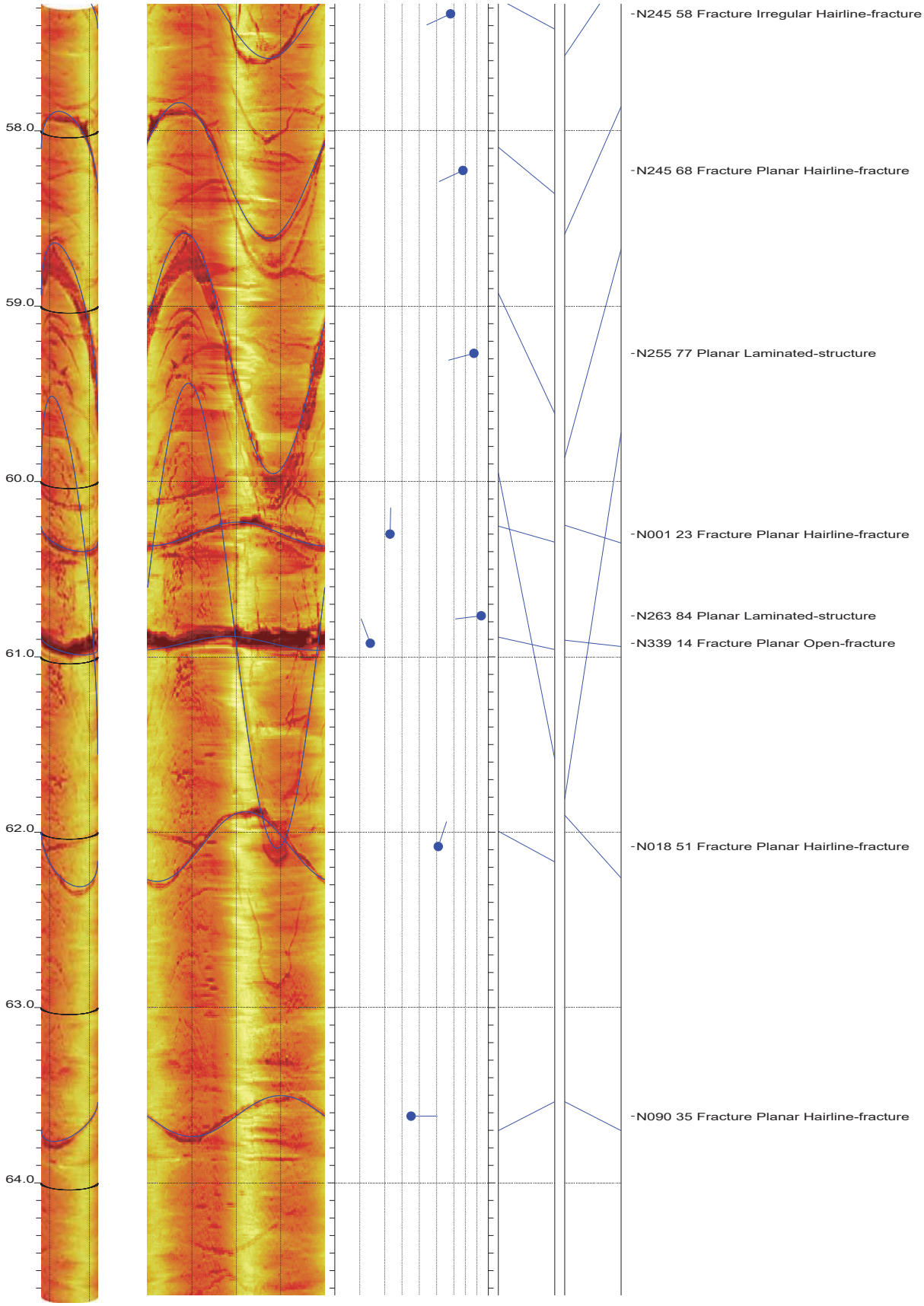


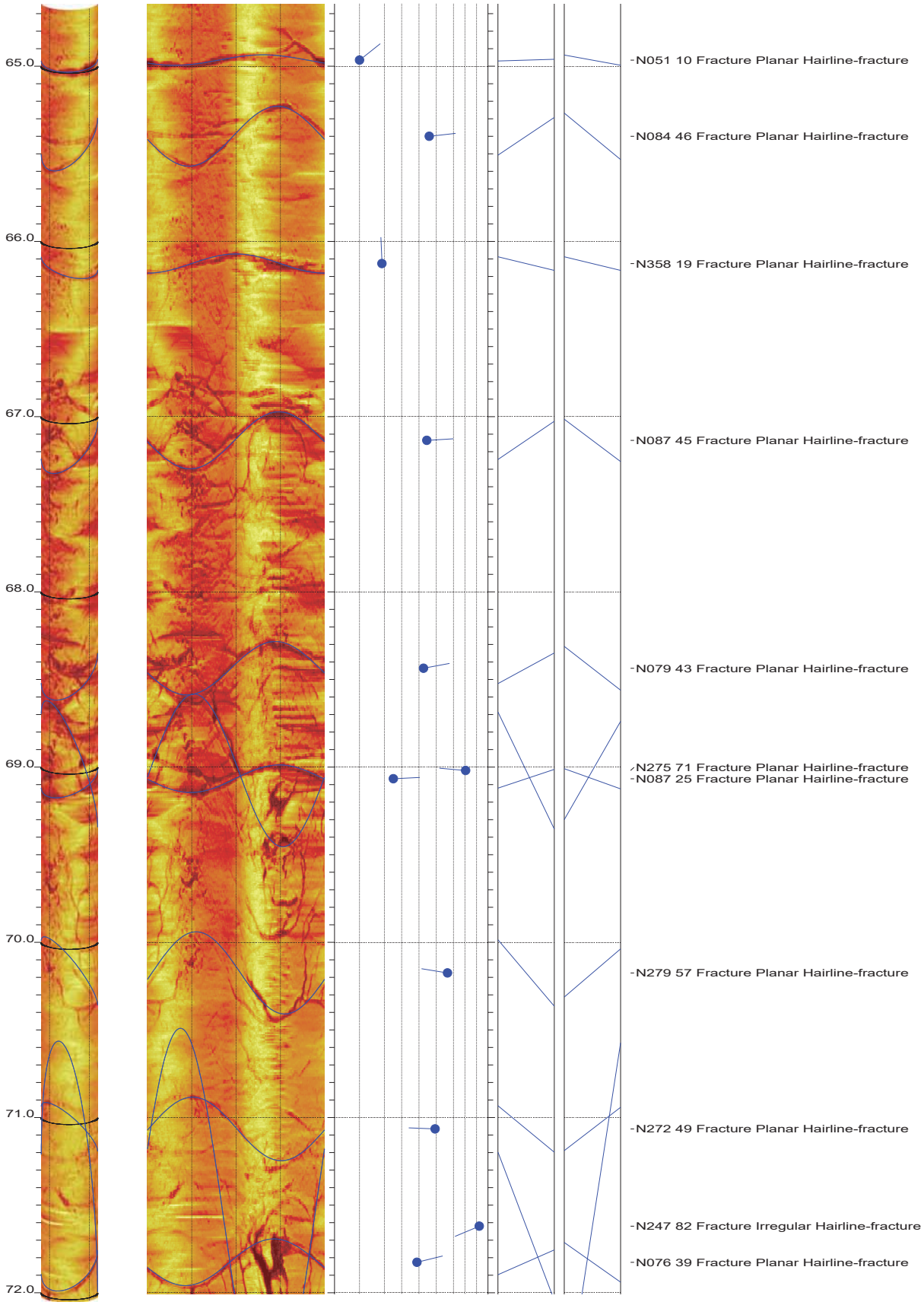

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-N074 49 Fracture Planar Hairline-fracture
-N241 47 Fracture Planar Hairline-fracture
-N010 38 Fracture Planar Hairline-fracture
-N003 39 Fracture Planar Hairline-fracture
-N245 37 Fracture Planar Hairline-fracture
-N247 44 Fracture Planar Hairline-fracture

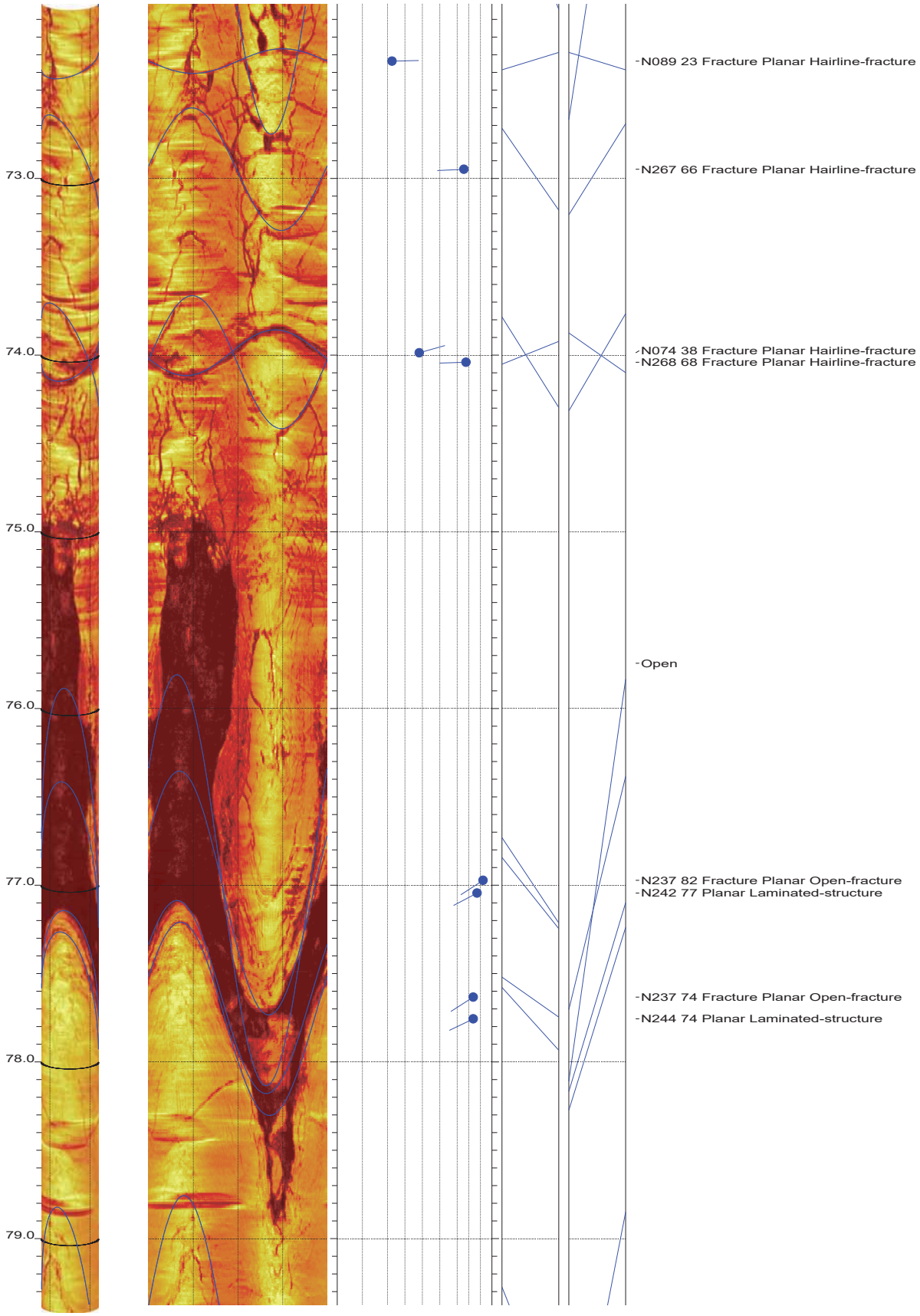

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N275 48 Fracture Planar Hairline-fracture
N272 81 Planar Laminated-structure
N089 26 Fracture Planar Hairline-fracture
N149 53 Fracture Planar Hairline-fracture
N053 54 Fracture Planar Hairline-fracture
N210 29 Fracture Planar Hairline-fracture
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N073 36 Fracture Planar Hairline-fracture
N225 38 Fracture Planar Hairline-fracture

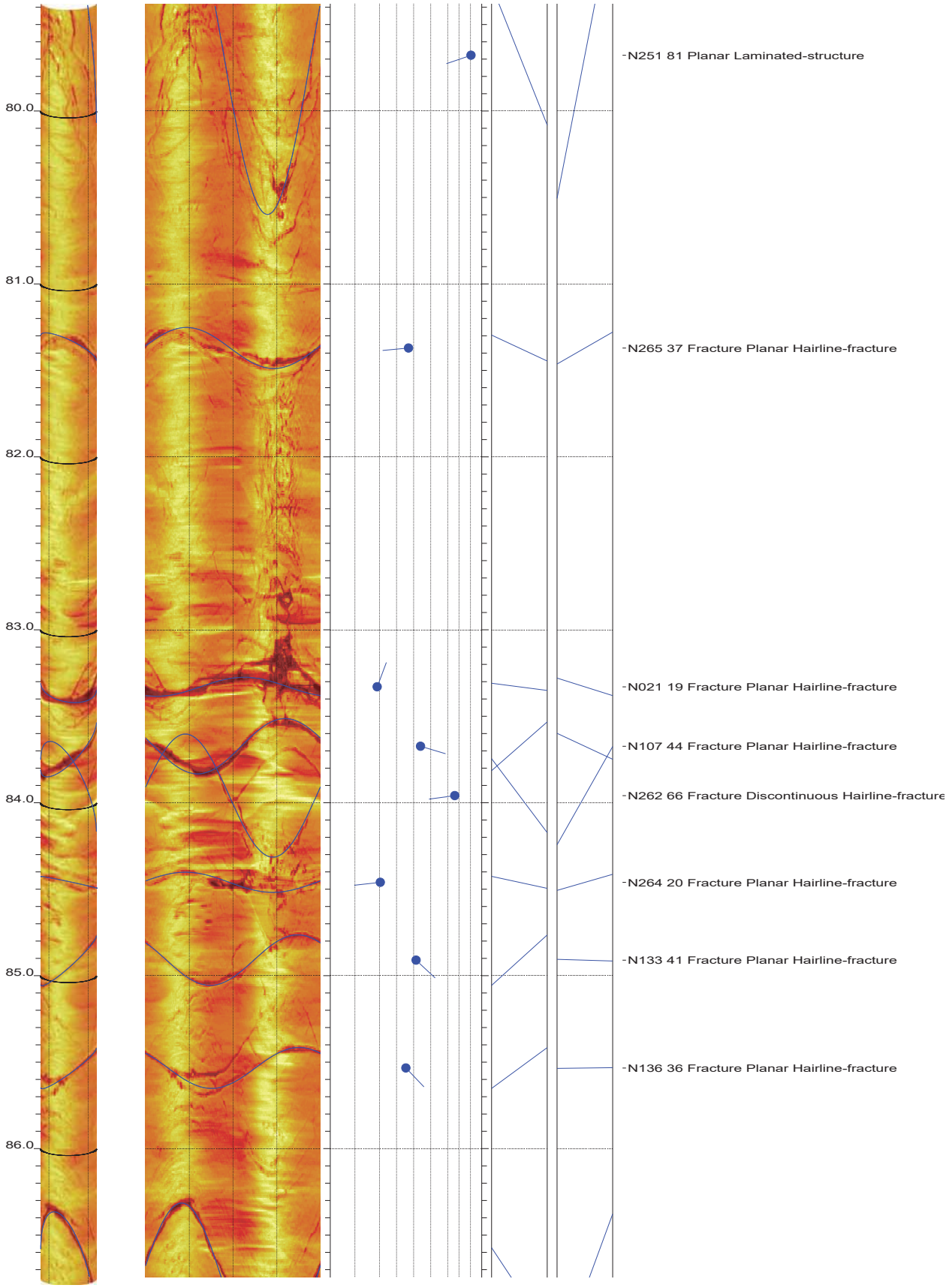

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N010 24 Fracture Planar Hairline-fracture
N052 62 Fracture Planar Hairline-fracture
N035 11 Fracture Planar Hairline-fracture
N293 29 Fracture Planar Hairline-fracture
N096 19 Fracture Discontinuous Hairline-fracture
N104 16 Fracture Planar Open-fracture
N059 16 Fracture Planar Hairline-fracture
N071 21 Fracture Planar Hairline-fracture
N245 81 Fracture Discontinuous Hairline-fracture

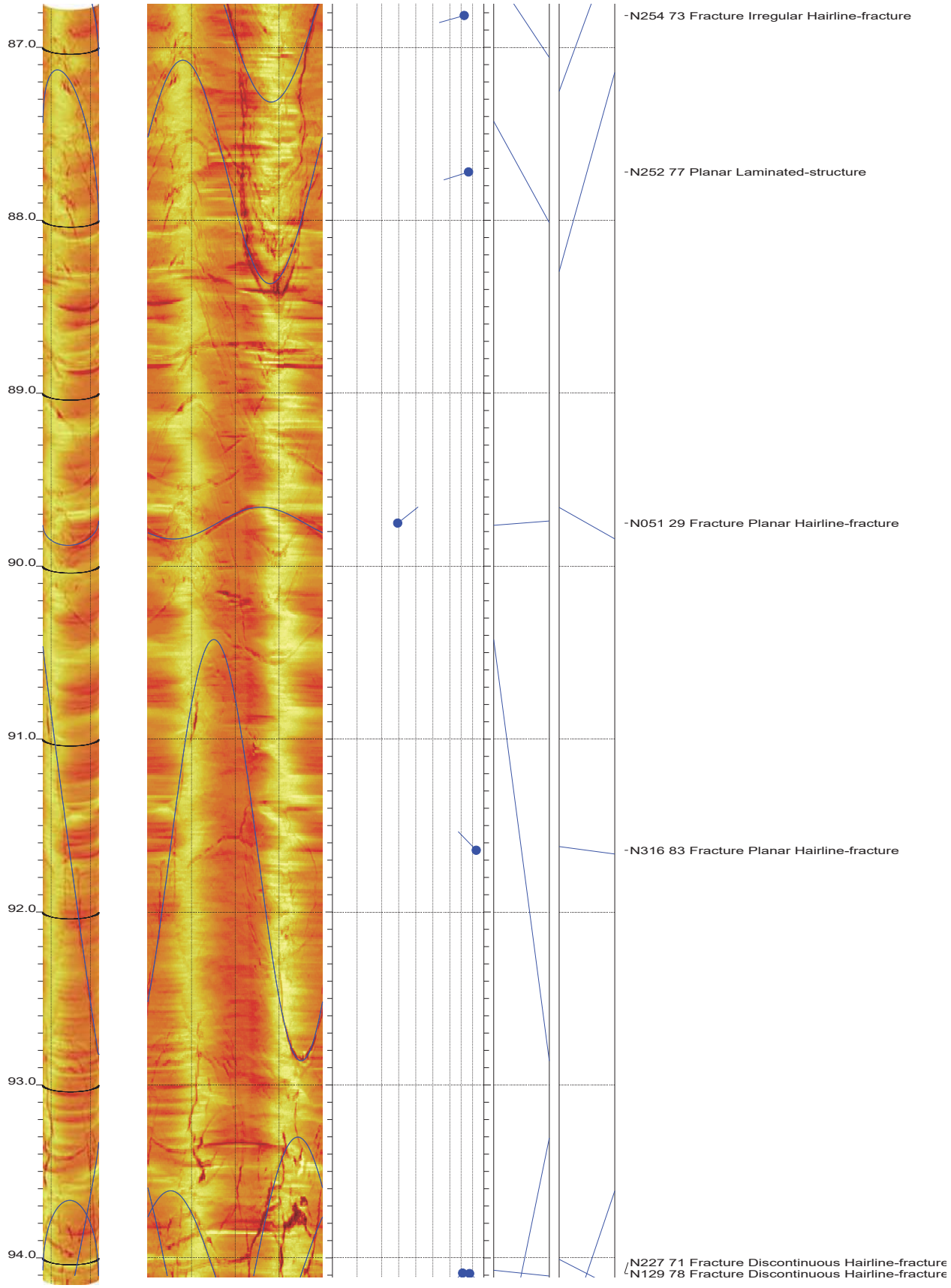

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-N266 76 Planar Laminated-structure
-N105 43 Fracture Planar Hairline-fracture
-N094 39 Fracture Planar Hairline-fracture

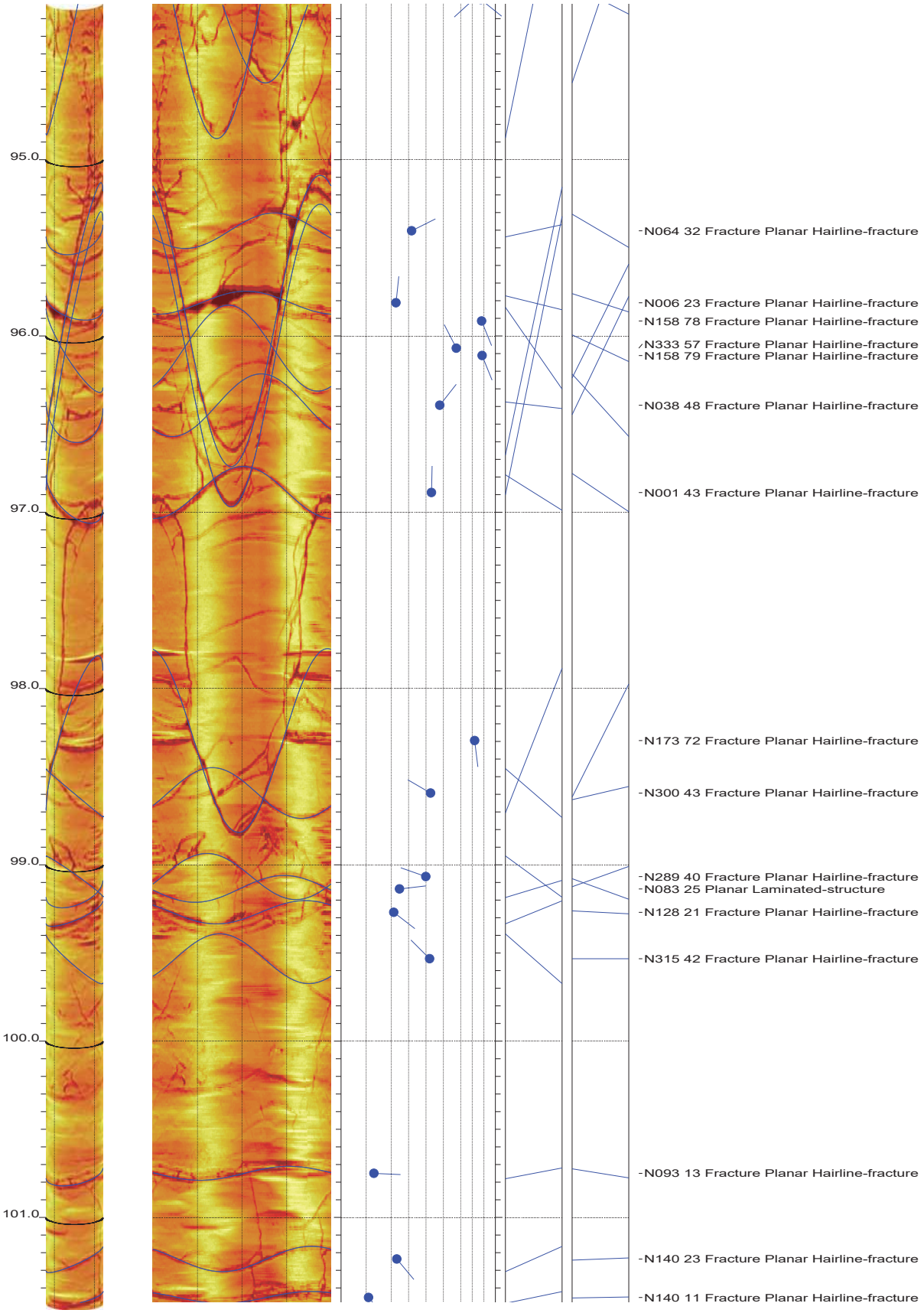

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-N255 77 Planar Laminated-structure
-N001 23 Fracture Planar Hairline-fracture
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-N339 14 Fracture Planar Open-fracture
-N018 51 Fracture Planar Hairline-fracture
-N090 35 Fracture Planar Hairline-fracture

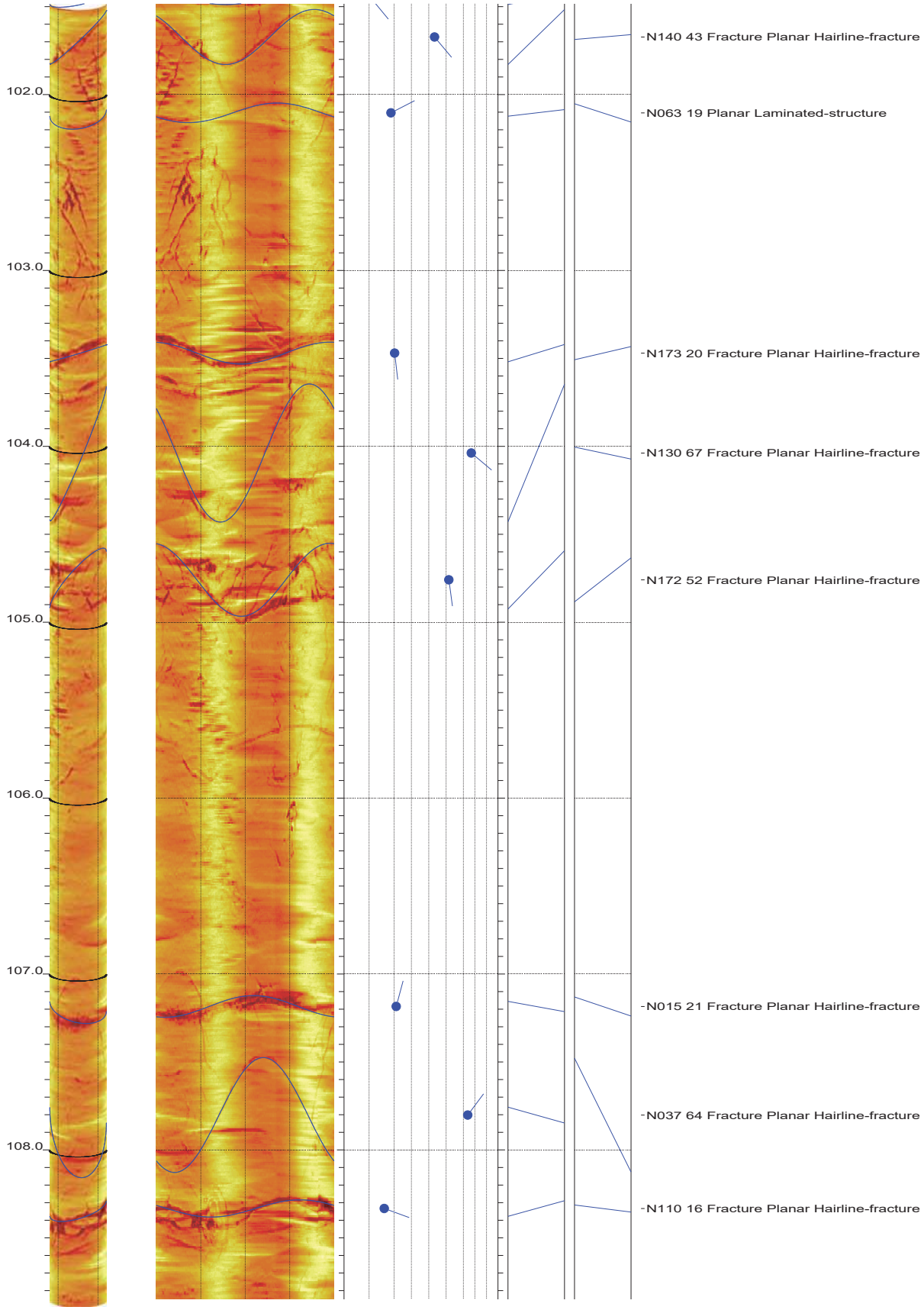

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N358 19 Fracture Planar Hairline-fracture
N087 45 Fracture Planar Hairline-fracture
N079 43 Fracture Planar Hairline-fracture
N275 71 Fracture Planar Hairline-fracture
N087 25 Fracture Planar Hairline-fracture
N279 57 Fracture Planar Hairline-fracture
N272 49 Fracture Planar Hairline-fracture
N247 82 Fracture Irregular Hairline-fracture
N076 39 Fracture Planar Hairline-fracture

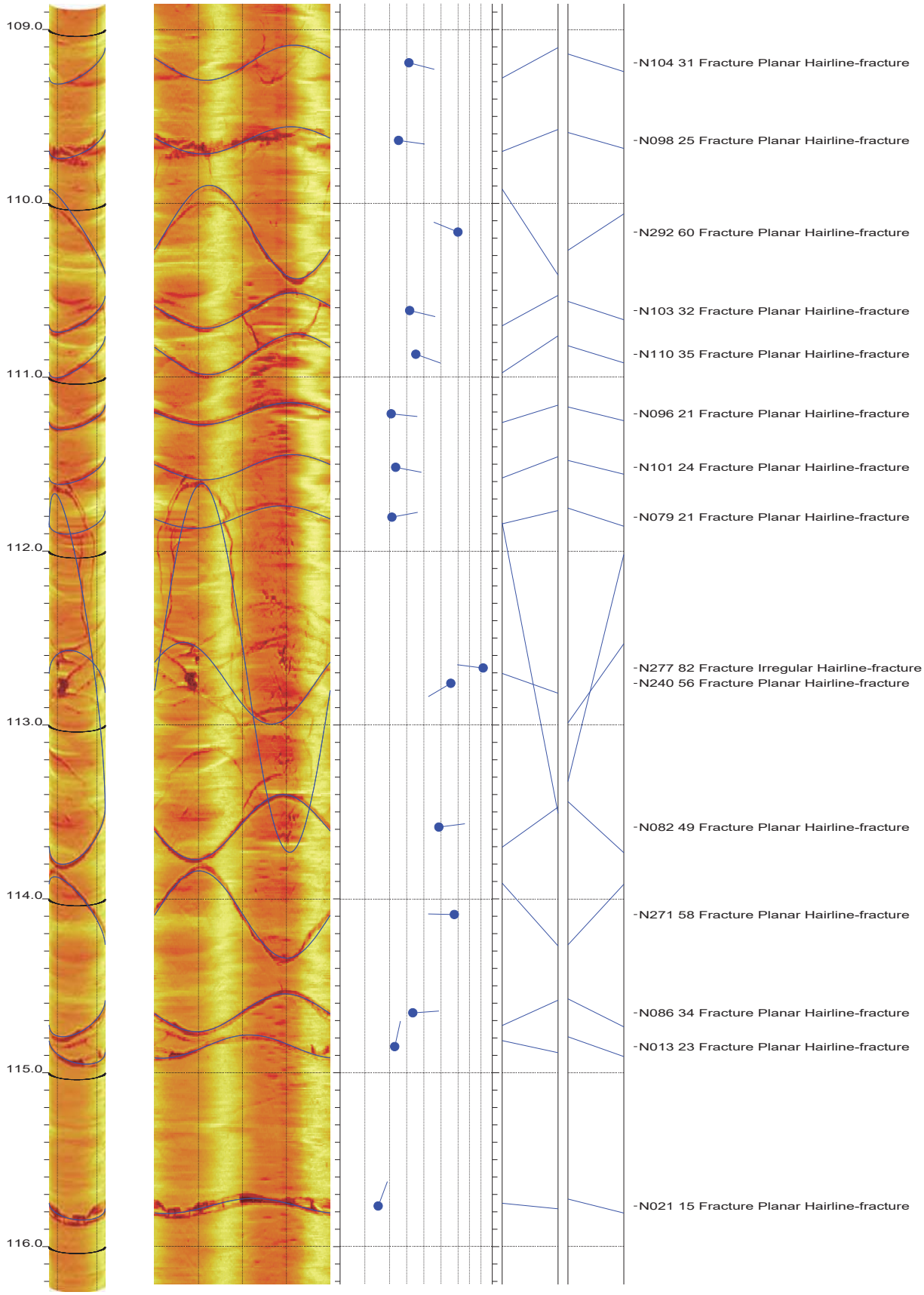

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N267 66 Fracture Planar Hairline-fracture
N074 38 Fracture Planar Hairline-fracture
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N244 74 Planar Laminated-structure

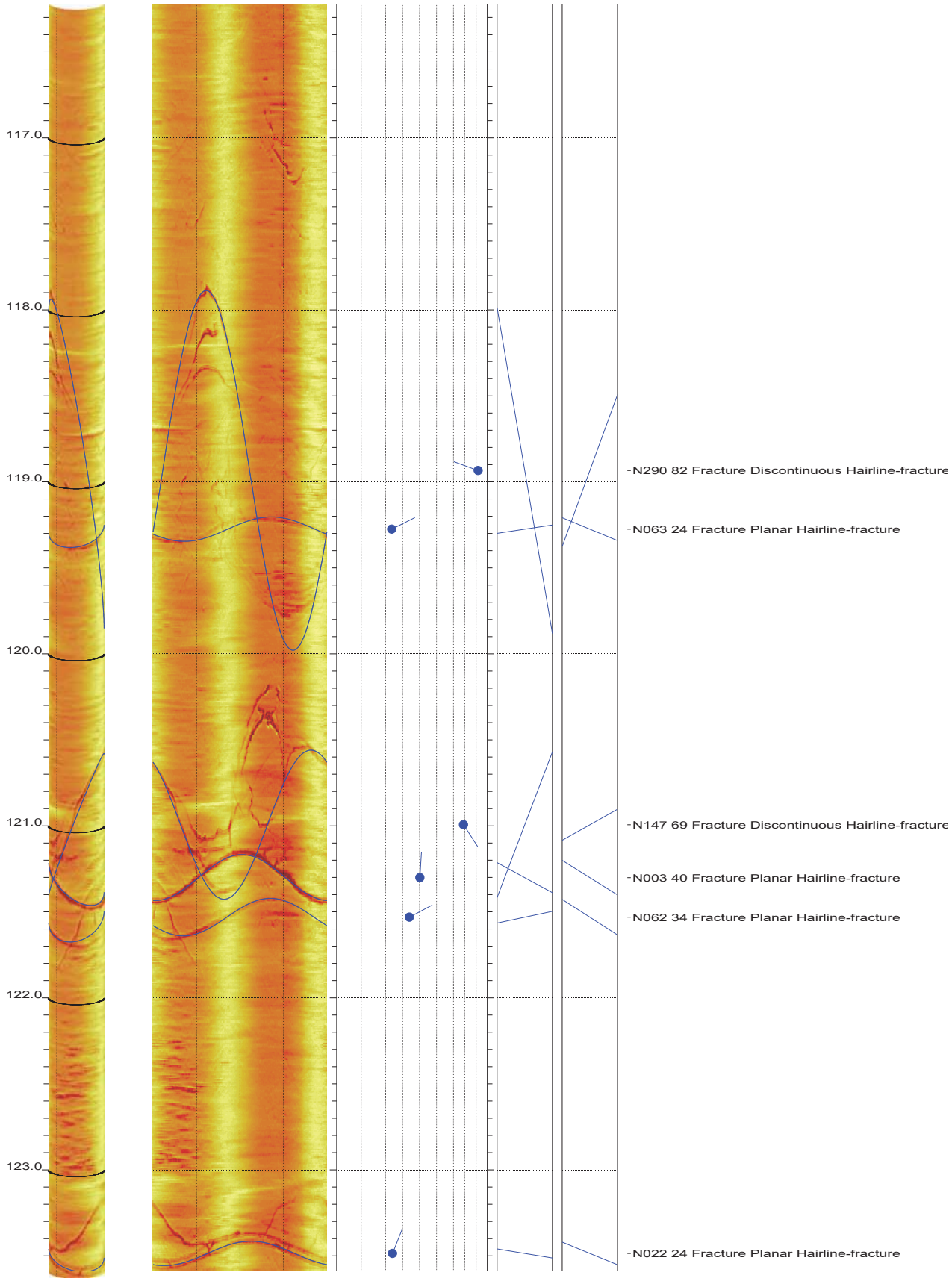

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-N021 19 Fracture Planar Hairline-fracture
-N107 44 Fracture Planar Hairline-fracture
-N262 66 Fracture Discontinuous Hairline-fracture
-N264 20 Fracture Planar Hairline-fracture
-N133 41 Fracture Planar Hairline-fracture
-N136 36 Fracture Planar Hairline-fracture

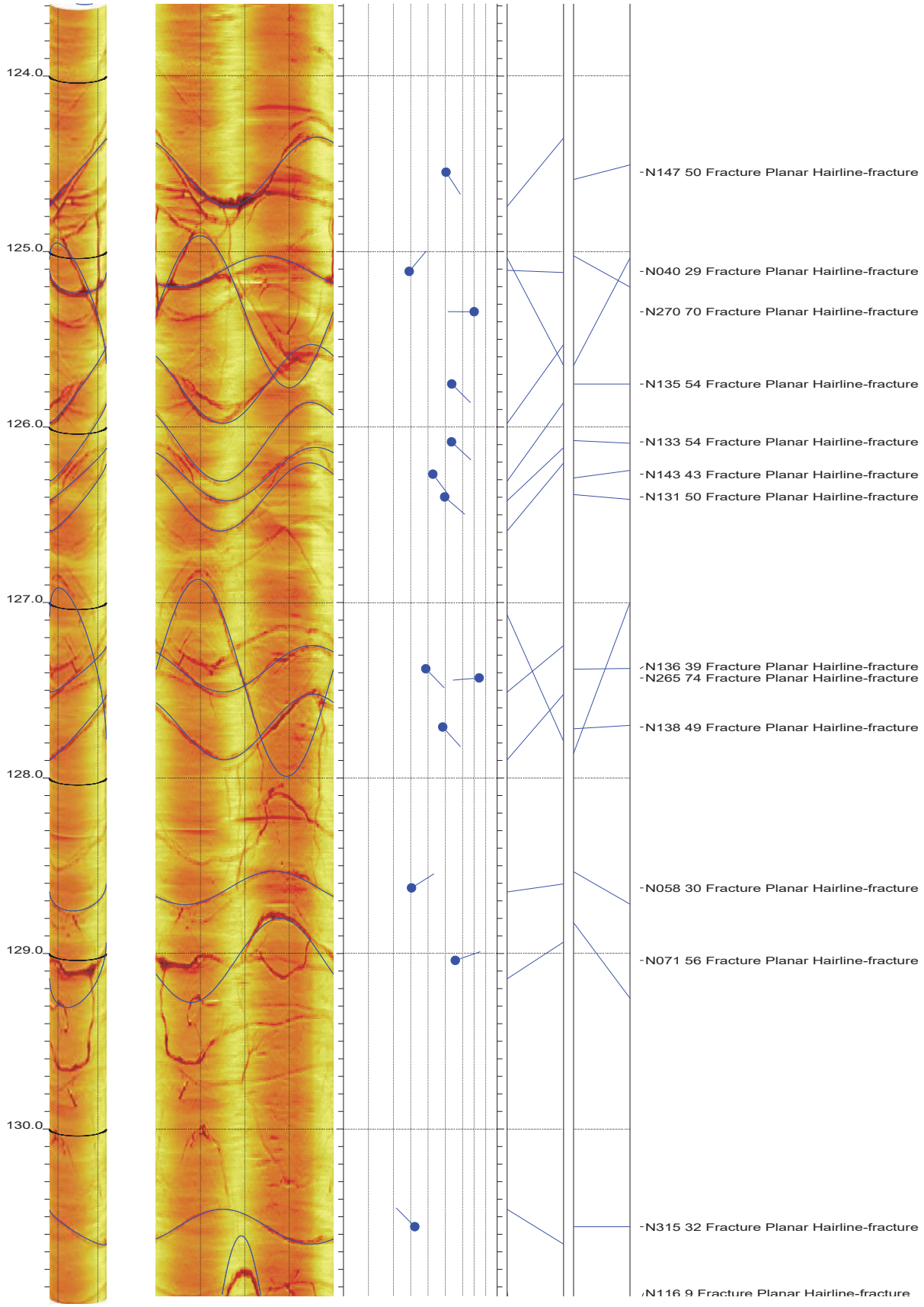

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N252 77 Planar Laminated-structure
N051 29 Fracture Planar Hairline-fracture
N316 83 Fracture Planar Hairline-fracture
N227 71 Fracture Discontinuous Hairline-fracture
N129 78 Fracture Discontinuous Hairline-fracture

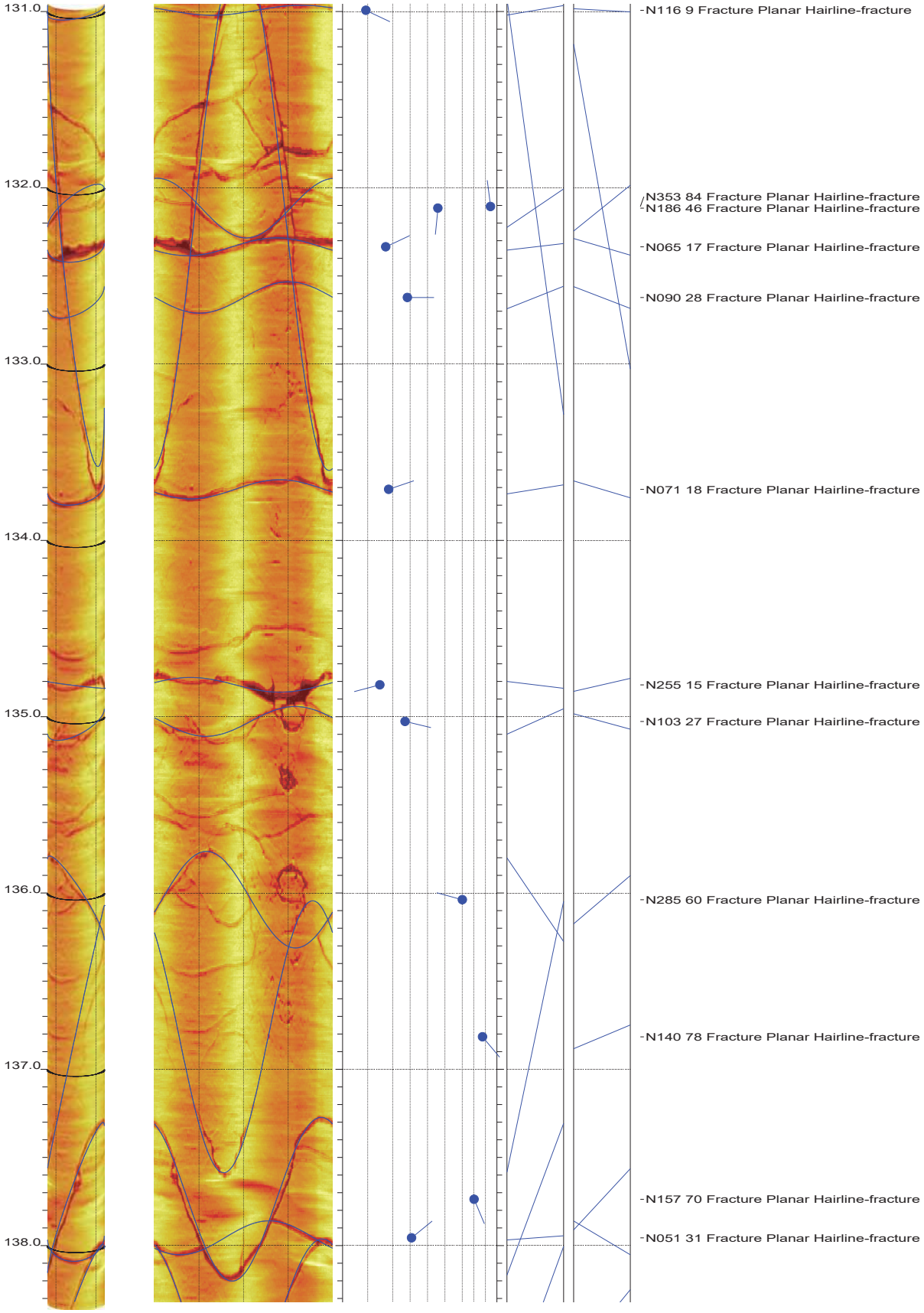

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N158 78 Fracture Planar Hairline-fracture
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N158 79 Fracture Planar Hairline-fracture
N038 48 Fracture Planar Hairline-fracture
N001 43 Fracture Planar Hairline-fracture
N173 72 Fracture Planar Hairline-fracture
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N289 40 Fracture Planar Hairline-fracture
N083 25 Planar Laminated-structure
N128 21 Fracture Planar Hairline-fracture
N315 42 Fracture Planar Hairline-fracture
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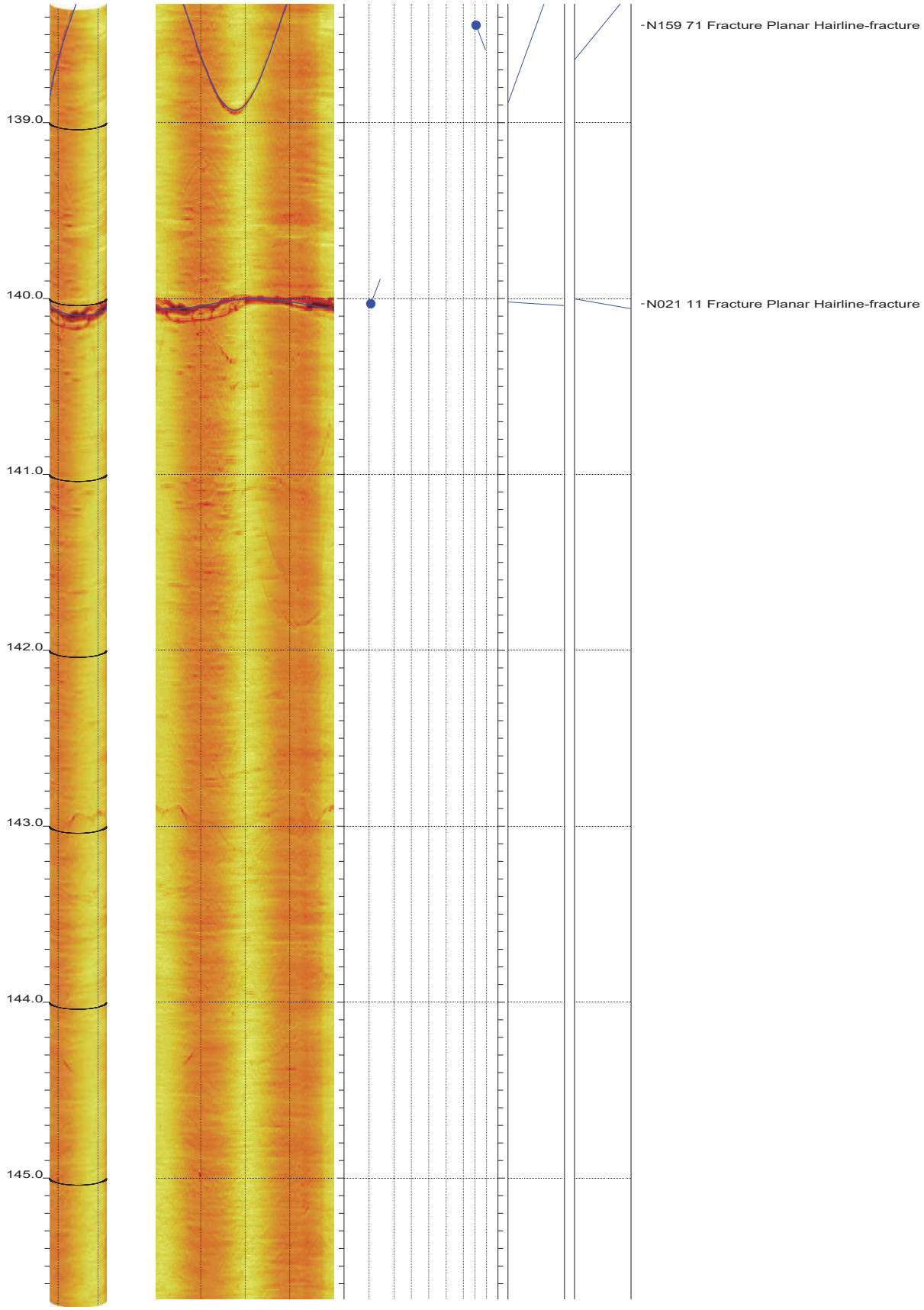

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-N063 19 Planar Laminated-structure
-N173 20 Fracture Planar Hairline-fracture
-N130 67 Fracture Planar Hairline-fracture
-N172 52 Fracture Planar Hairline-fracture
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-N037 64 Fracture Planar Hairline-fracture
-N110 16 Fracture Planar Hairline-fracture

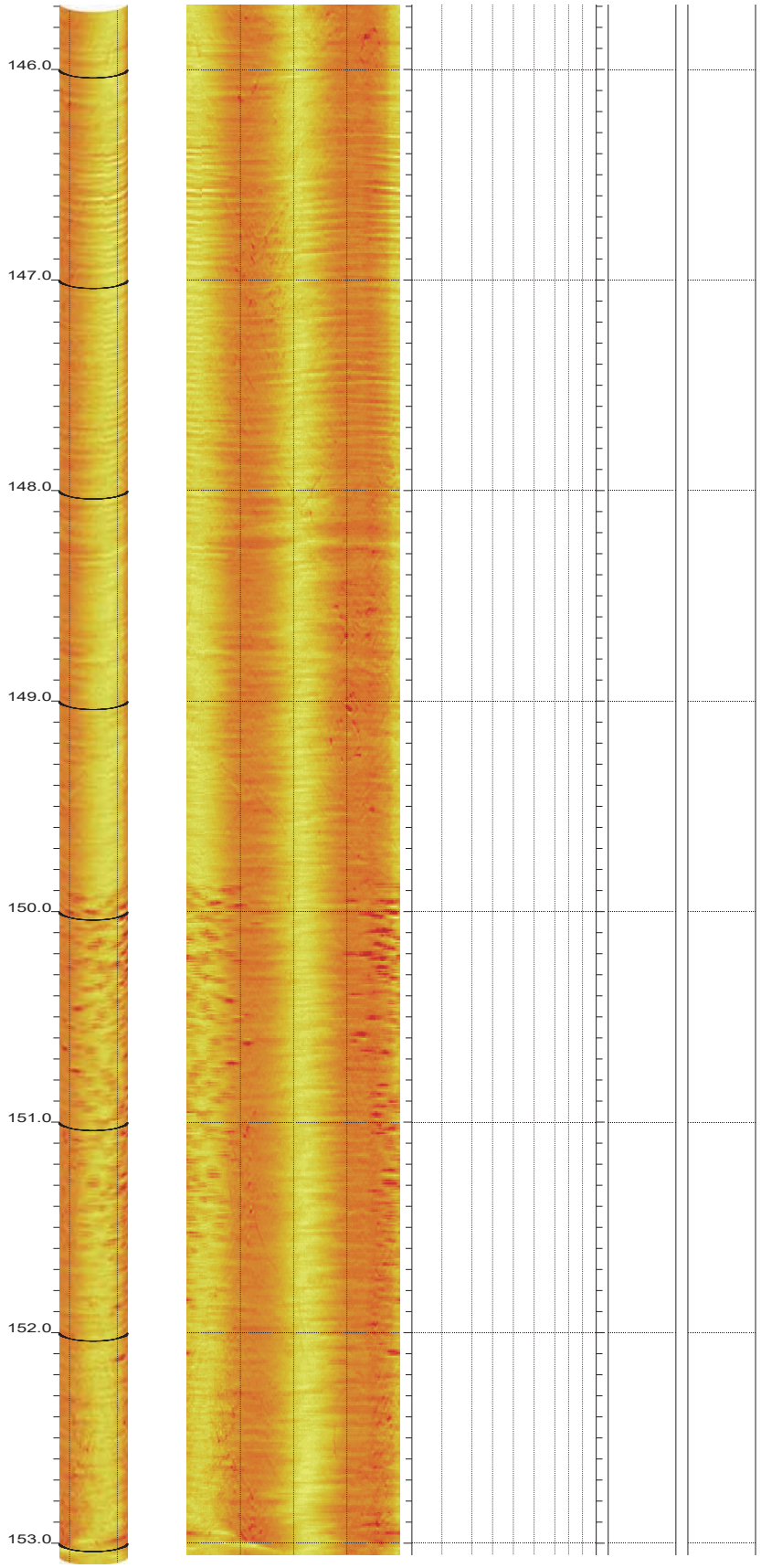

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-N103 32 Fracture Planar Hairline-fracture
-N110 35 Fracture Planar Hairline-fracture
-N096 21 Fracture Planar Hairline-fracture
-N101 24 Fracture Planar Hairline-fracture
-N079 21 Fracture Planar Hairline-fracture
-N277 82 Fracture Irregular Hairline-fracture
-N240 56 Fracture Planar Hairline-fracture
-N082 49 Fracture Planar Hairline-fracture
-N271 58 Fracture Planar Hairline-fracture
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-N021 15 Fracture Planar Hairline-fracture

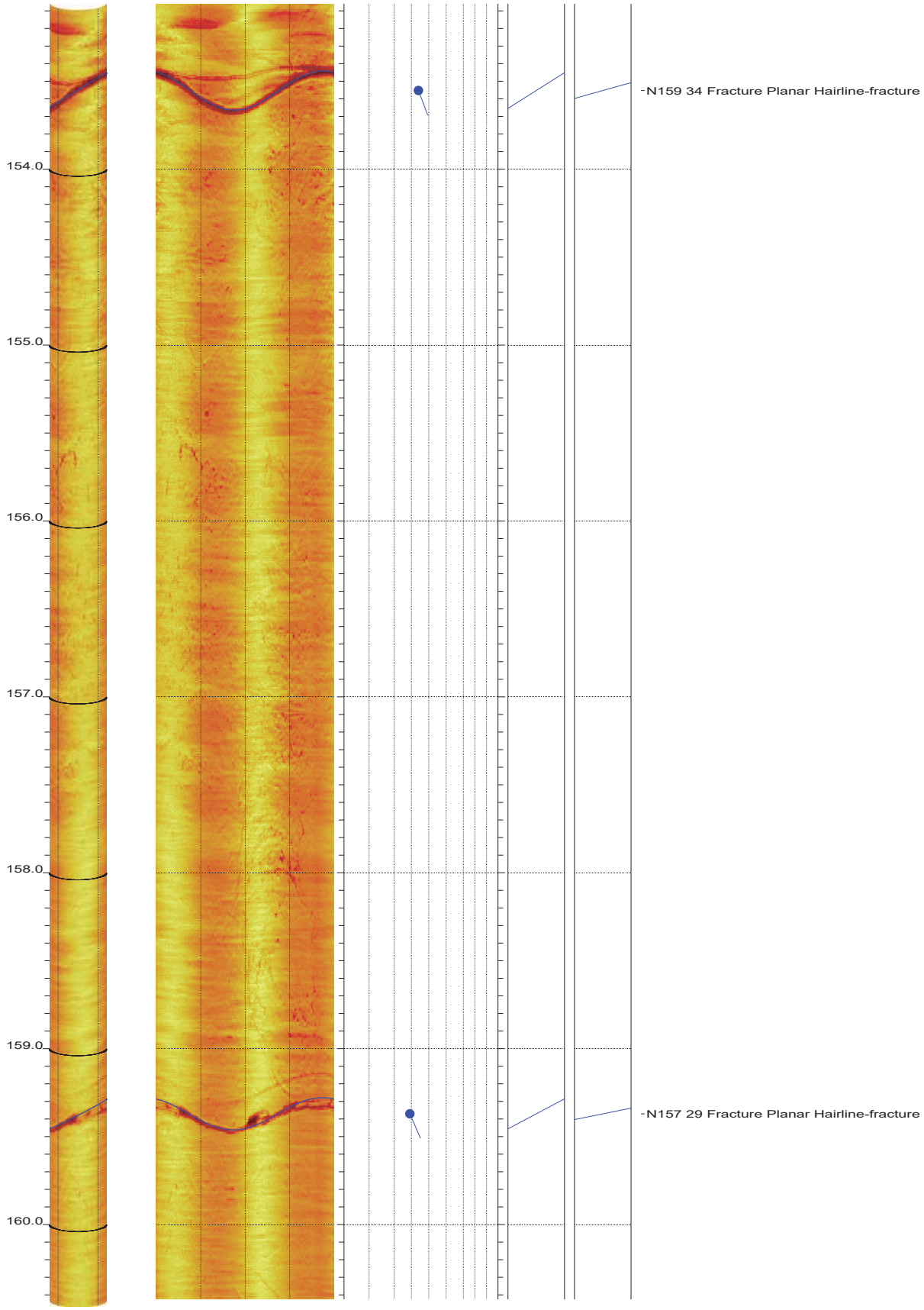

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N147 69 Fracture Discontinuous Hairline-fracture
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N022 24 Fracture Planar Hairline-fracture

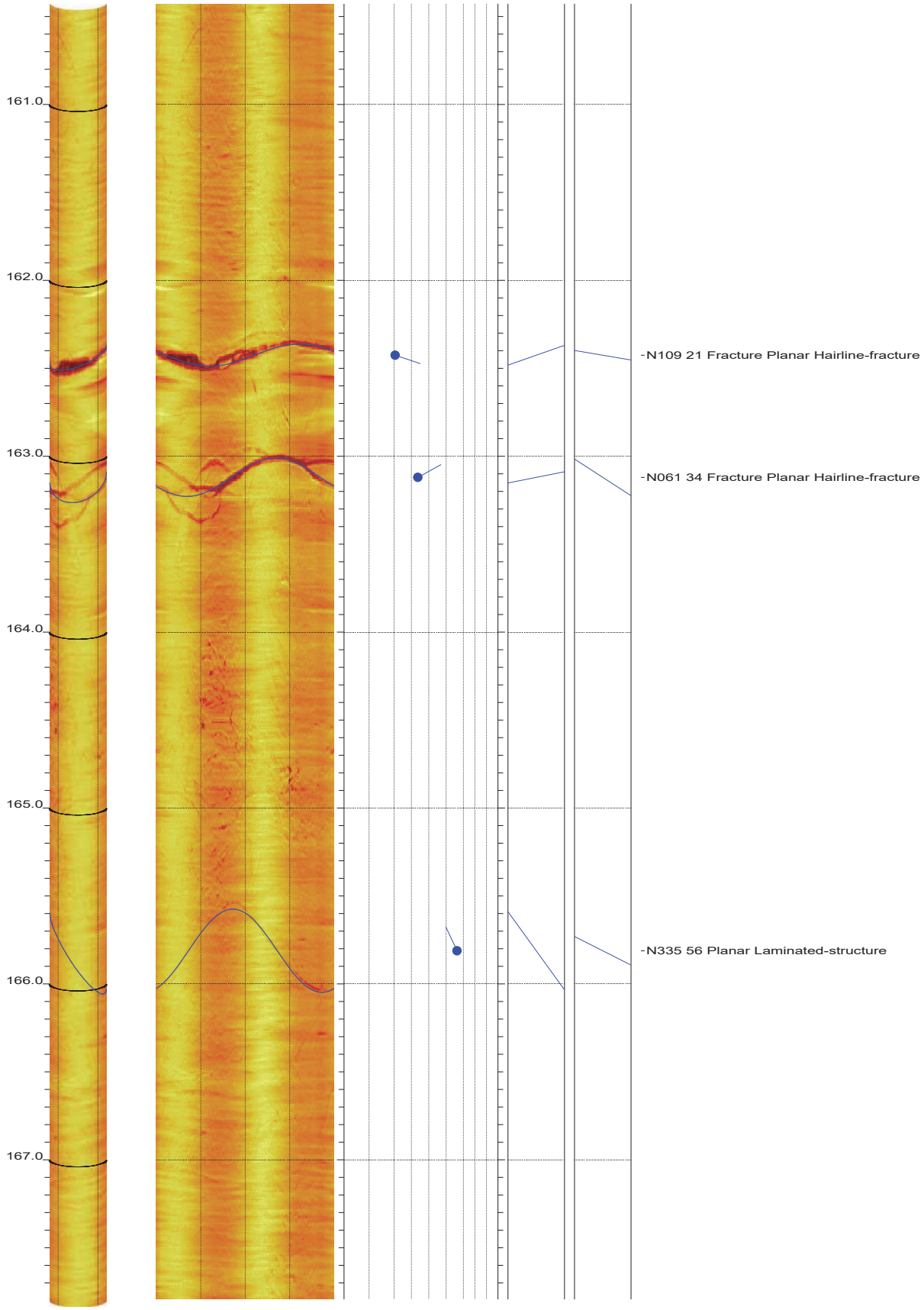

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N270 70 Fracture Planar Hairline-fracture
N135 54 Fracture Planar Hairline-fracture
N133 54 Fracture Planar Hairline-fracture
N143 43 Fracture Planar Hairline-fracture
N131 50 Fracture Planar Hairline-fracture
N136 39 Fracture Planar Hairline-fracture
N265 74 Fracture Planar Hairline-fracture
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N116 9 Fracture Planar Hairline-fracture

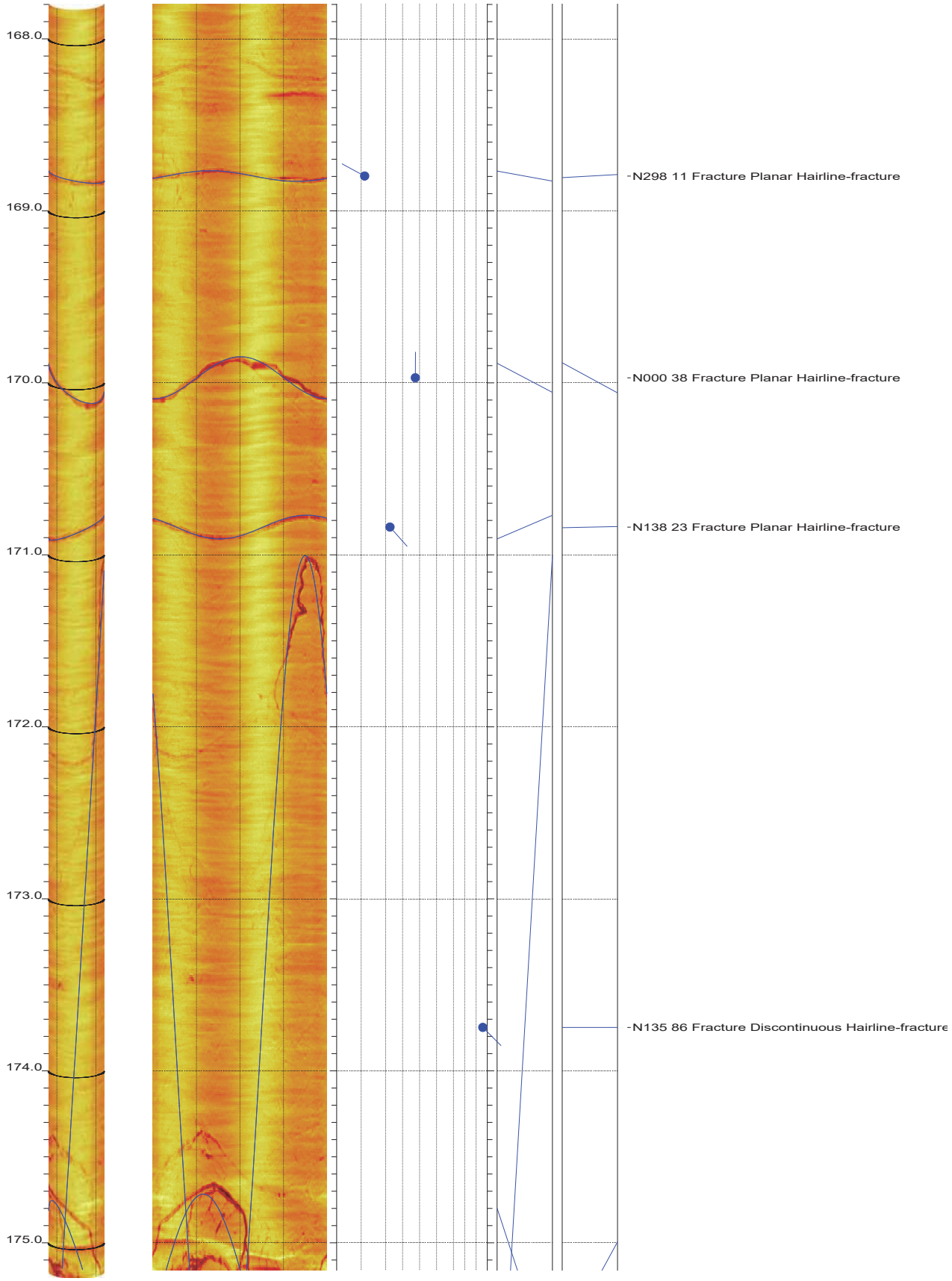

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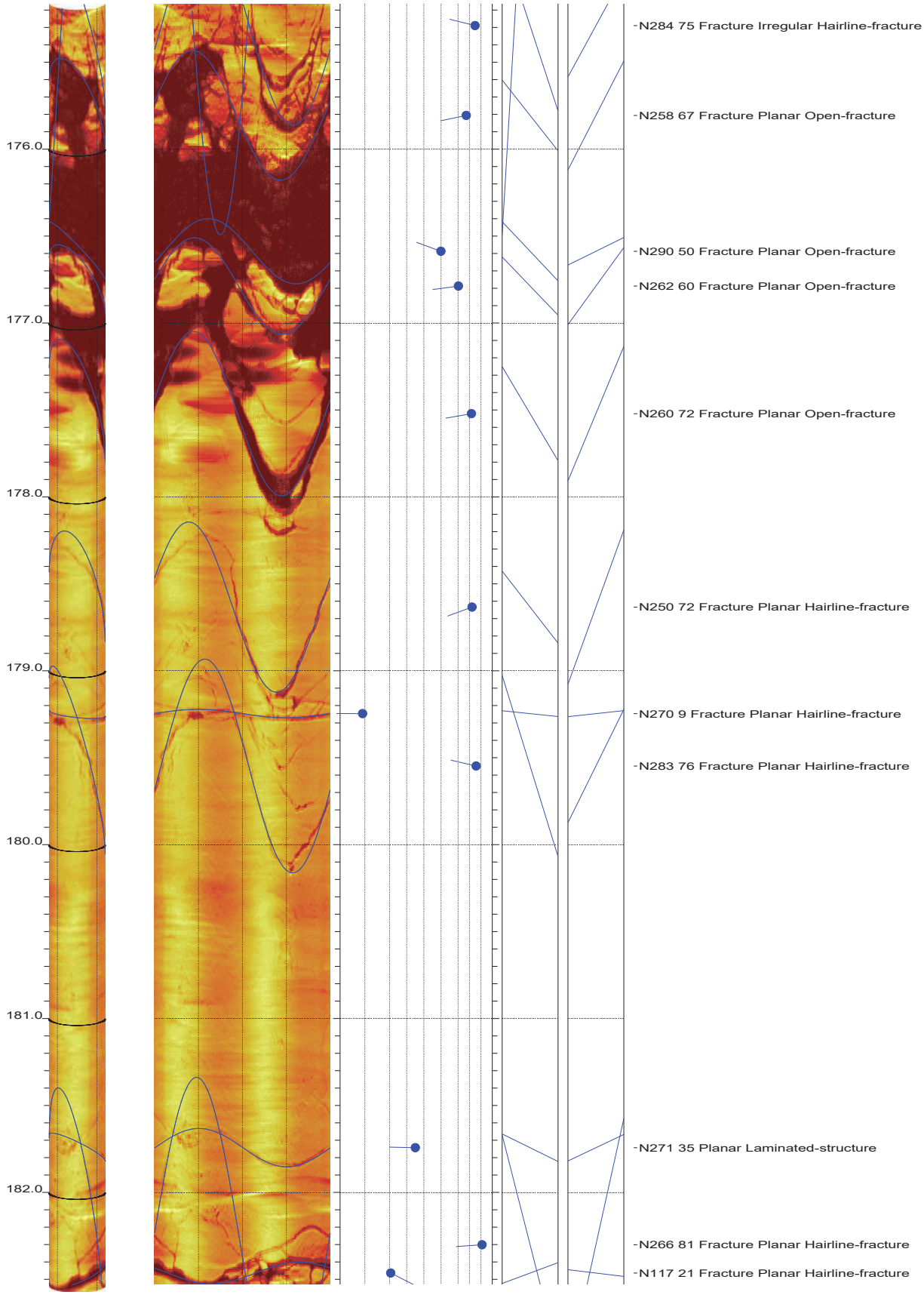

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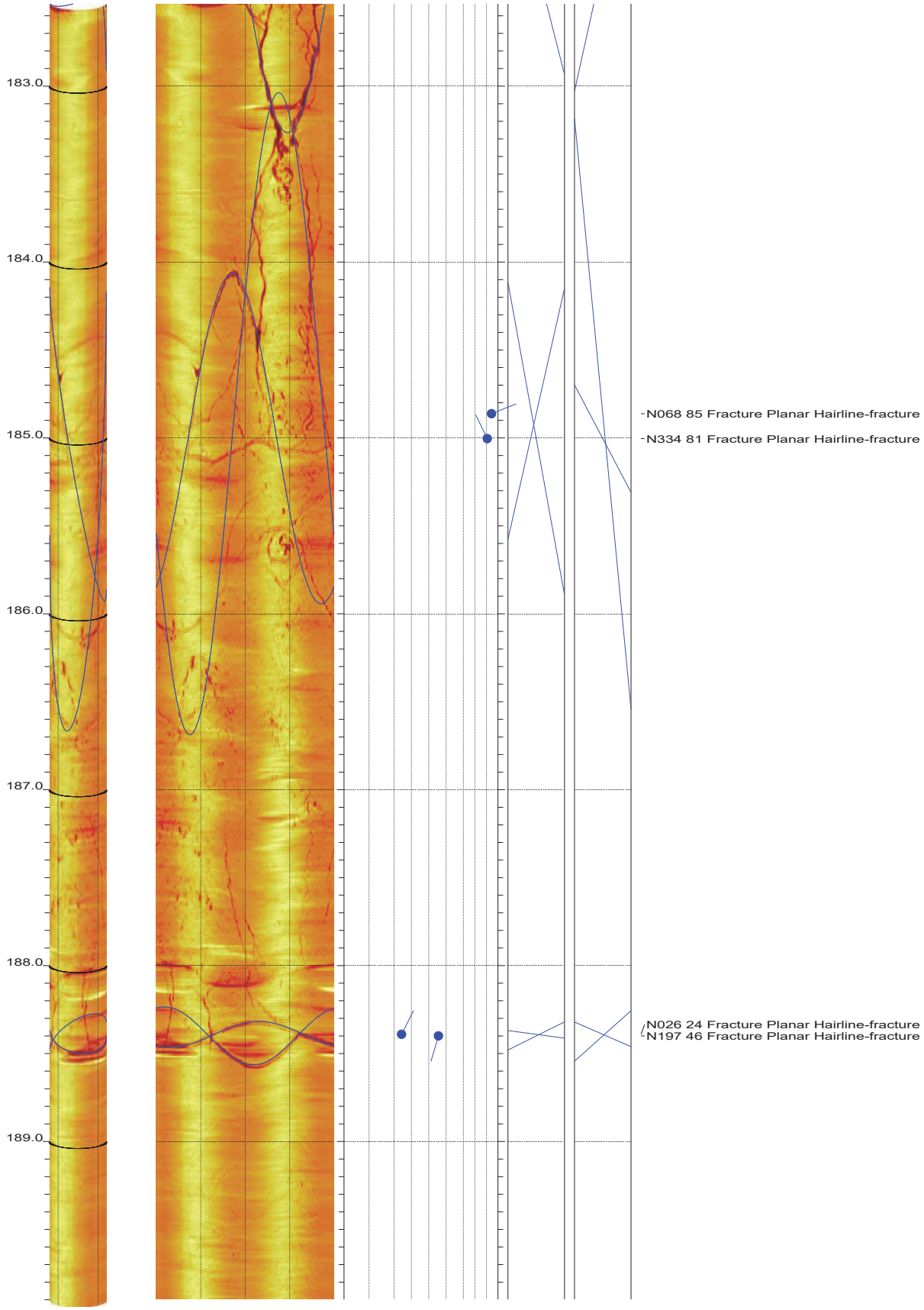

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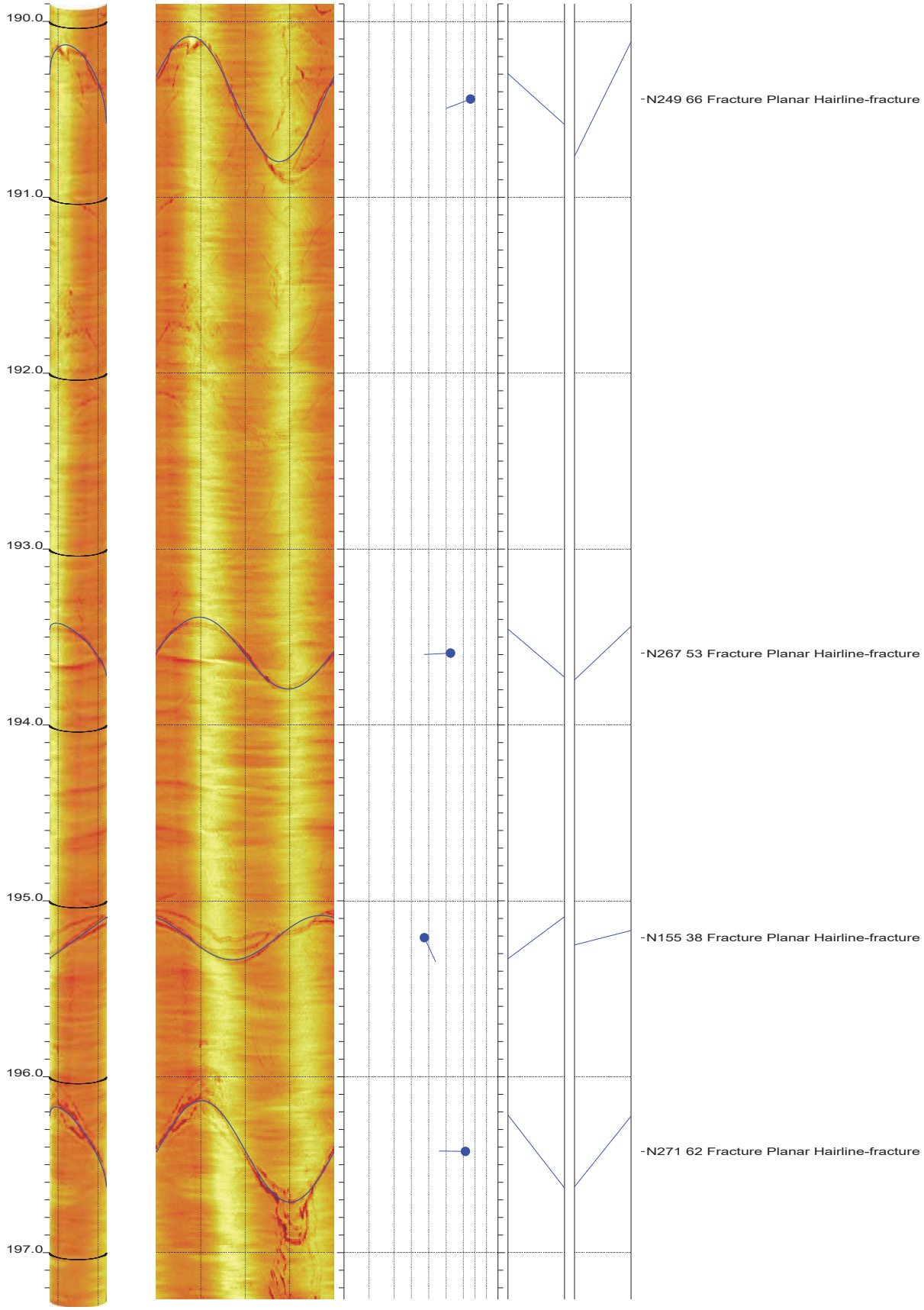

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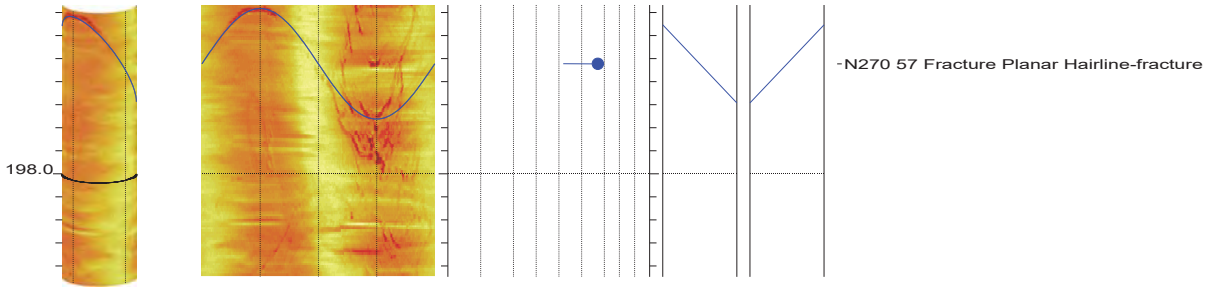

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N138 23 Fracture Planar Hairline-fracture
N135 86 Fracture Discontinuous Hairline-fracture


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-N262 60 Fracture Planar Open-fracture
-N260 72 Fracture Planar Open-fracture
-N250 72 Fracture Planar Hairline-fracture
-N270 9 Fracture Planar Hairline-fracture
-N283 76 Fracture Planar Hairline-fracture
-N271 35 Planar Laminated-structure
-N266 81 Fracture Planar Hairline-fracture
-N117 21 Fracture Planar Hairline-fracture


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N026 24 Fracture Planar Hairline-fracture
N197 46 Fracture Planar Hairline-fracture


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198.0
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BHTV DATA PROCESSING
RGLDIP vsn 6.2
INTERPRETED BHTV DIPS LOG

AECOM

Borehole: B-103

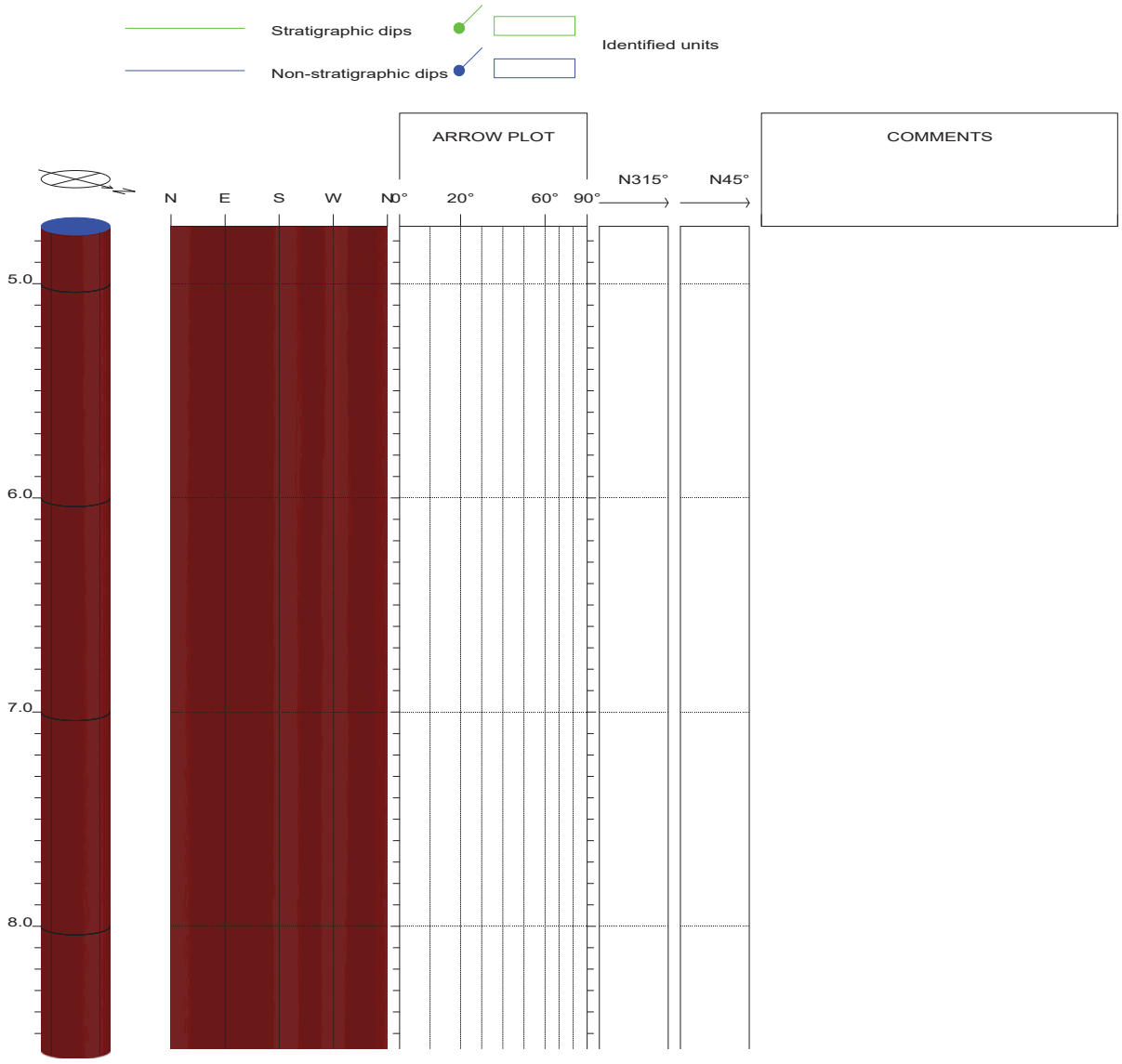
VAIL DAM

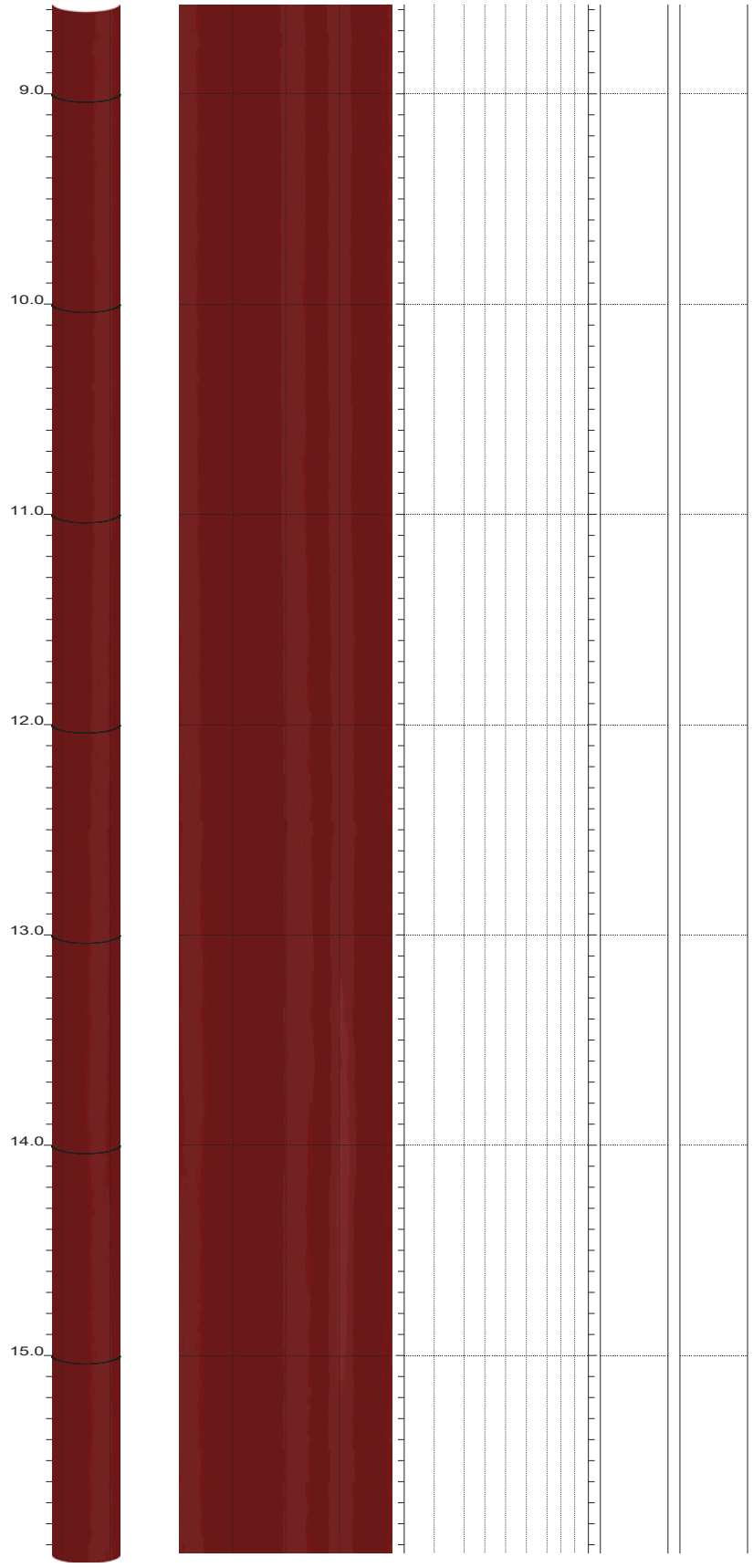
top of borehole.....
East: _
North:_
Elev: _

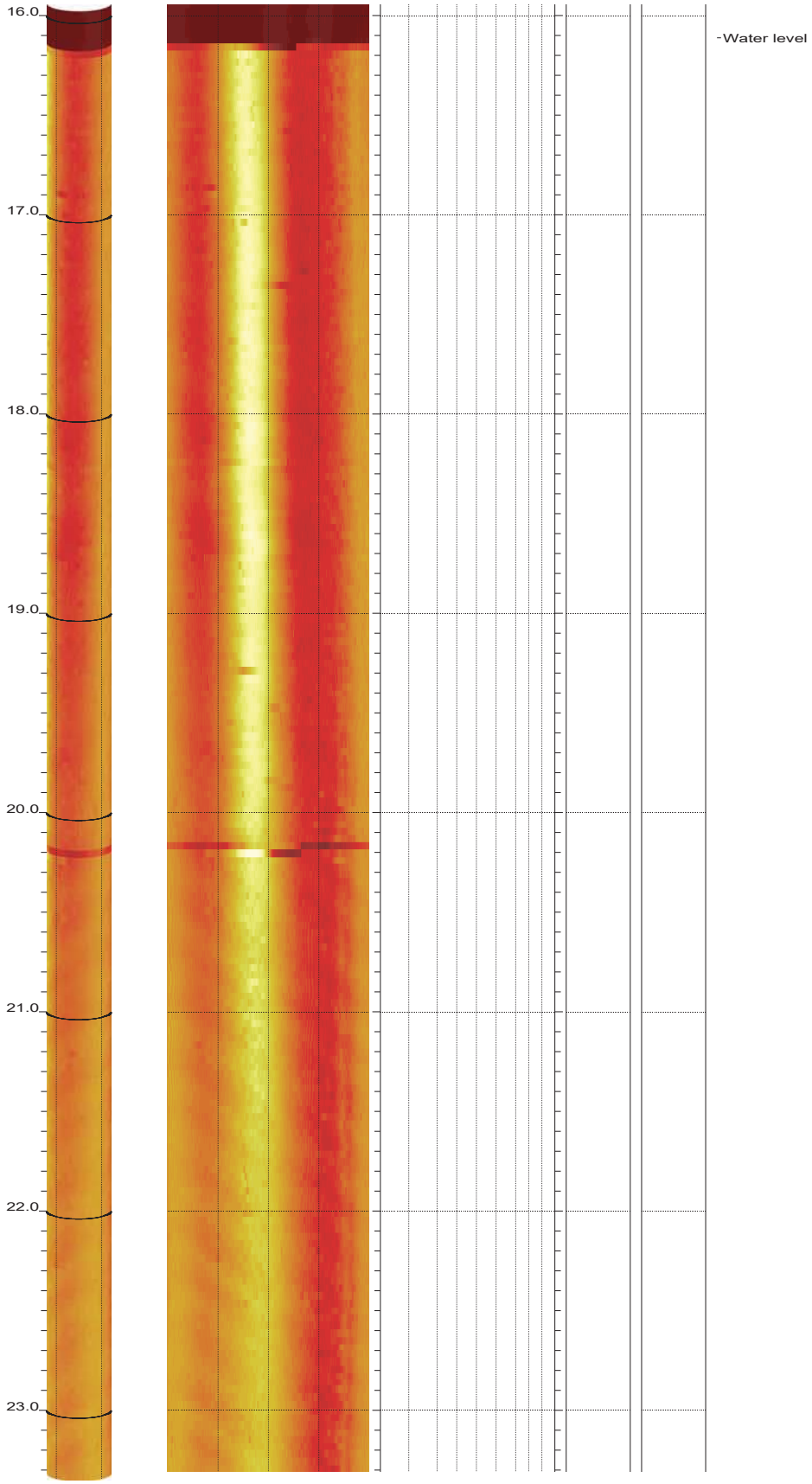
North ref. is true
Depth units are feet
Vertical scale: 1/10
Horiz scale = 1.00x Vert scale

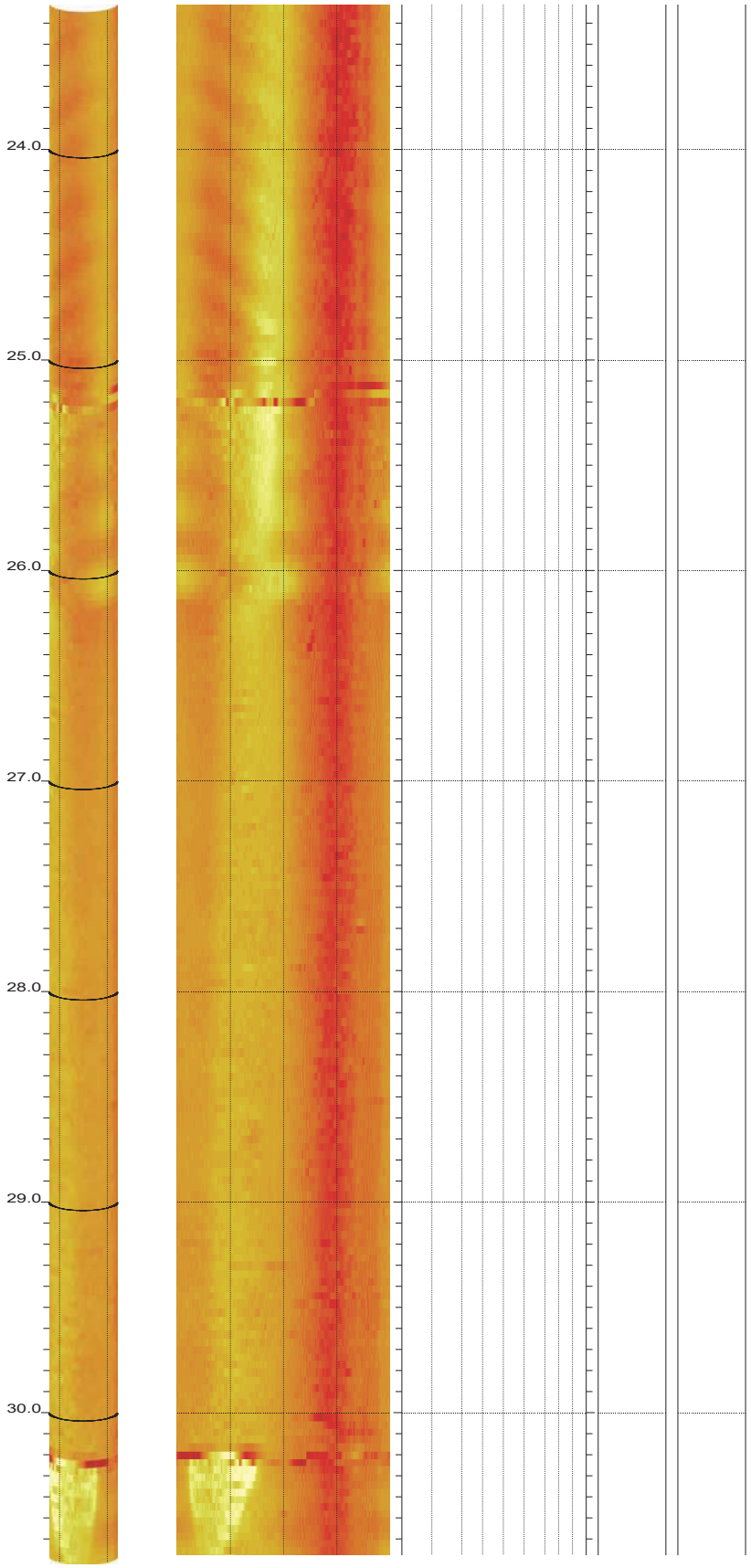
Zone from 200.000 to 4.732ft
Format: BHTV-NESWN

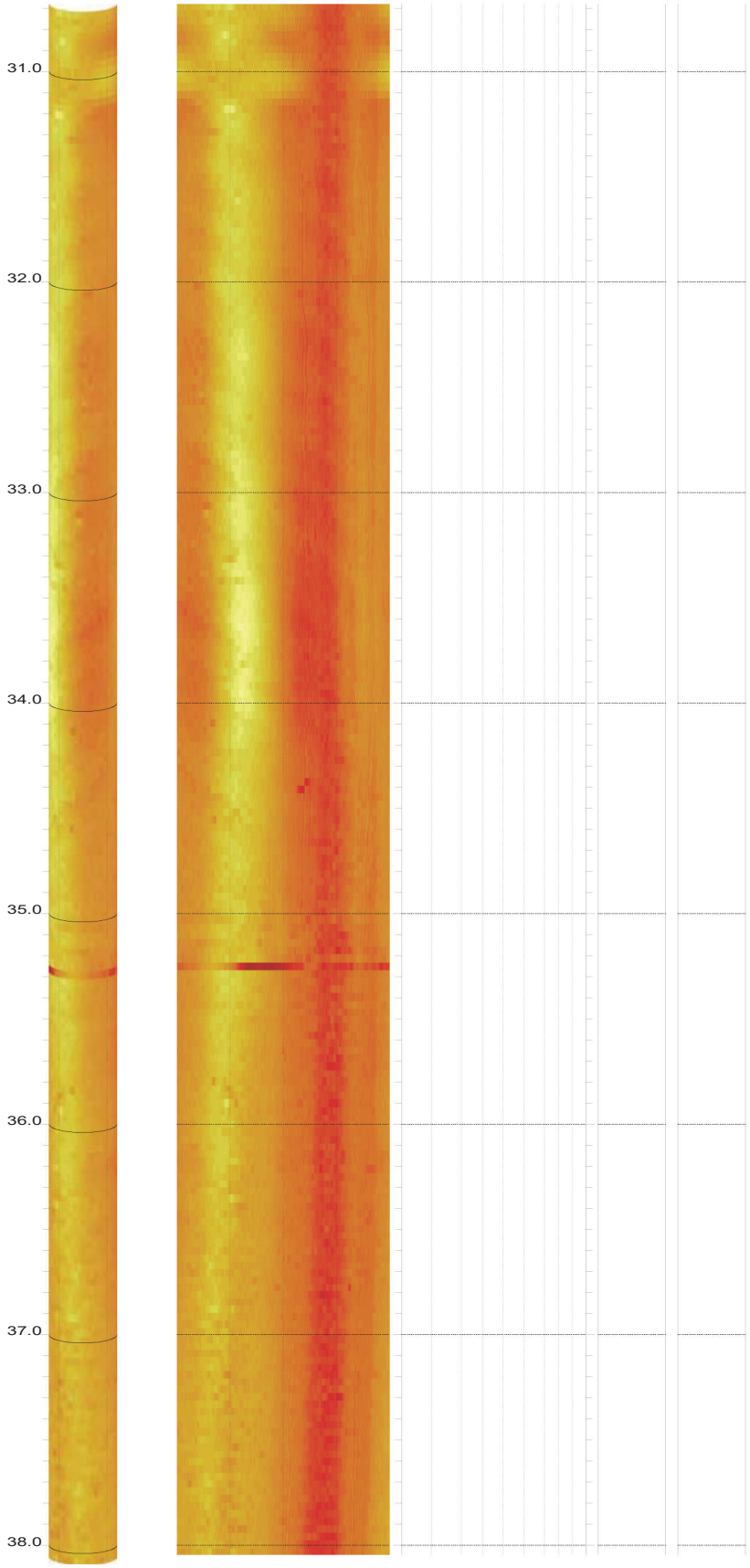
Borehole diam: 3.860inch
Vertical = borehole-axis
Image: Amplitude

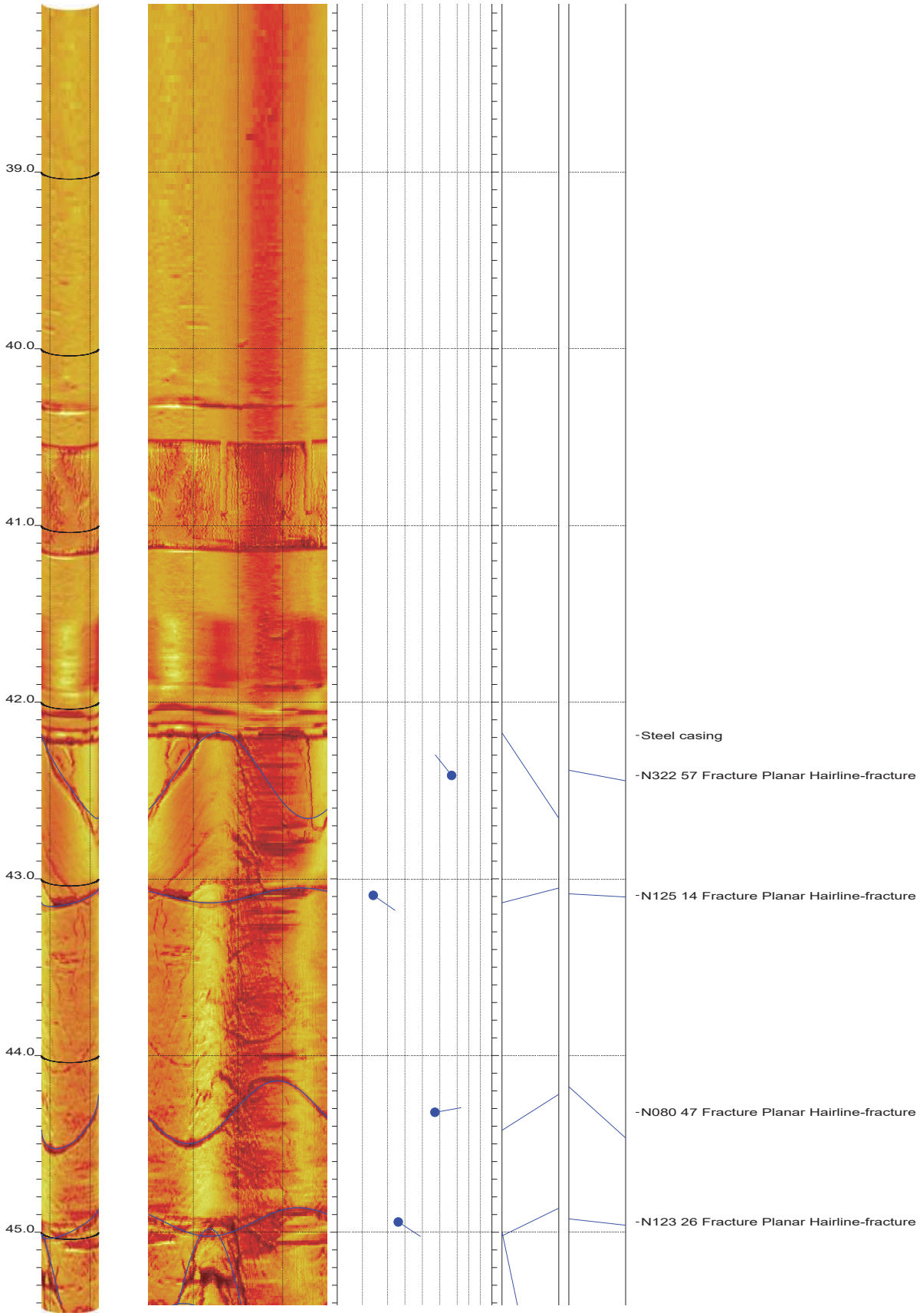


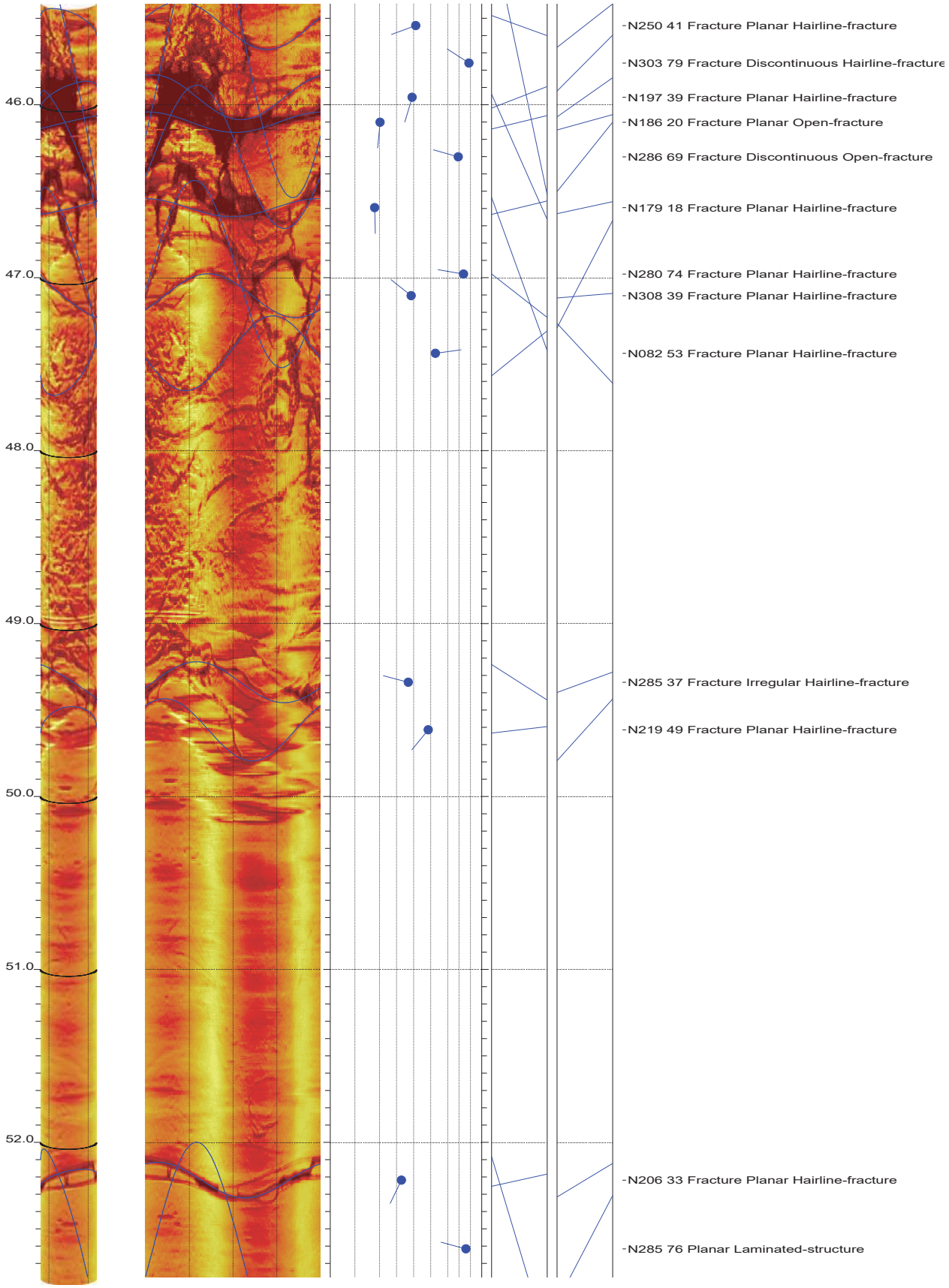

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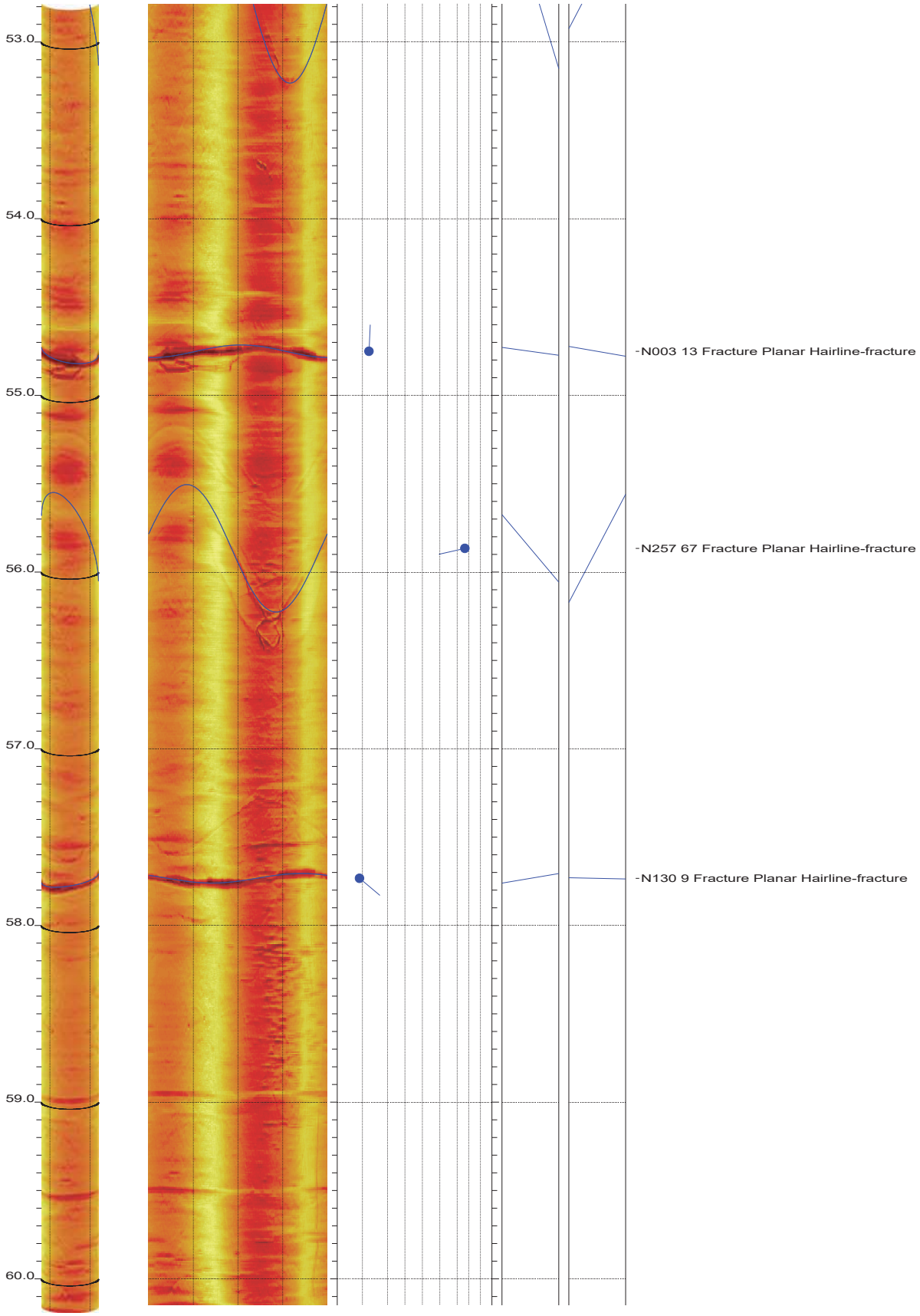

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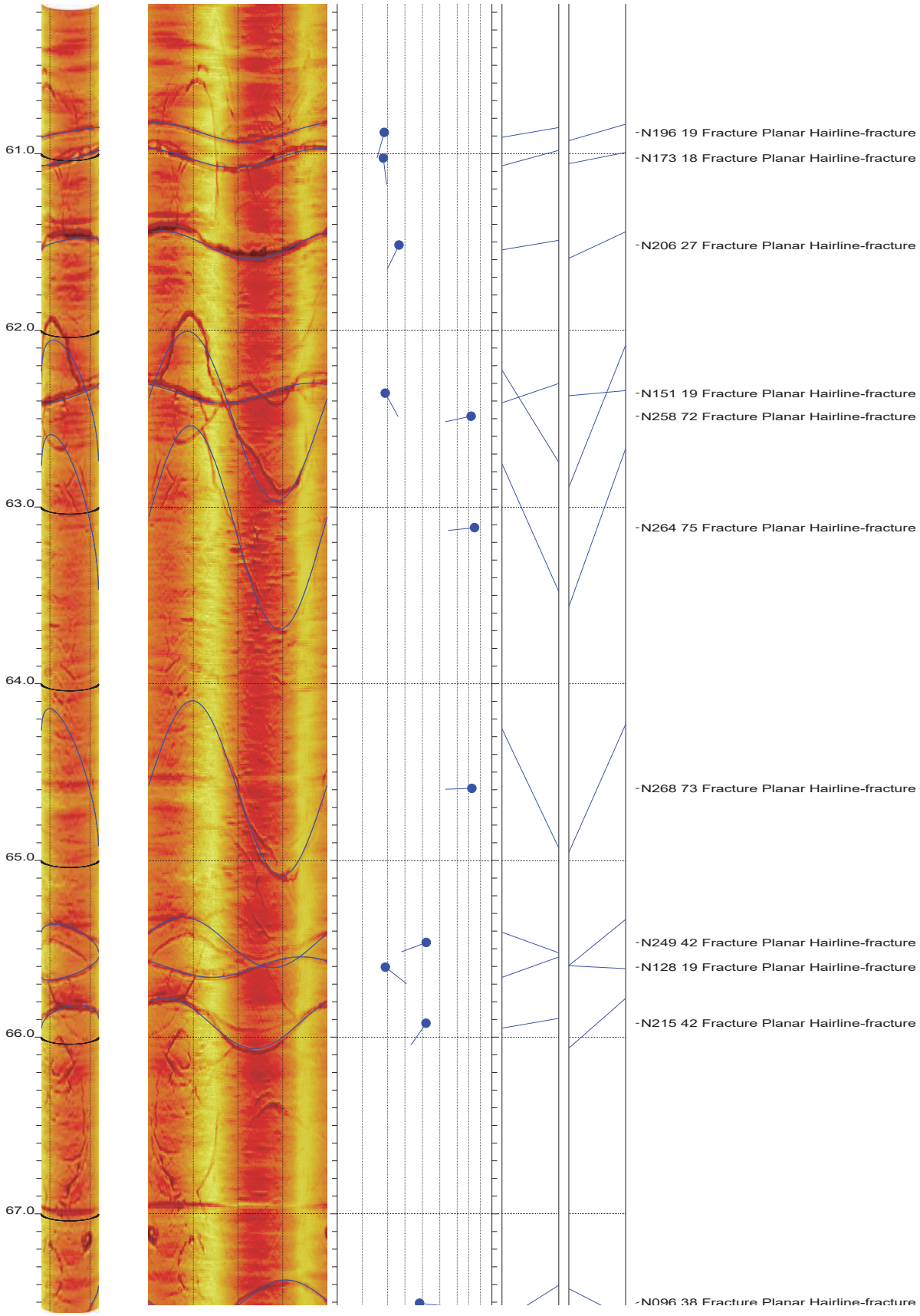

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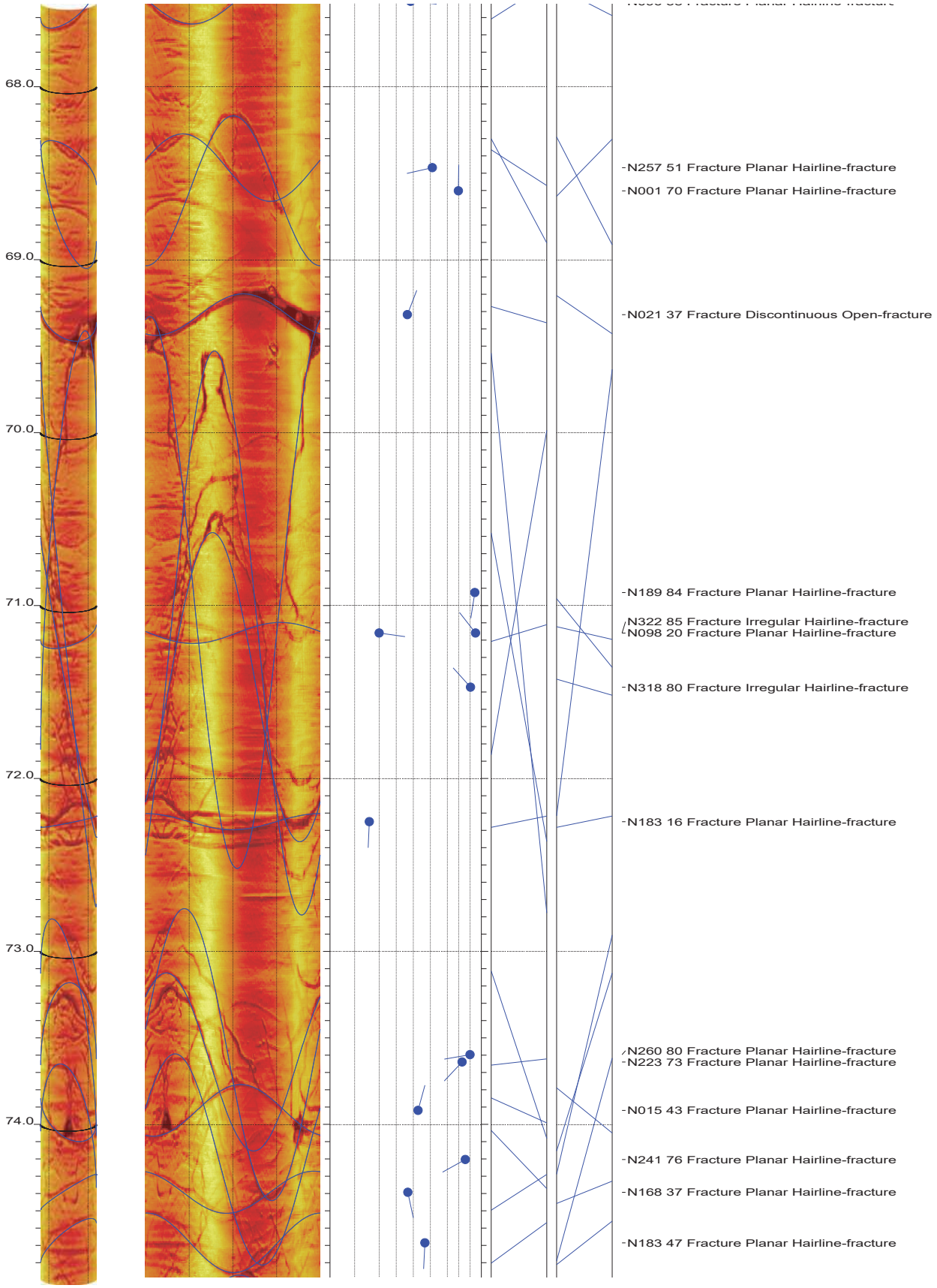

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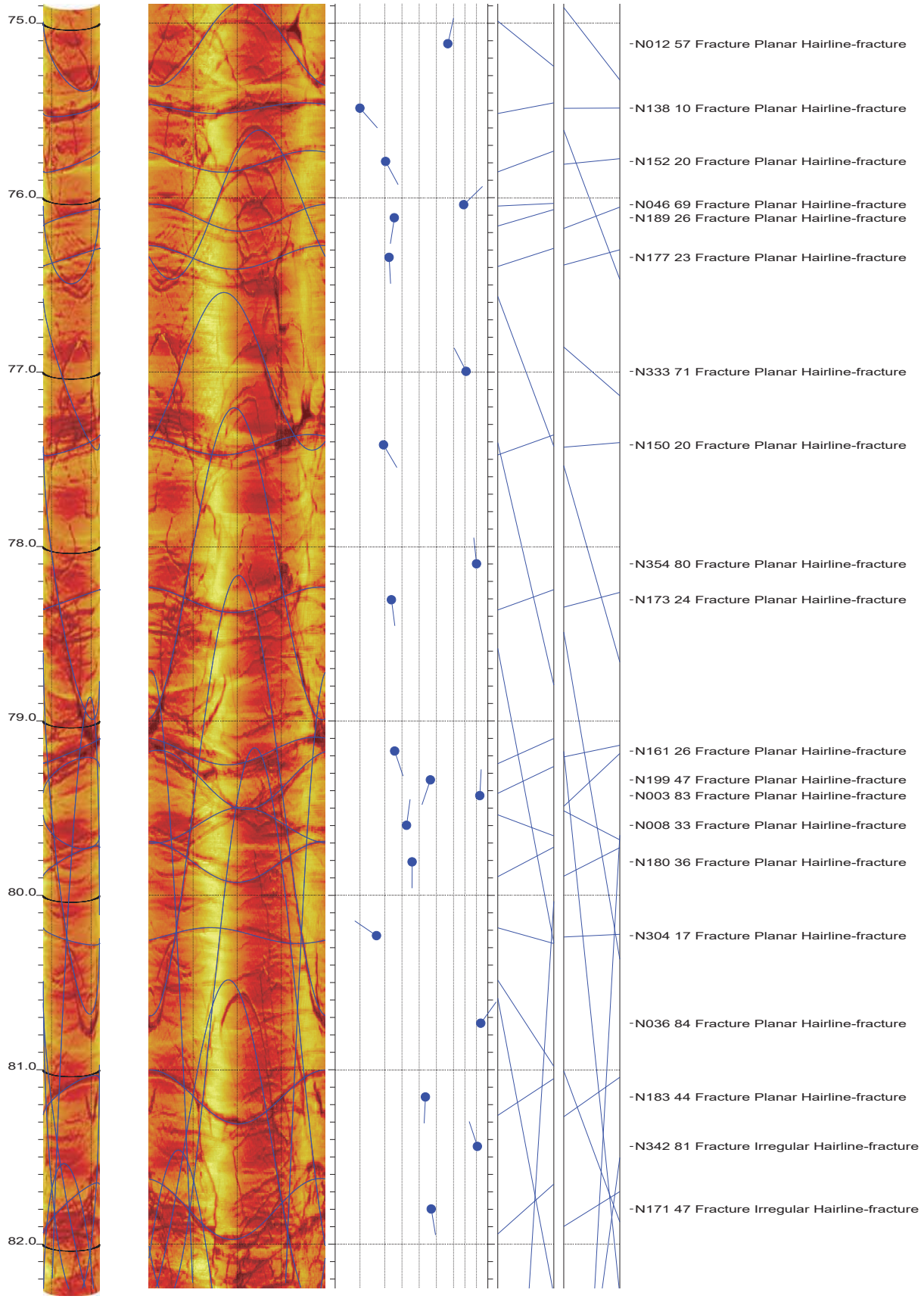

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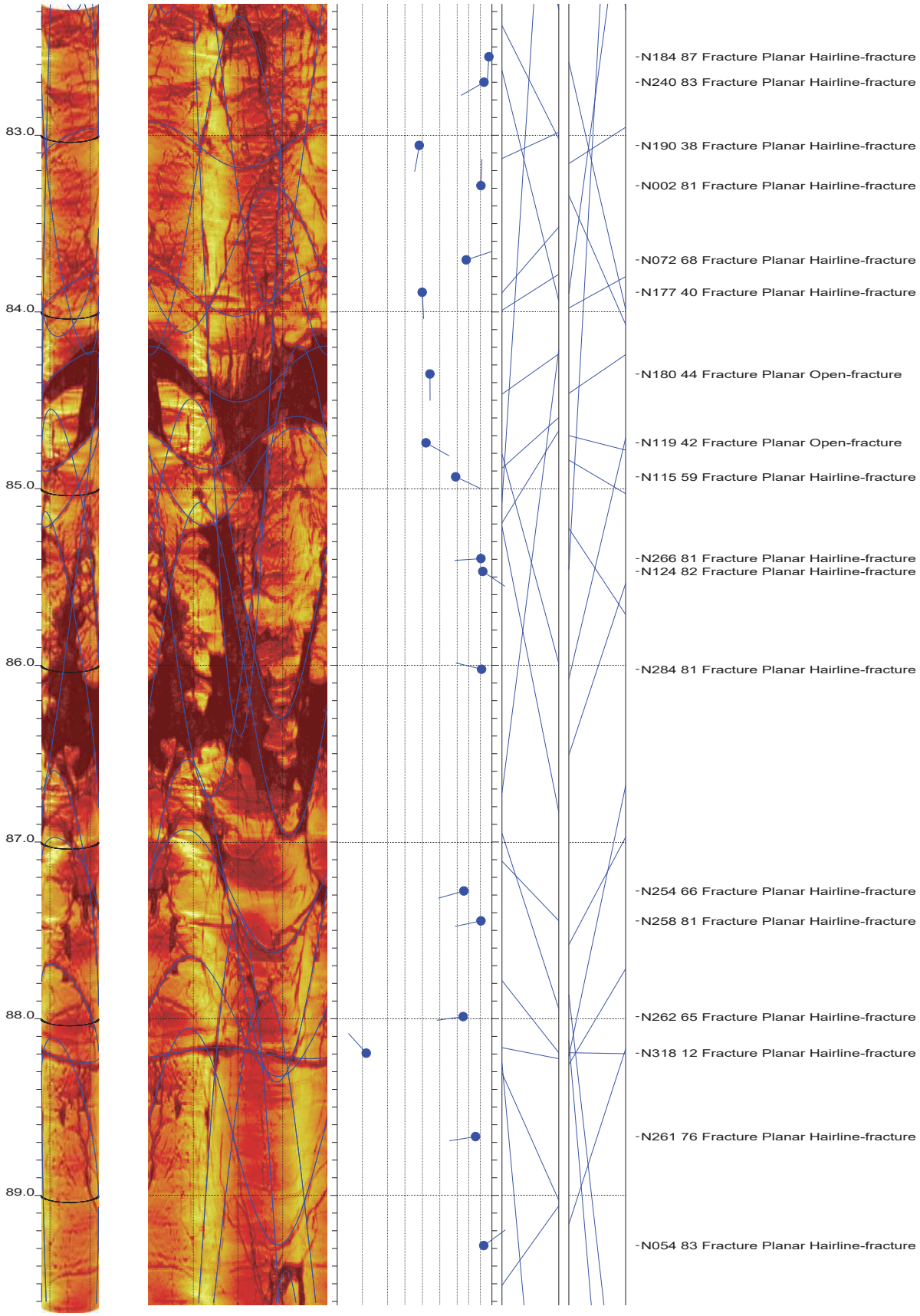

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N286 69 Fracture Discontinuous Open-fracture
N179 18 Fracture Planar Hairline-fracture
N280 74 Fracture Planar Hairline-fracture
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N082 53 Fracture Planar Hairline-fracture
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N206 33 Fracture Planar Hairline-fracture
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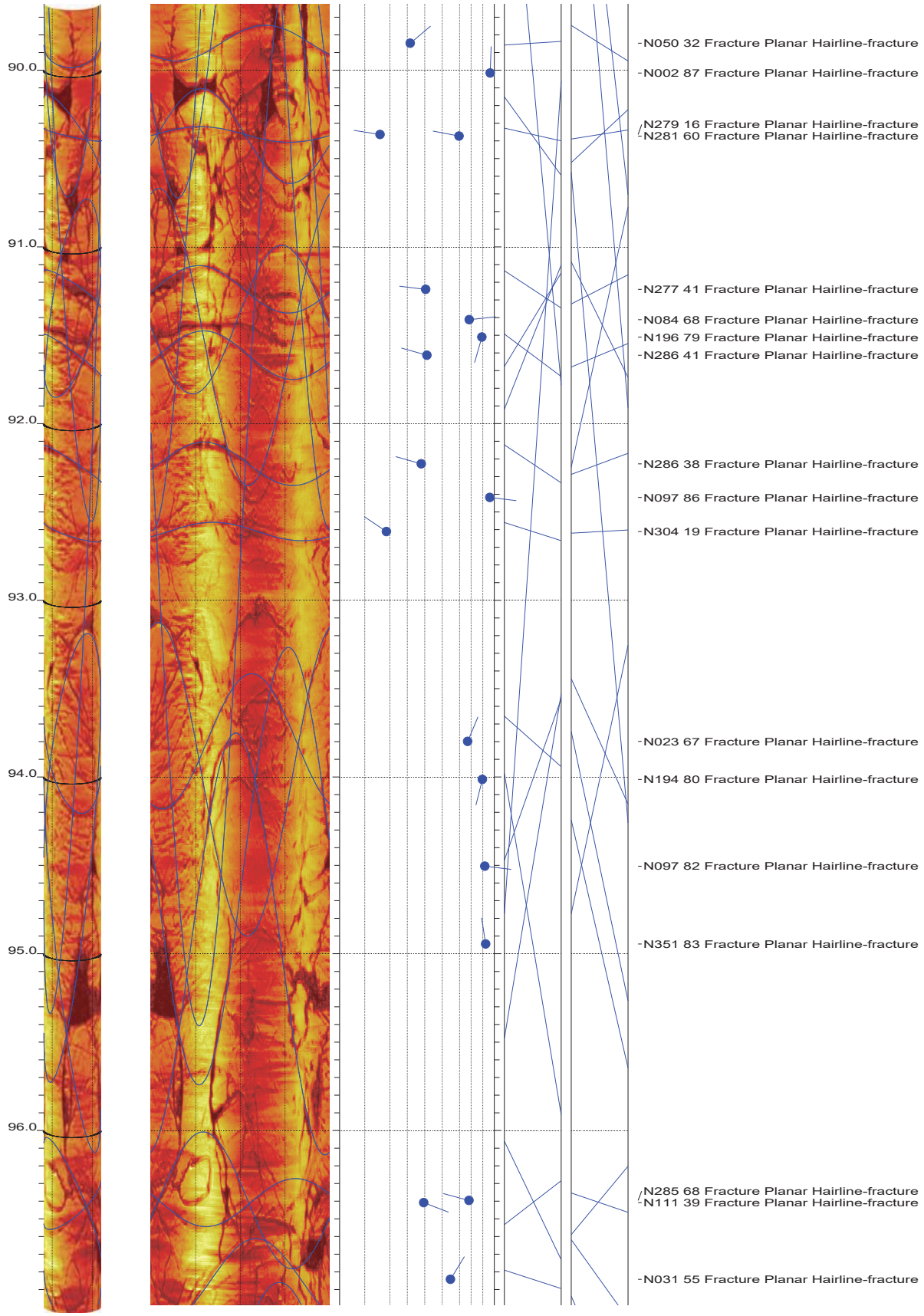

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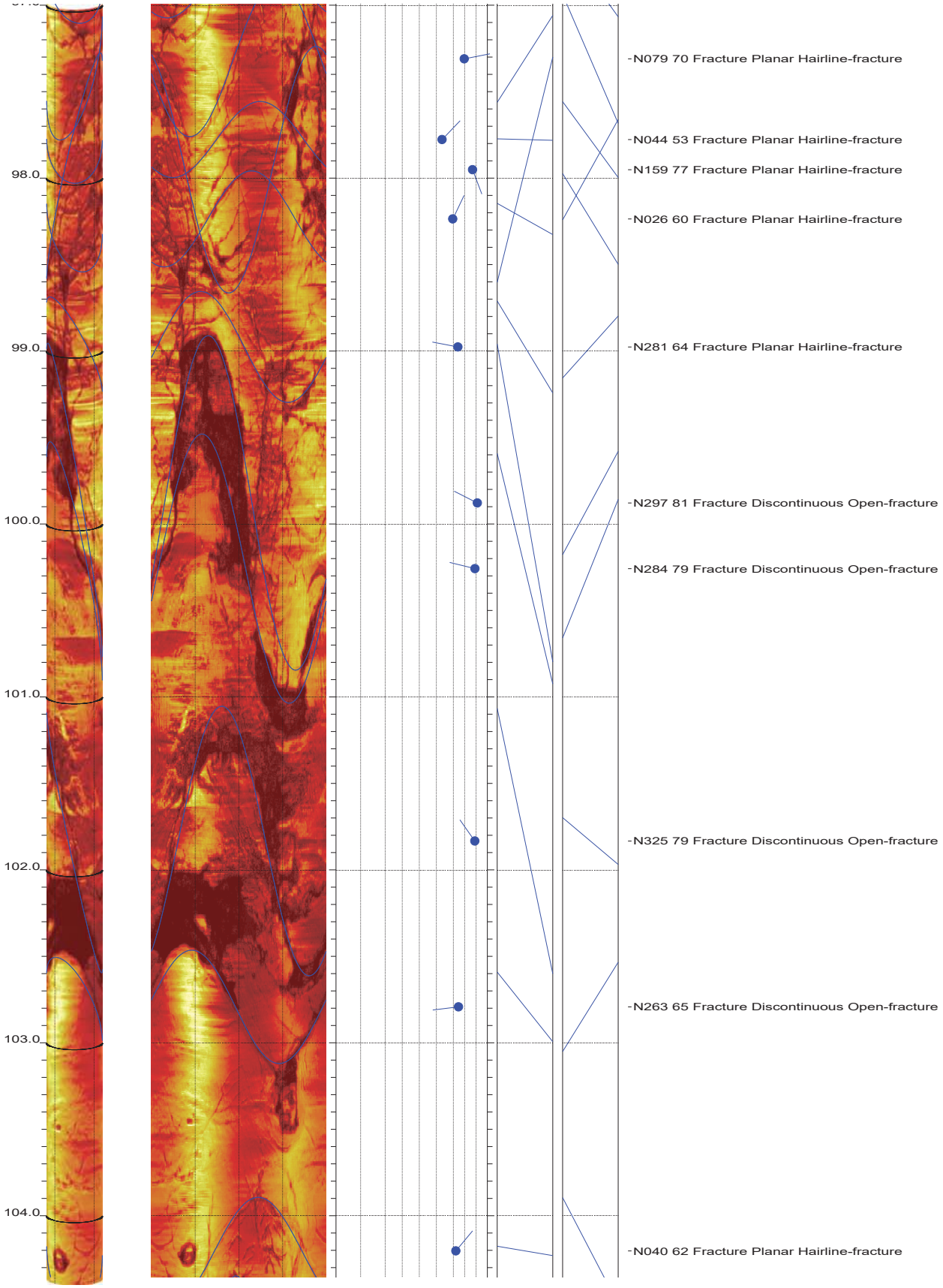

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N268 73 Fracture Planar Hairline-fracture
N249 42 Fracture Planar Hairline-fracture
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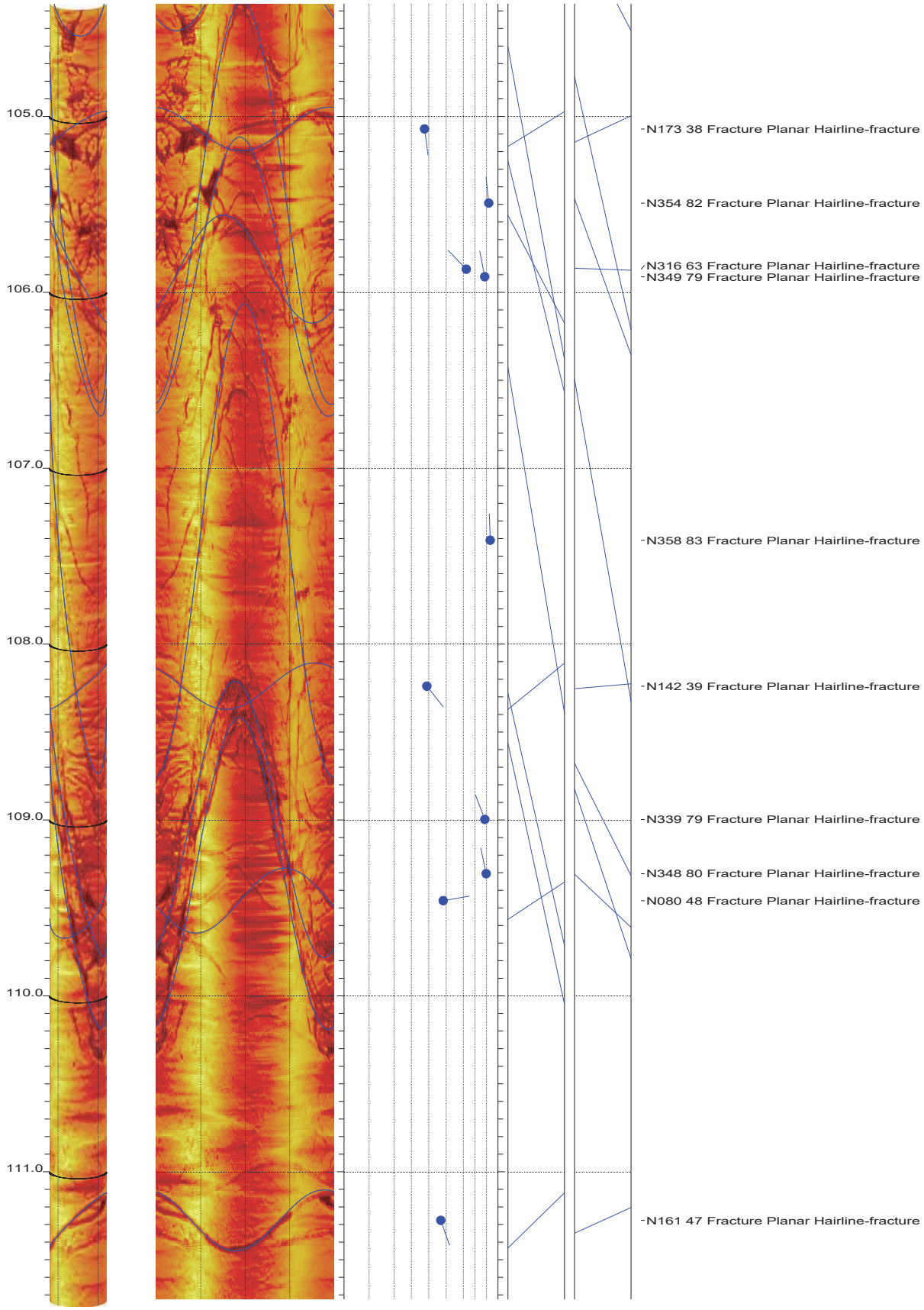

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-N322 85 Fracture Irregular Hairline-fracture
-N098 20 Fracture Planar Hairline-fracture
-N318 80 Fracture Irregular Hairline-fracture
-N183 16 Fracture Planar Hairline-fracture
-N260 80 Fracture Planar Hairline-fracture
-N223 73 Fracture Planar Hairline-fracture
-N015 43 Fracture Planar Hairline-fracture
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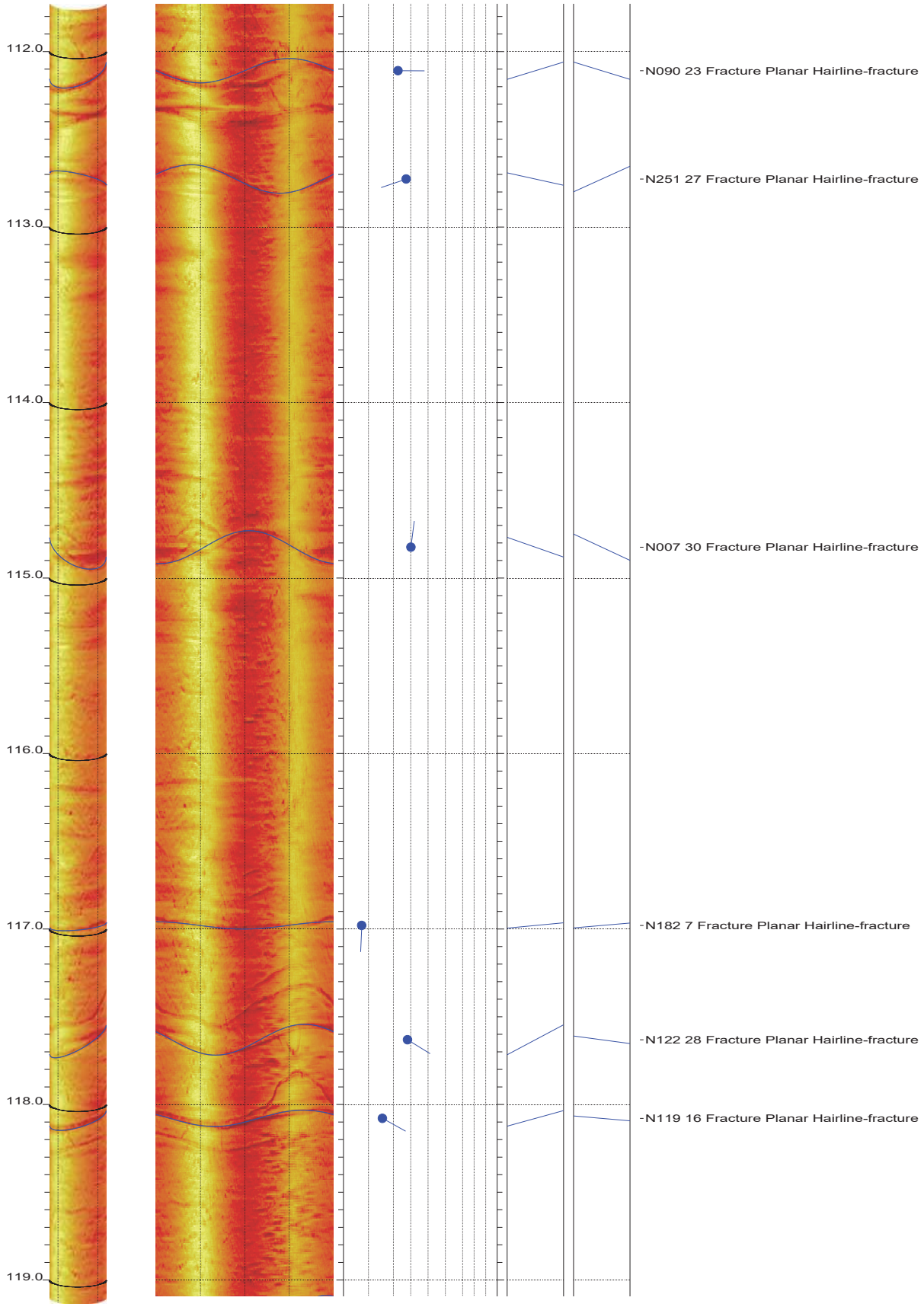

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-N189 26 Fracture Planar Hairline-fracture
-N177 23 Fracture Planar Hairline-fracture
-N333 71 Fracture Planar Hairline-fracture
-N150 20 Fracture Planar Hairline-fracture
-N354 80 Fracture Planar Hairline-fracture
-N173 24 Fracture Planar Hairline-fracture
-N161 26 Fracture Planar Hairline-fracture
-N199 47 Fracture Planar Hairline-fracture
-N003 83 Fracture Planar Hairline-fracture
-N008 33 Fracture Planar Hairline-fracture
-N180 36 Fracture Planar Hairline-fracture
-N304 17 Fracture Planar Hairline-fracture
-N036 84 Fracture Planar Hairline-fracture
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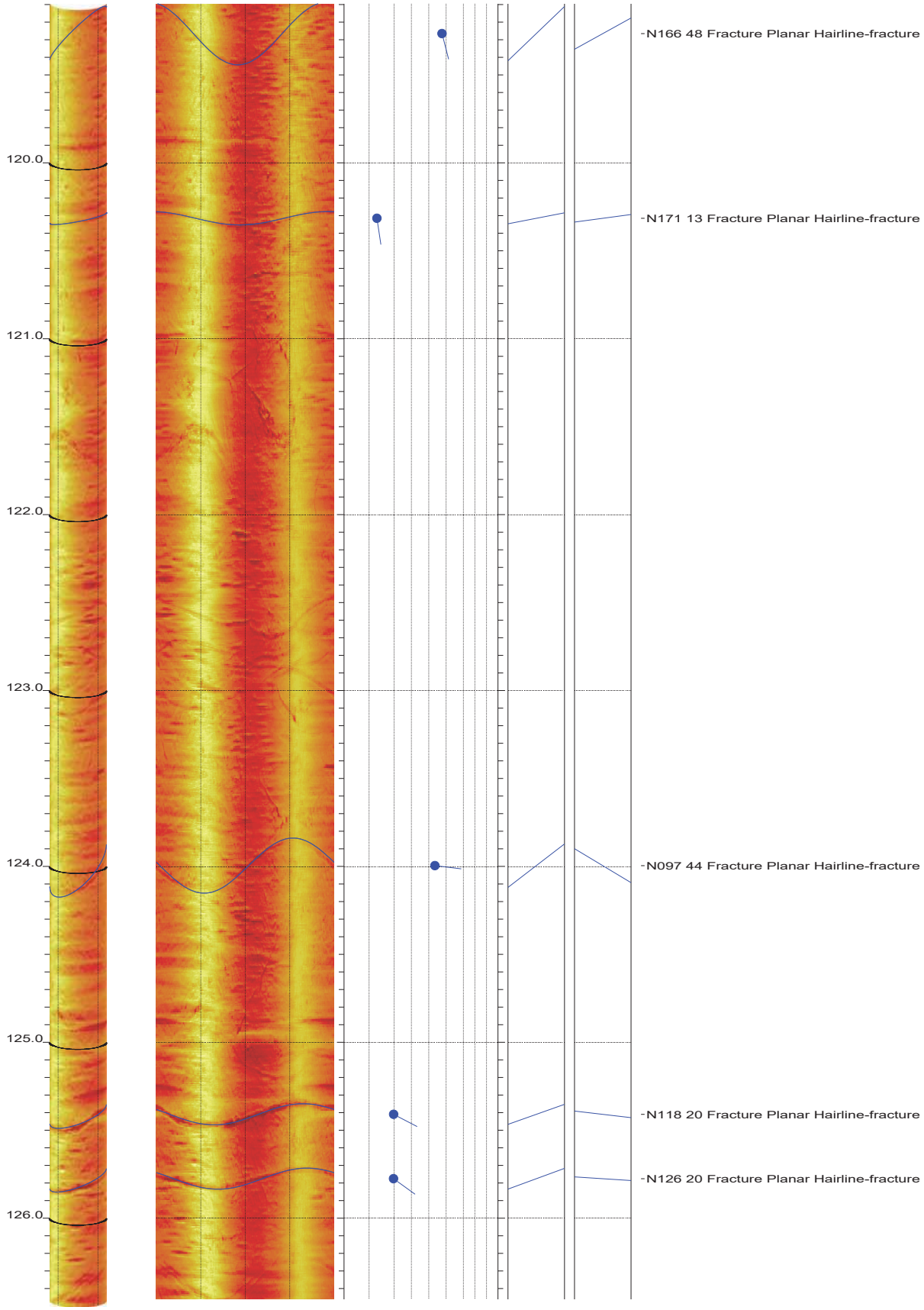

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-N002 81 Fracture Planar Hairline-fracture
-N072 68 Fracture Planar Hairline-fracture
-N177 40 Fracture Planar Hairline-fracture
-N180 44 Fracture Planar Open-fracture
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-N124 82 Fracture Planar Hairline-fracture
-N284 81 Fracture Planar Hairline-fracture
-N254 66 Fracture Planar Hairline-fracture
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-N262 65 Fracture Planar Hairline-fracture
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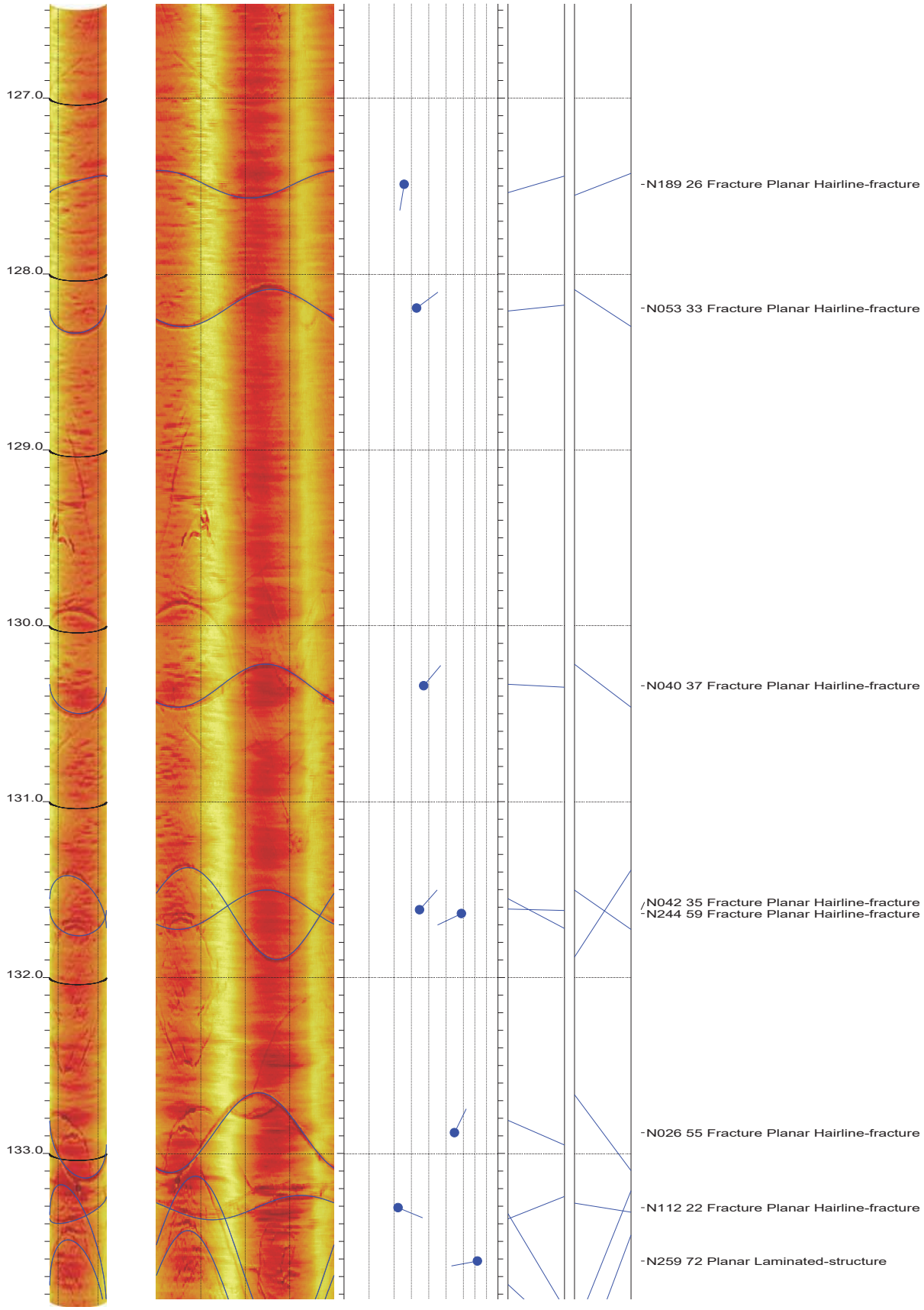

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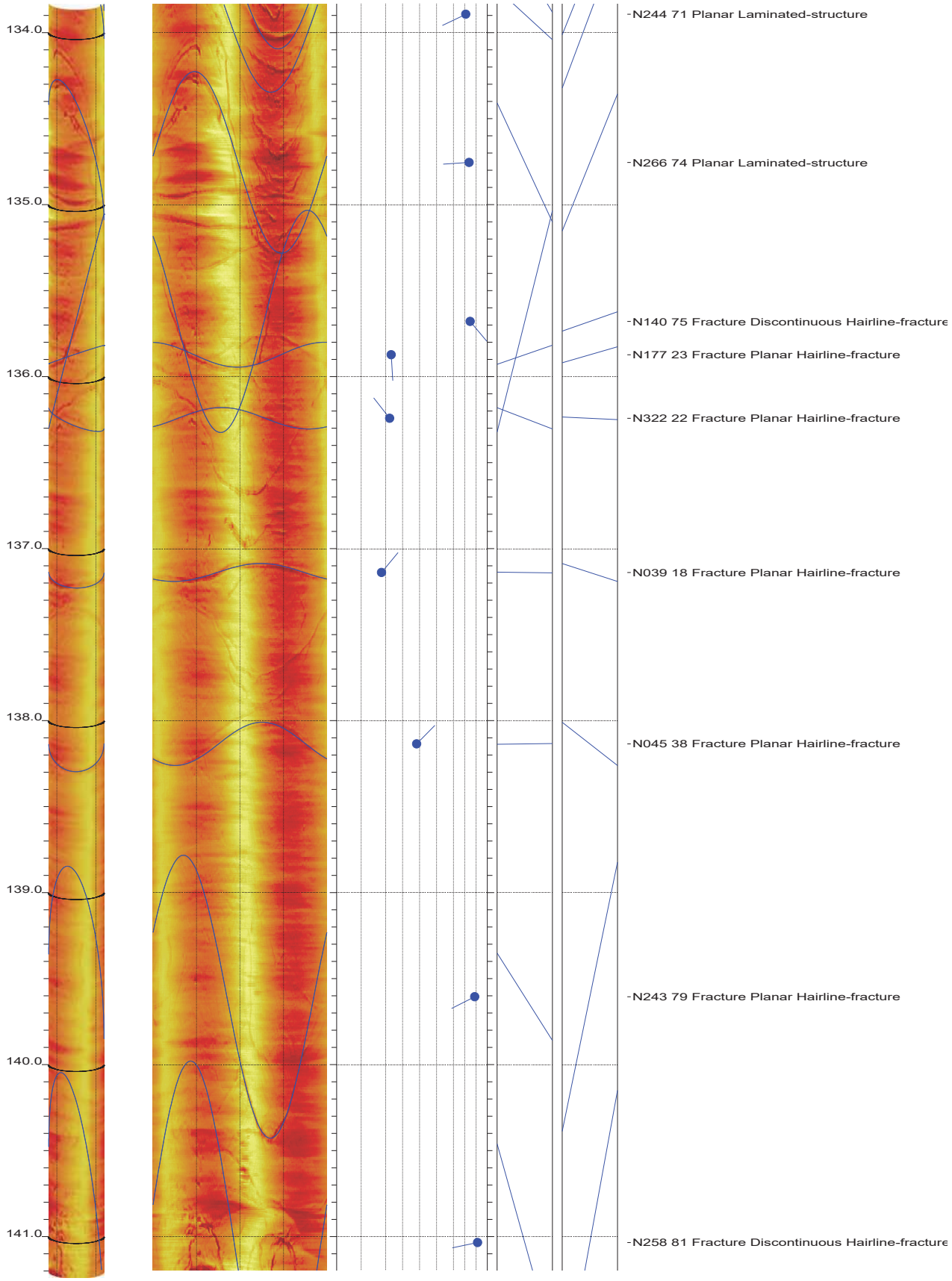

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N281 64 Fracture Planar Hairline-fracture
N297 81 Fracture Discontinuous Open-fracture
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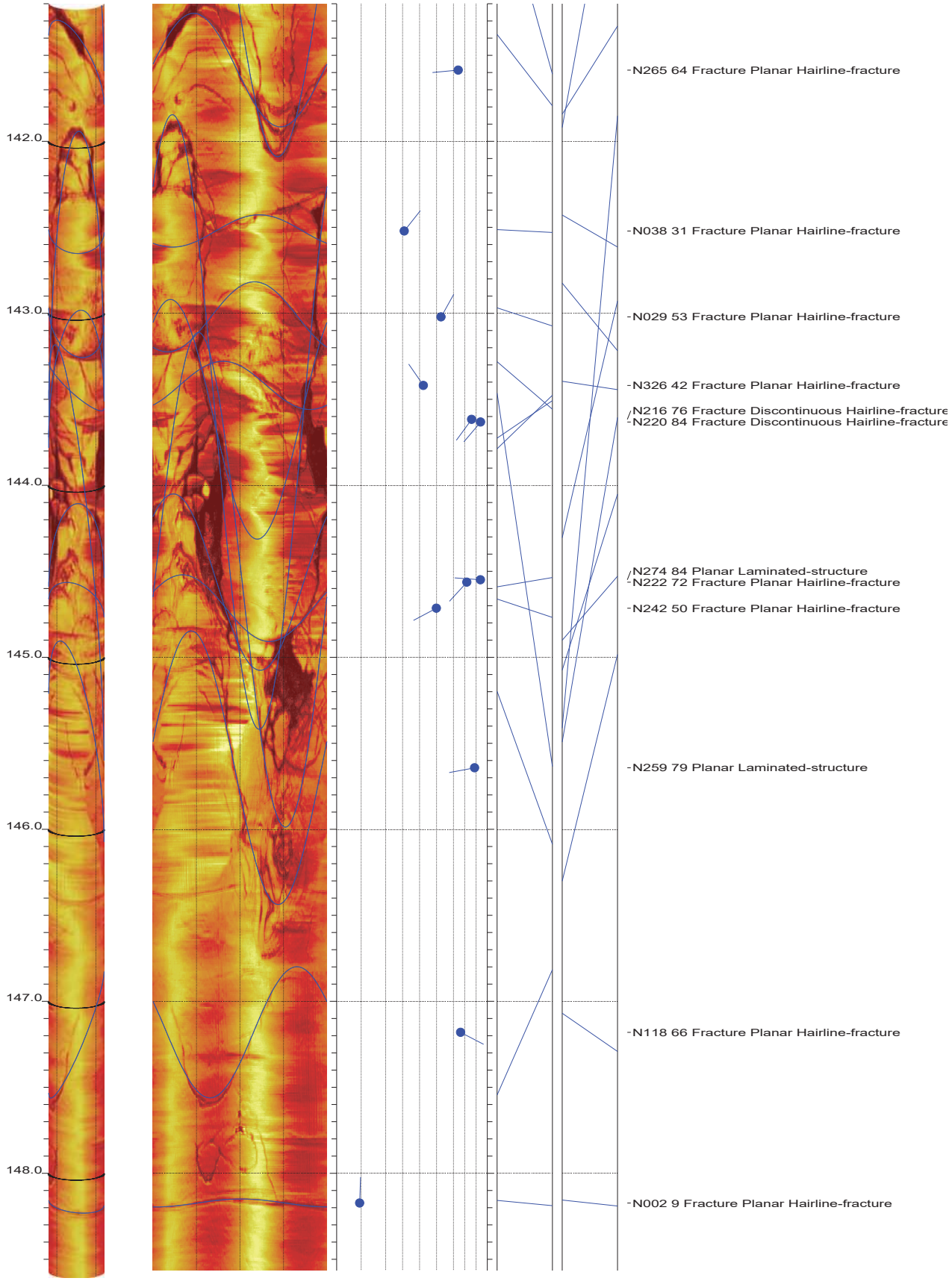

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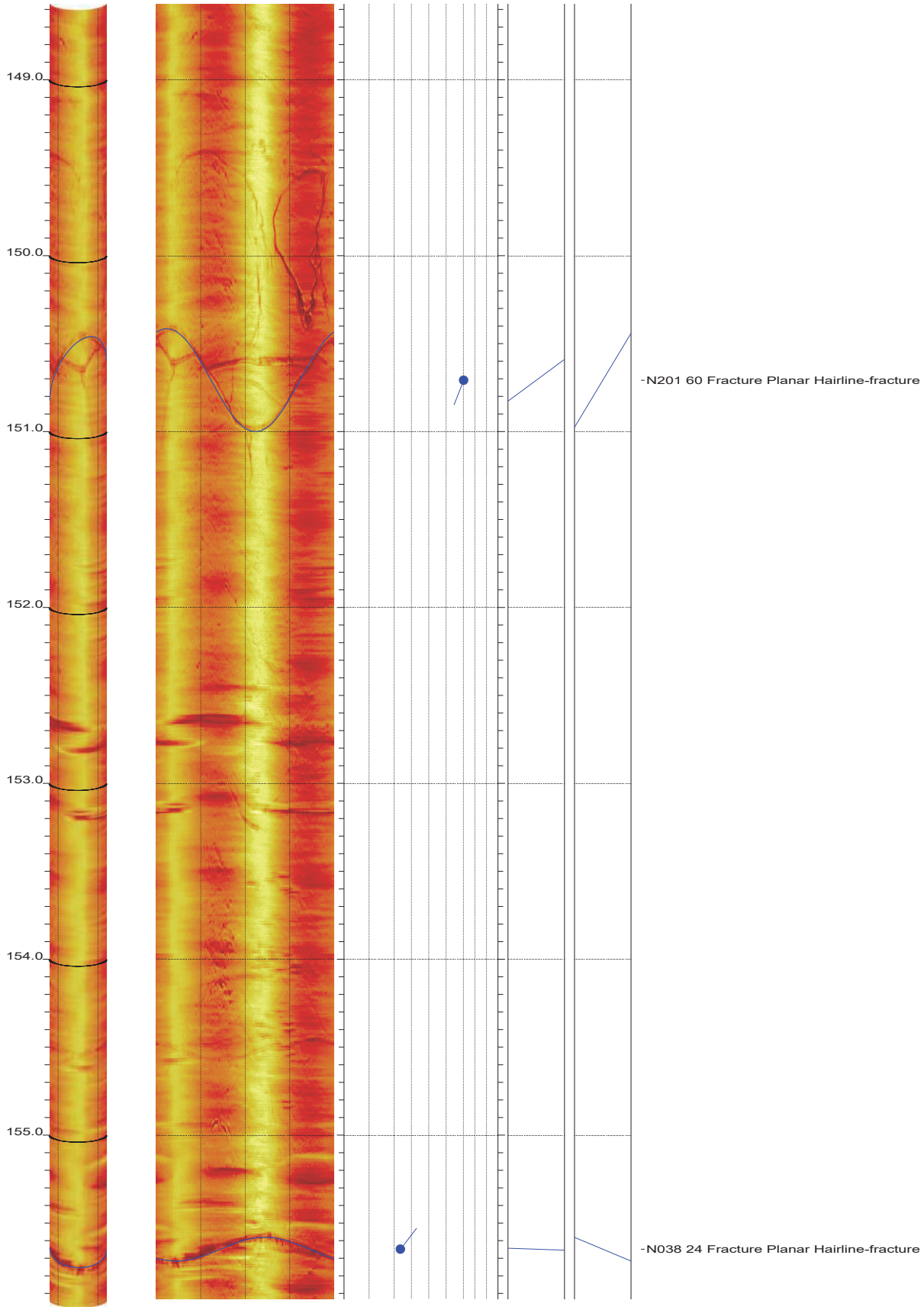

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-N007 30 Fracture Planar Hairline-fracture
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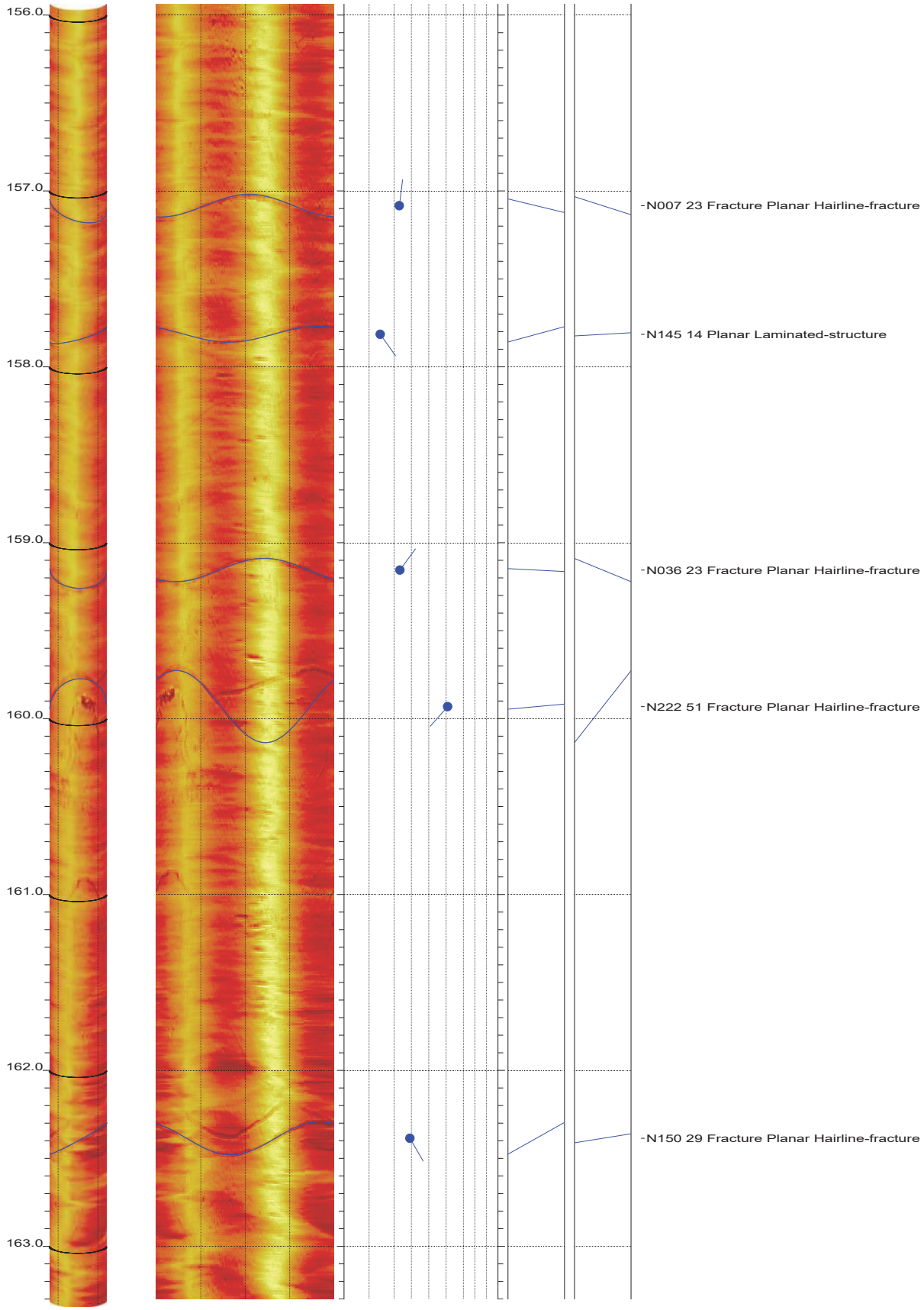

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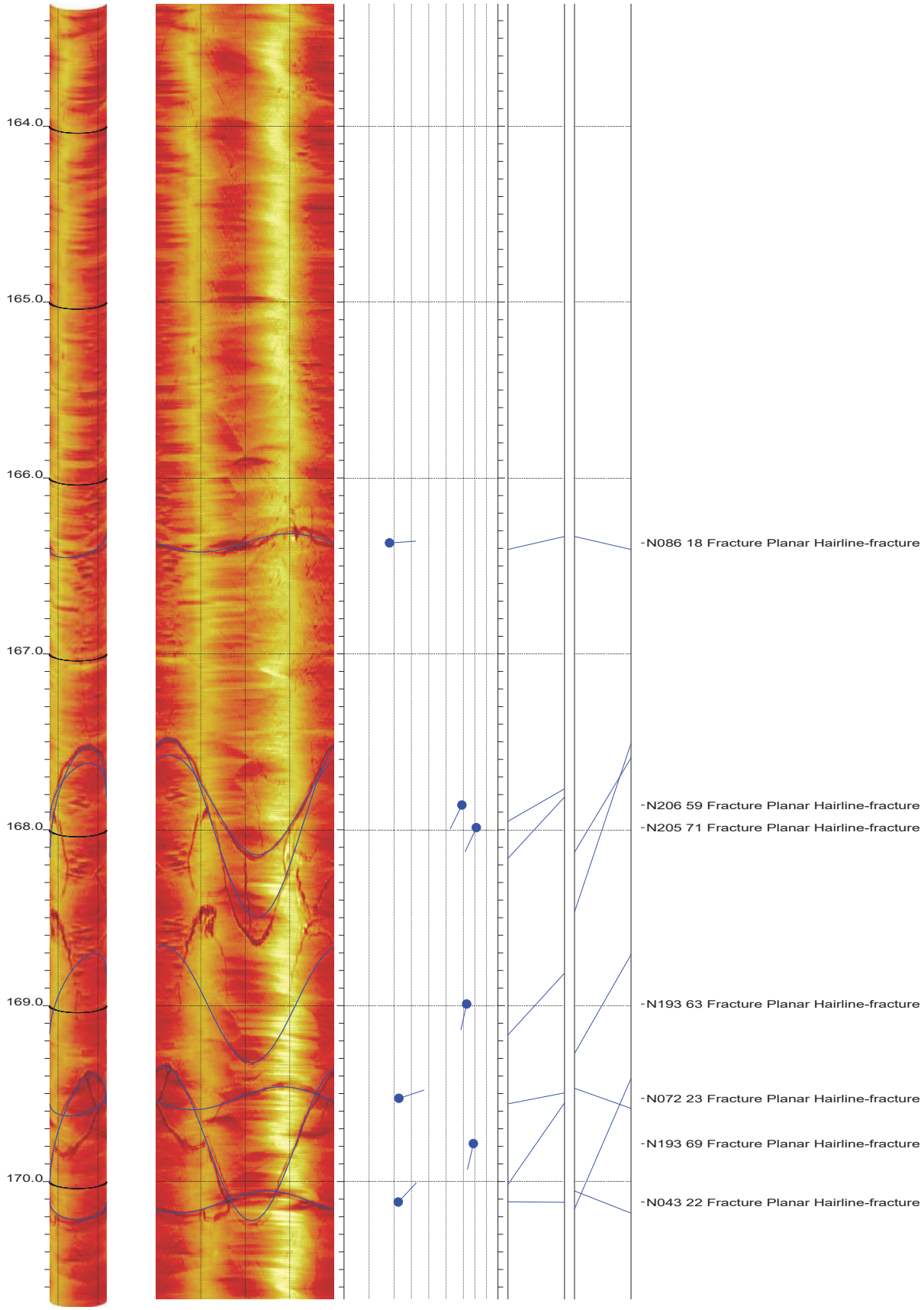

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N042 35 Fracture Planar Hairline-fracture
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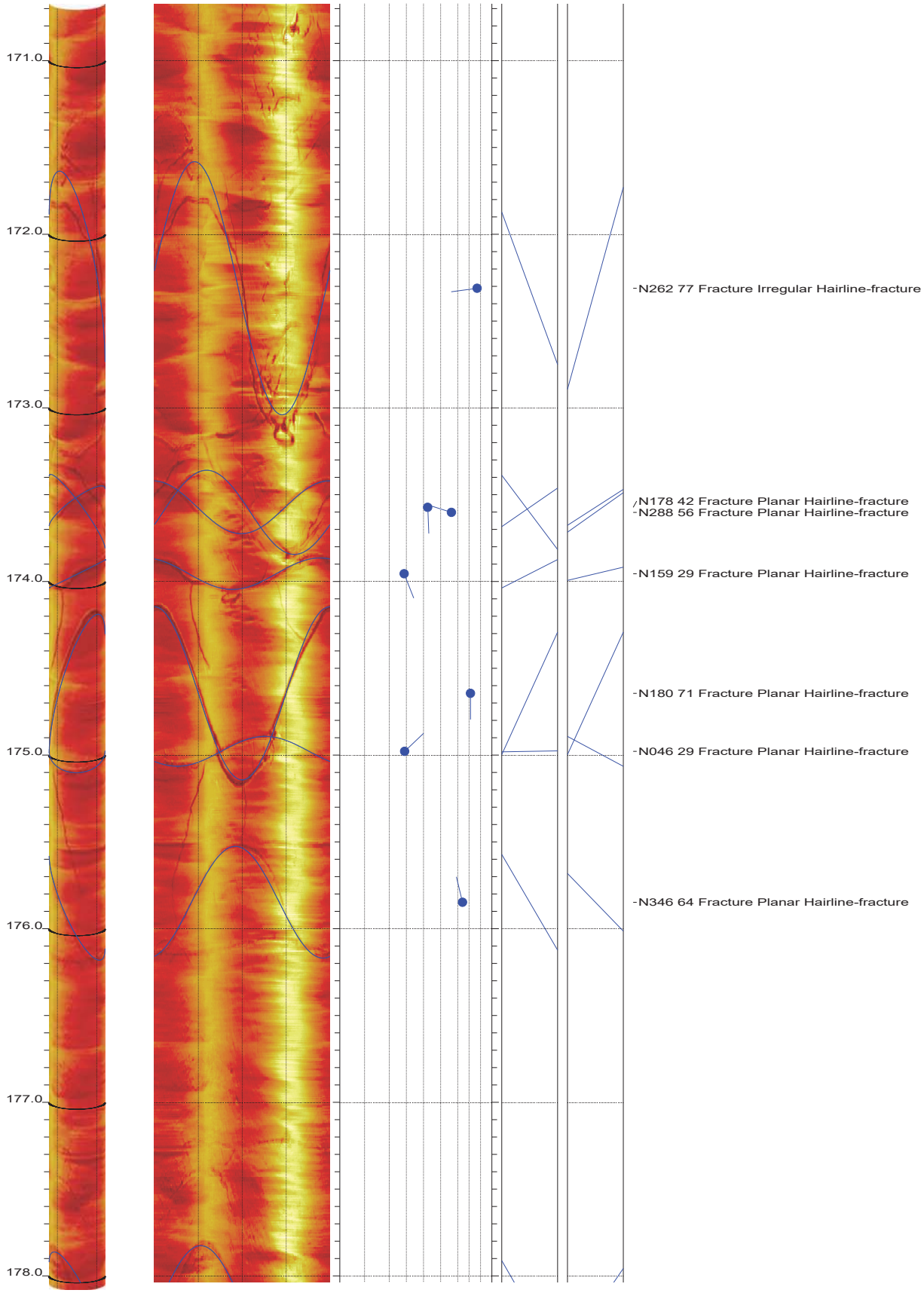

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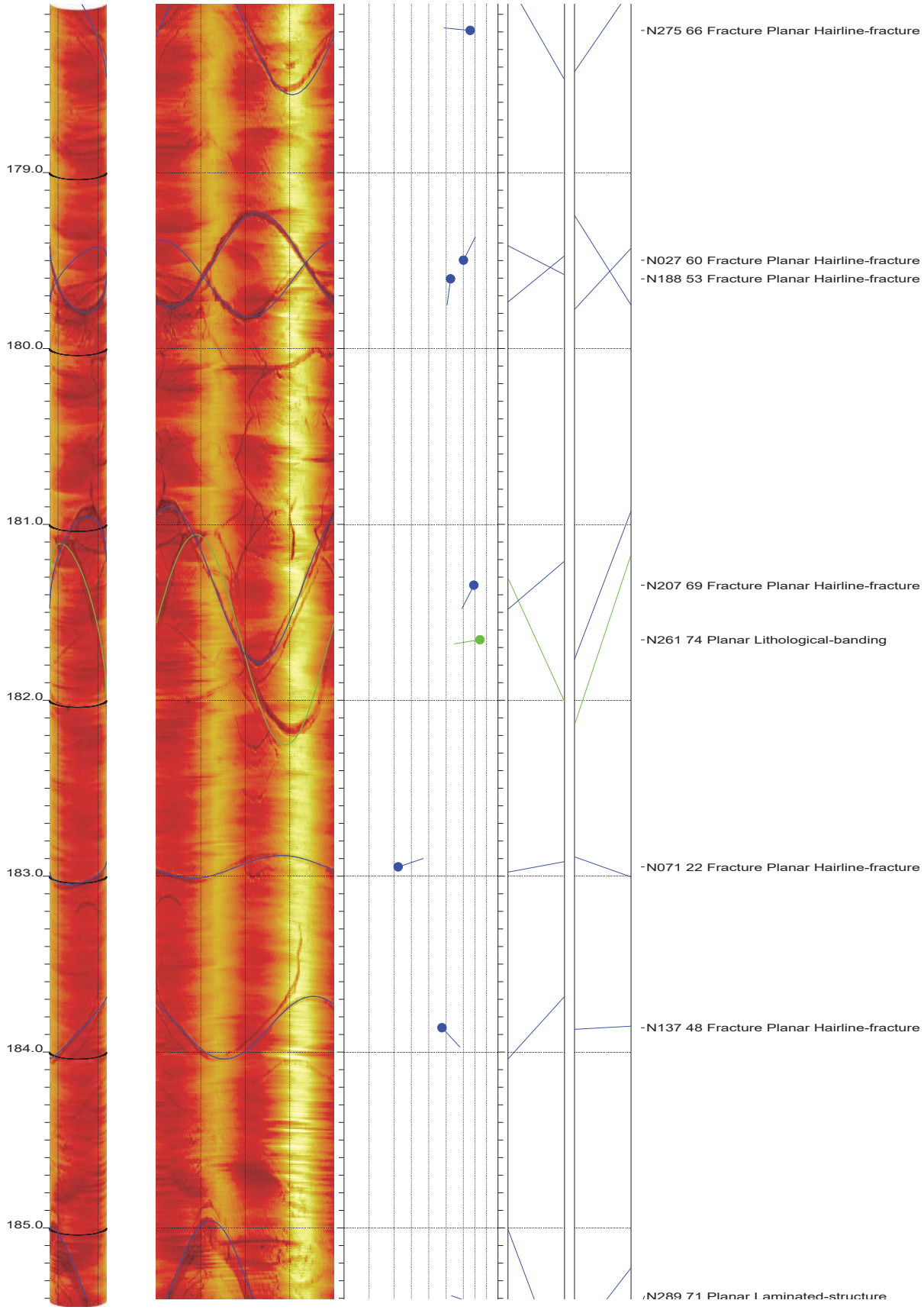

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N220 84 Fracture Discontinuous Hairline-fracture
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N222 72 Fracture Planar Hairline-fracture
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N002 9 Fracture Planar Hairline-fracture

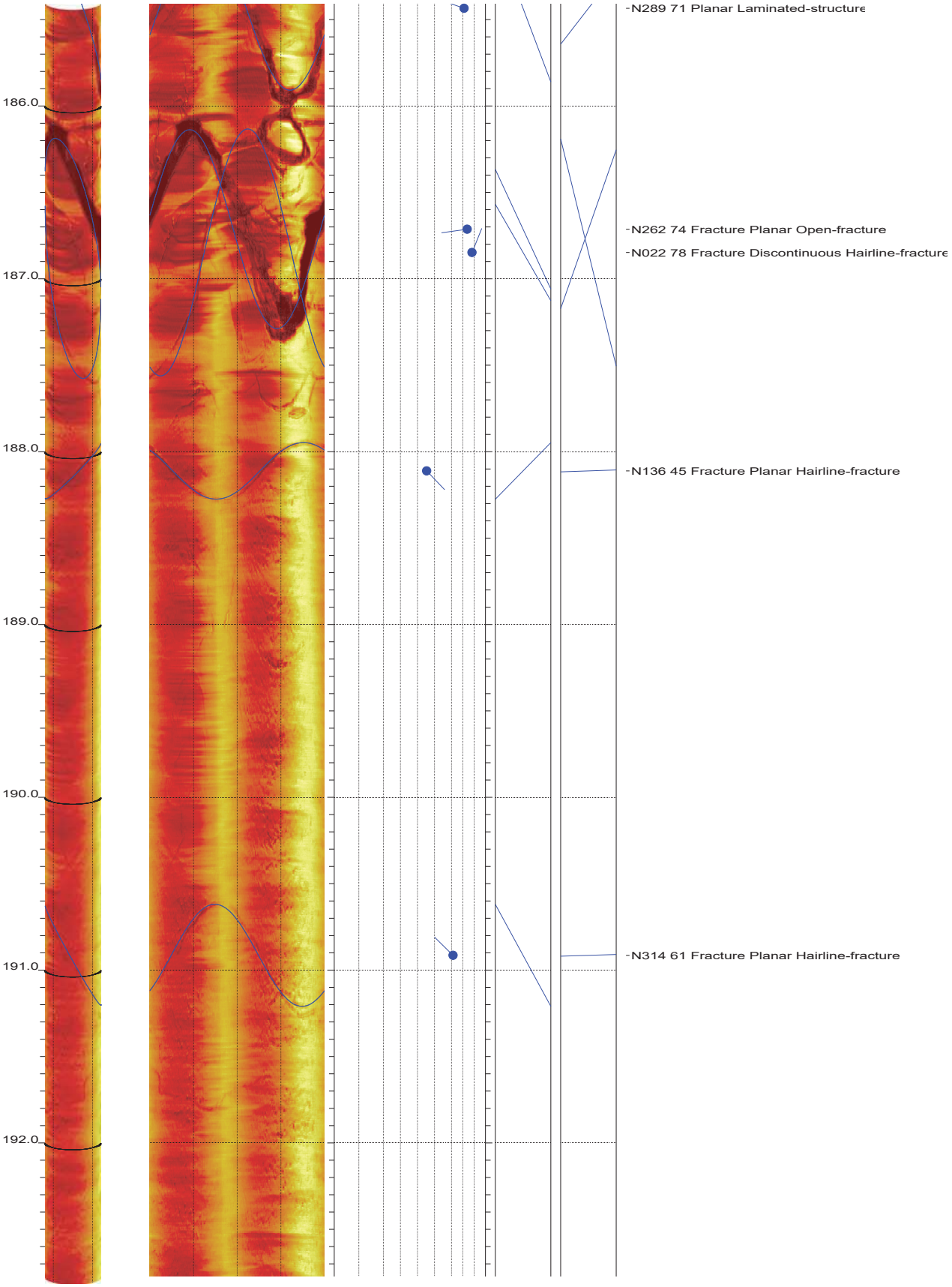

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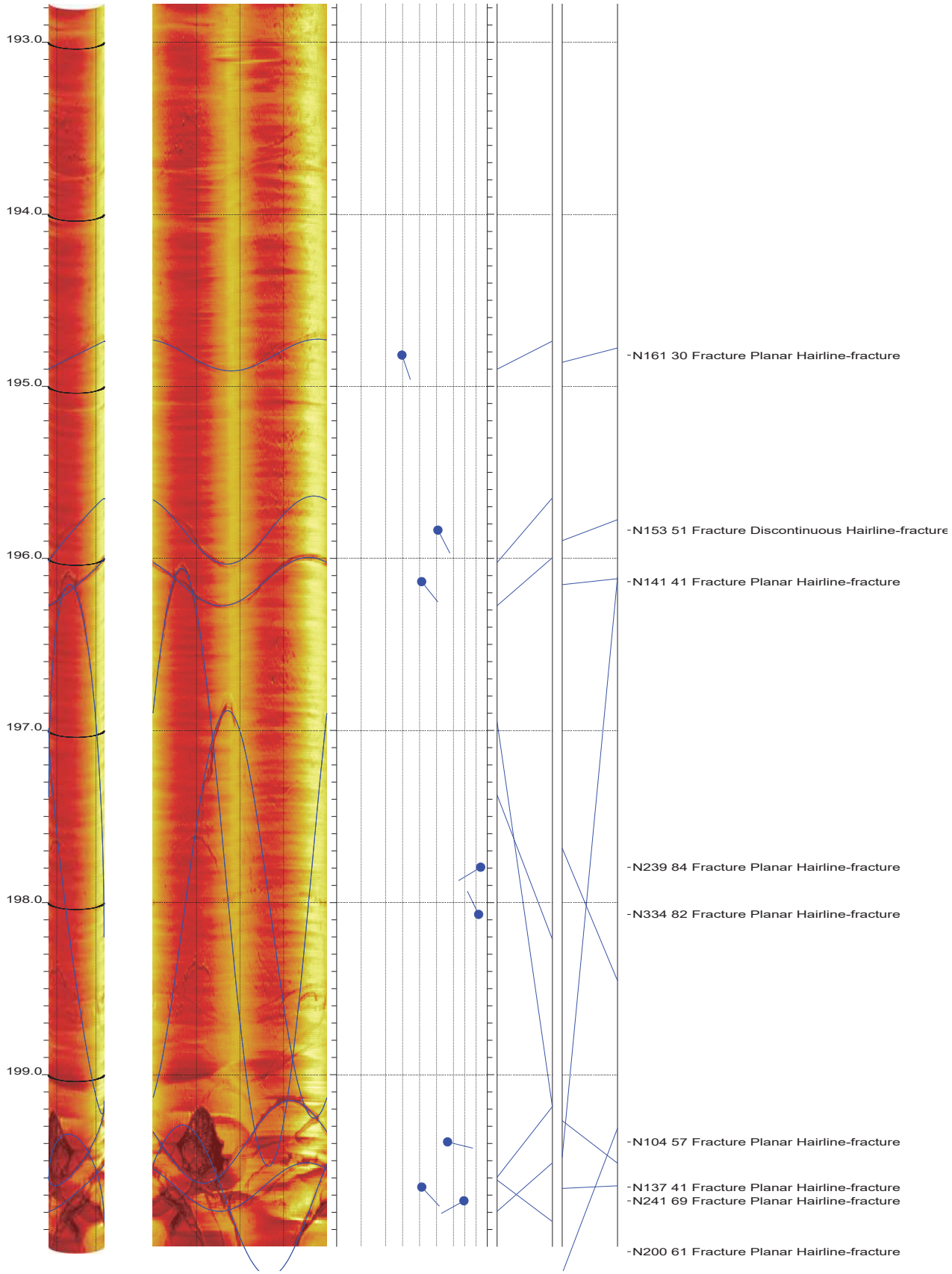

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-N137 41 Fracture Planar Hairline-fracture
-N241 69 Fracture Planar Hairline-fracture
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BHTV DATA PROCESSING
RGLDIP vsn 6.2
INTERPRETED BHTV DIPS LOG

AECOM

Borehole: B-104

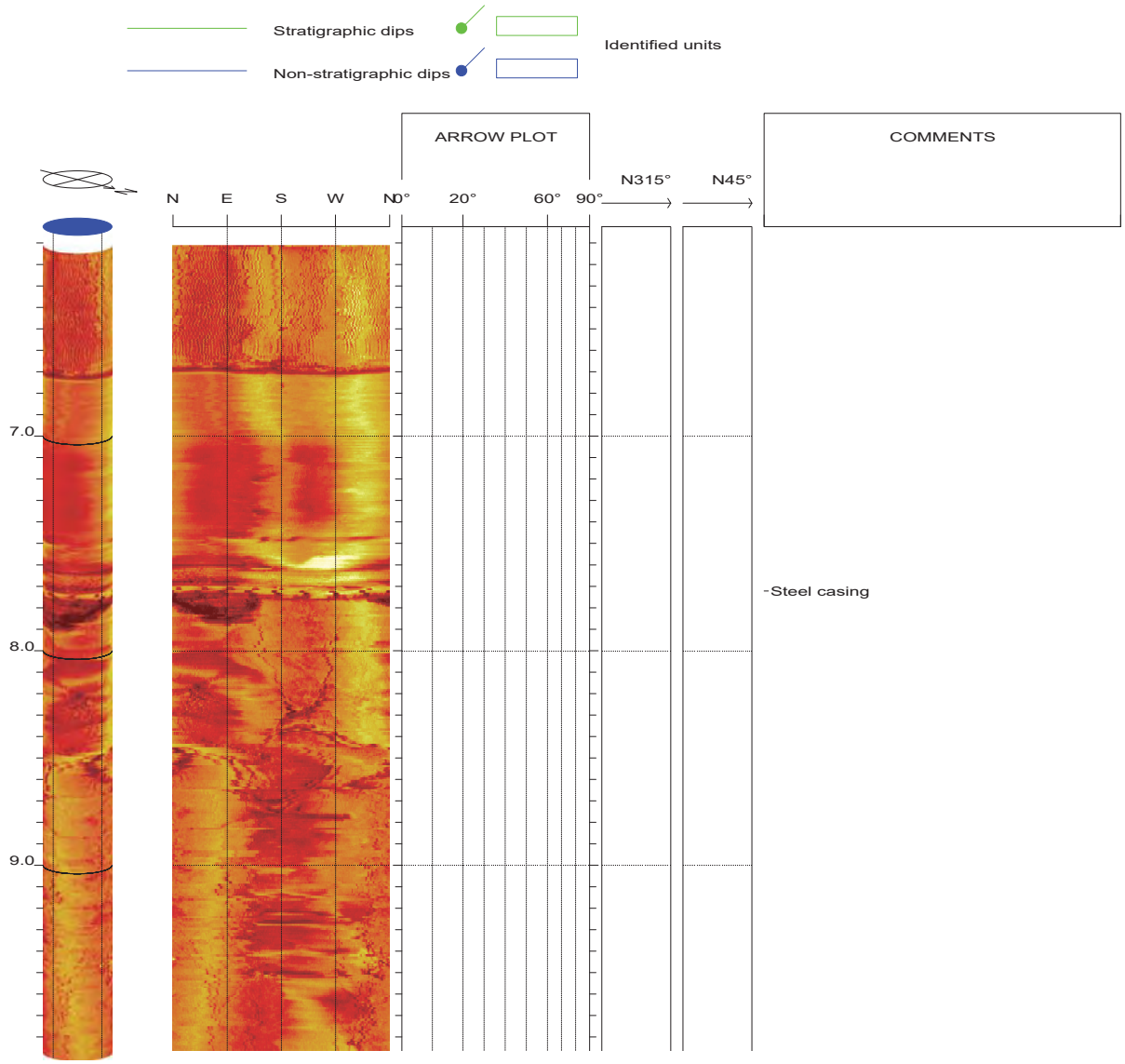
VAIL DAM

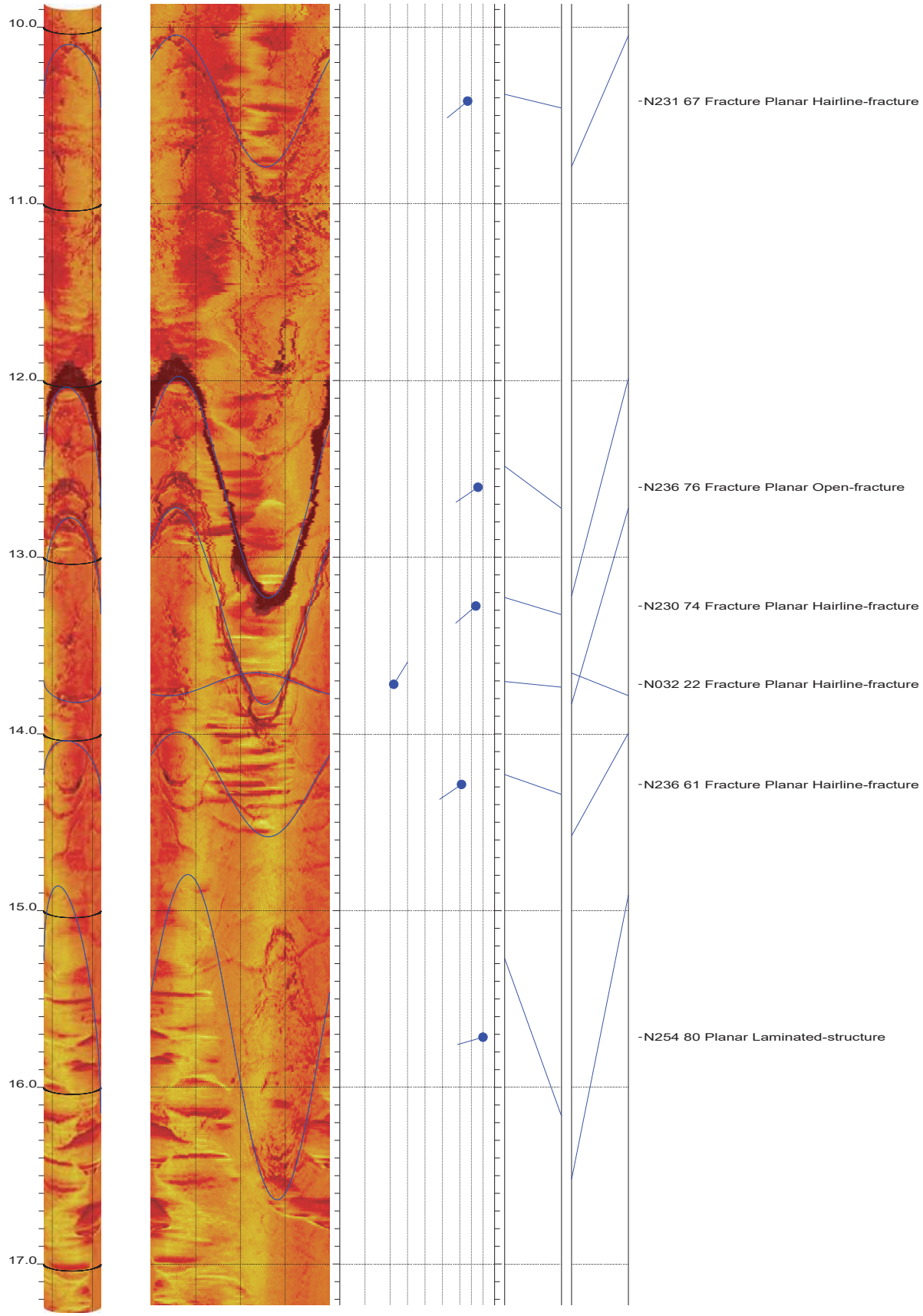
top of borehole.....
East: _
North:_
Elev: _

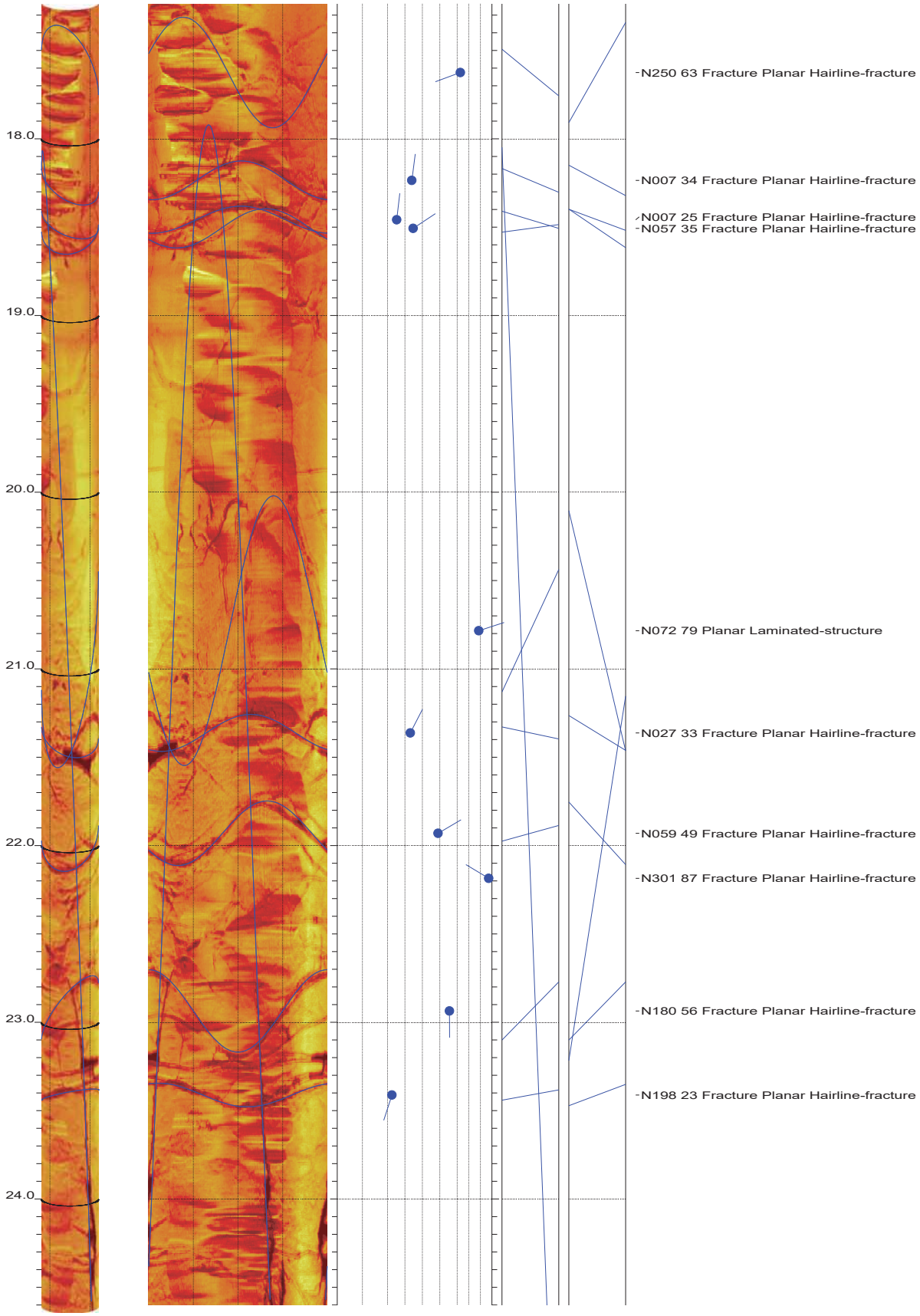
North ref. is true
Depth units are feet
Vertical scale: 1/10
Horiz scale = 1.00x Vert scale

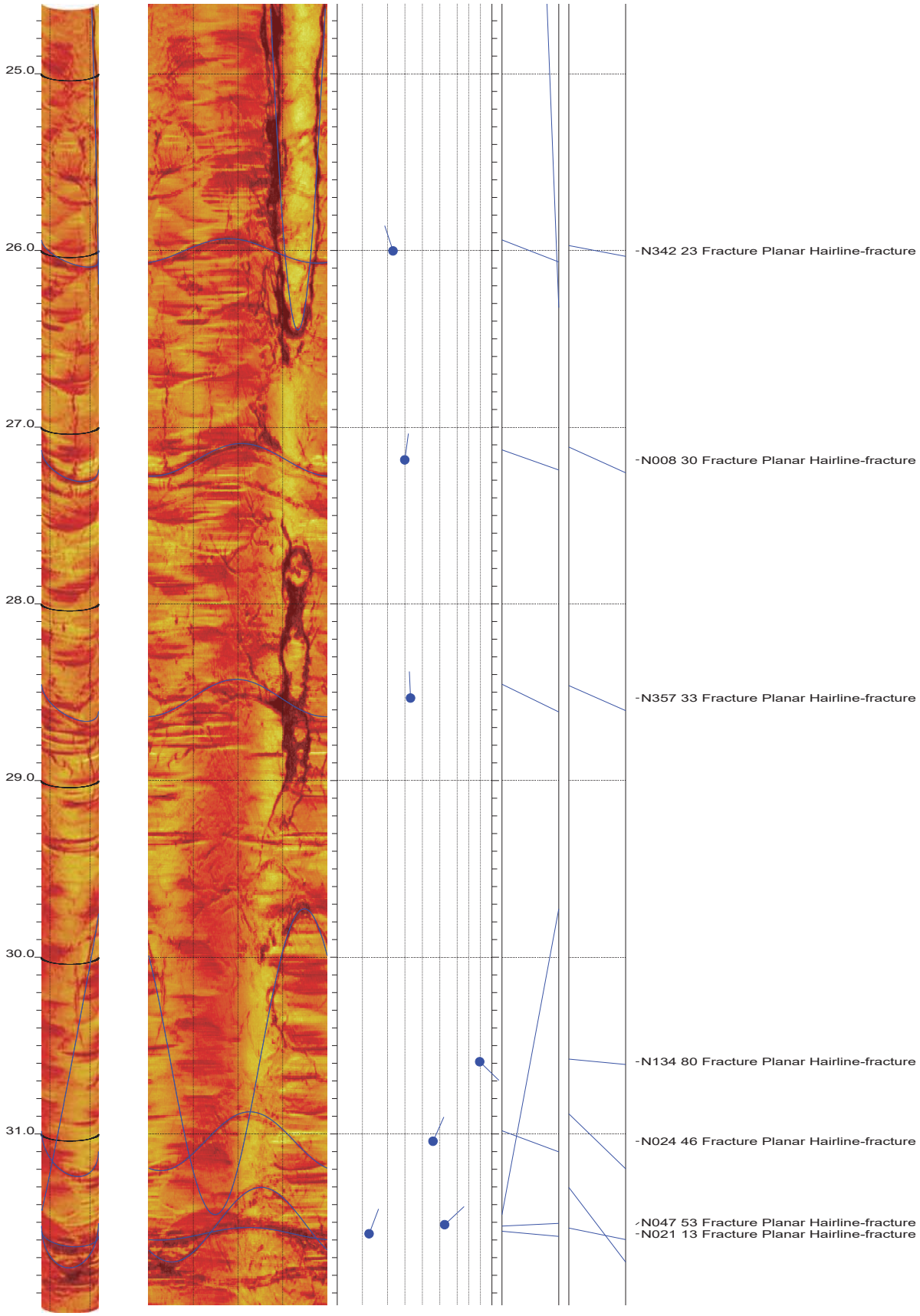
Zone from 148.344 to 6.024ft
Format: BHTV-NESWN

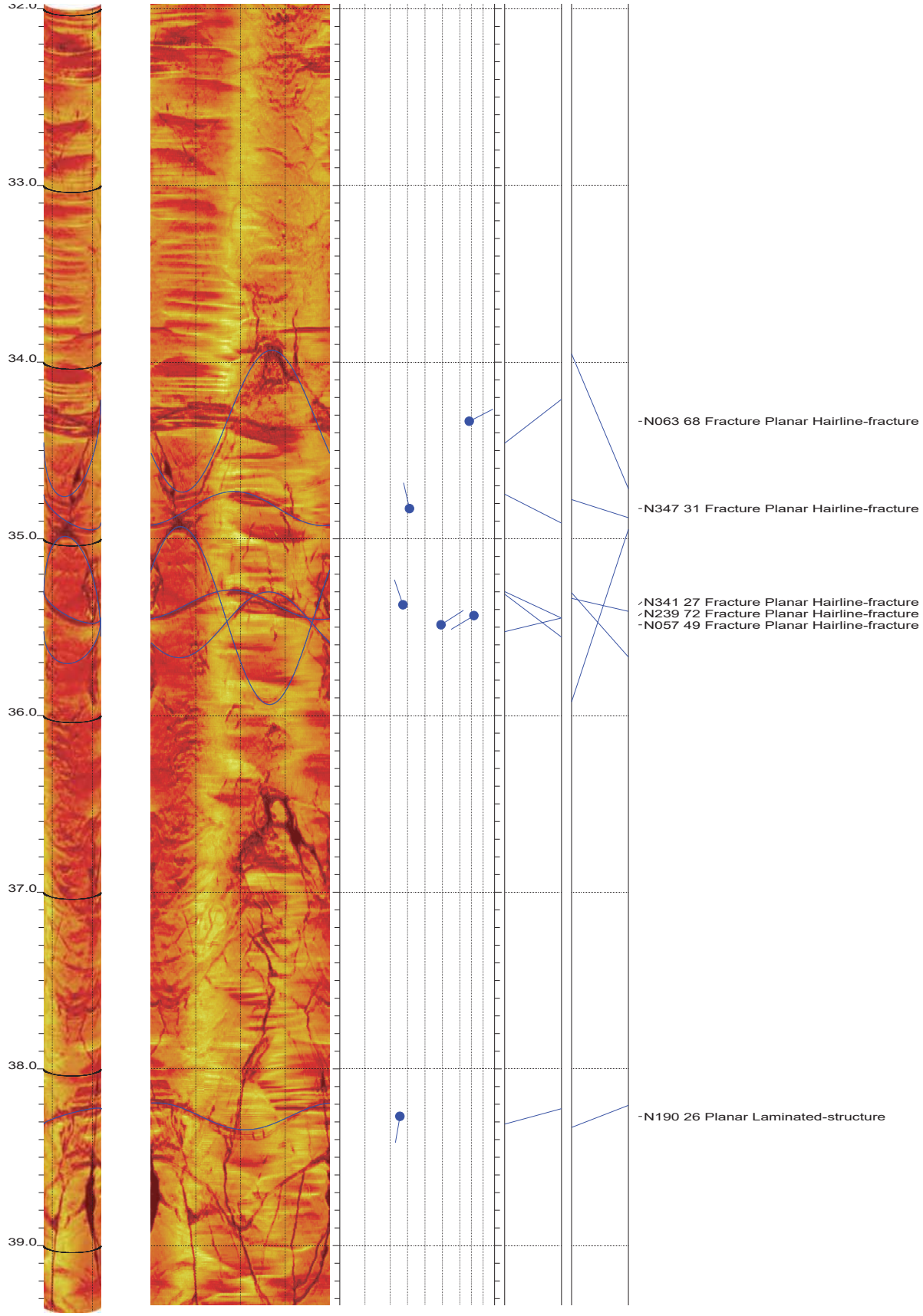
Borehole diam: 3.860inch
Vertical = borehole-axis
Image: Amplitude

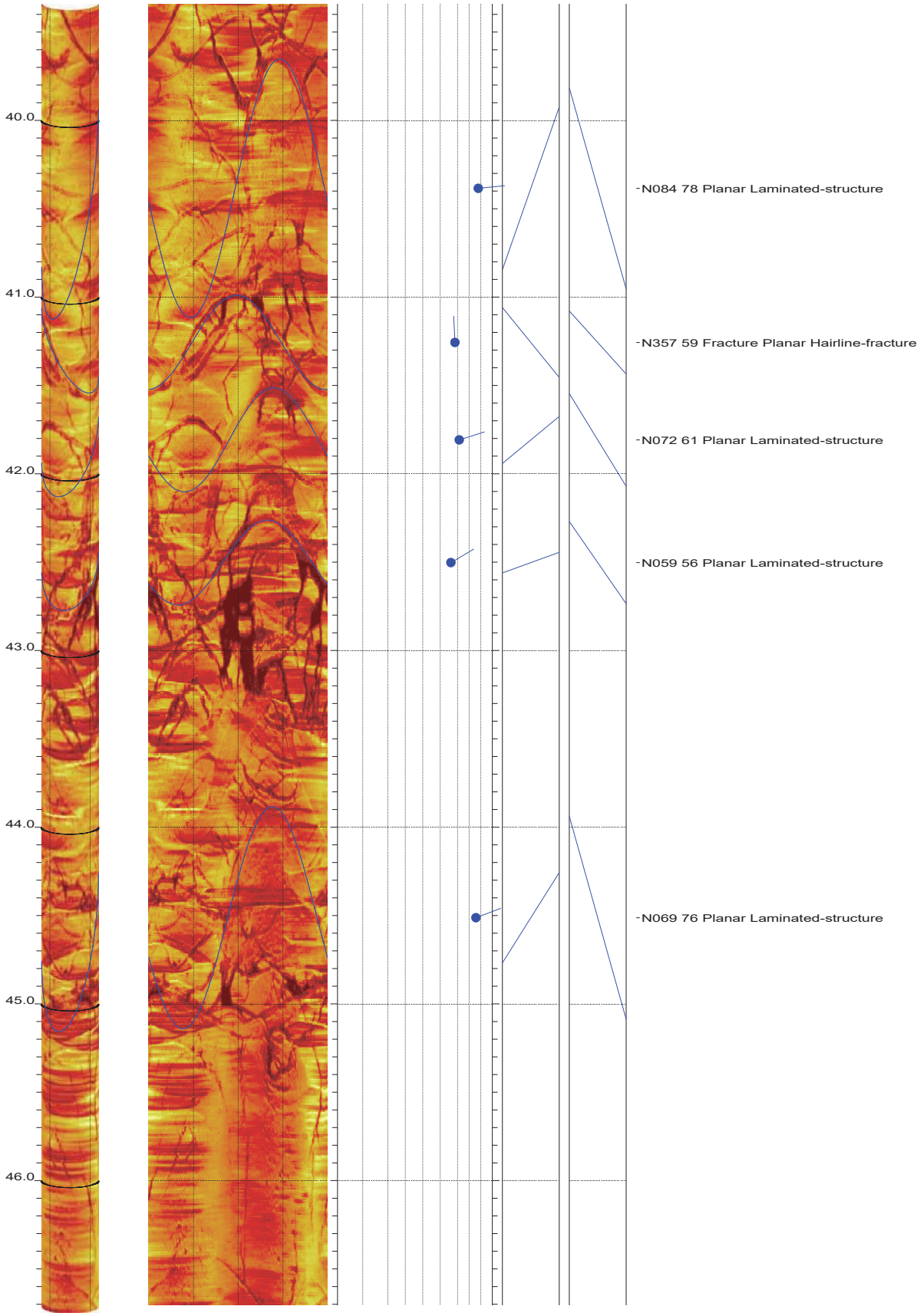


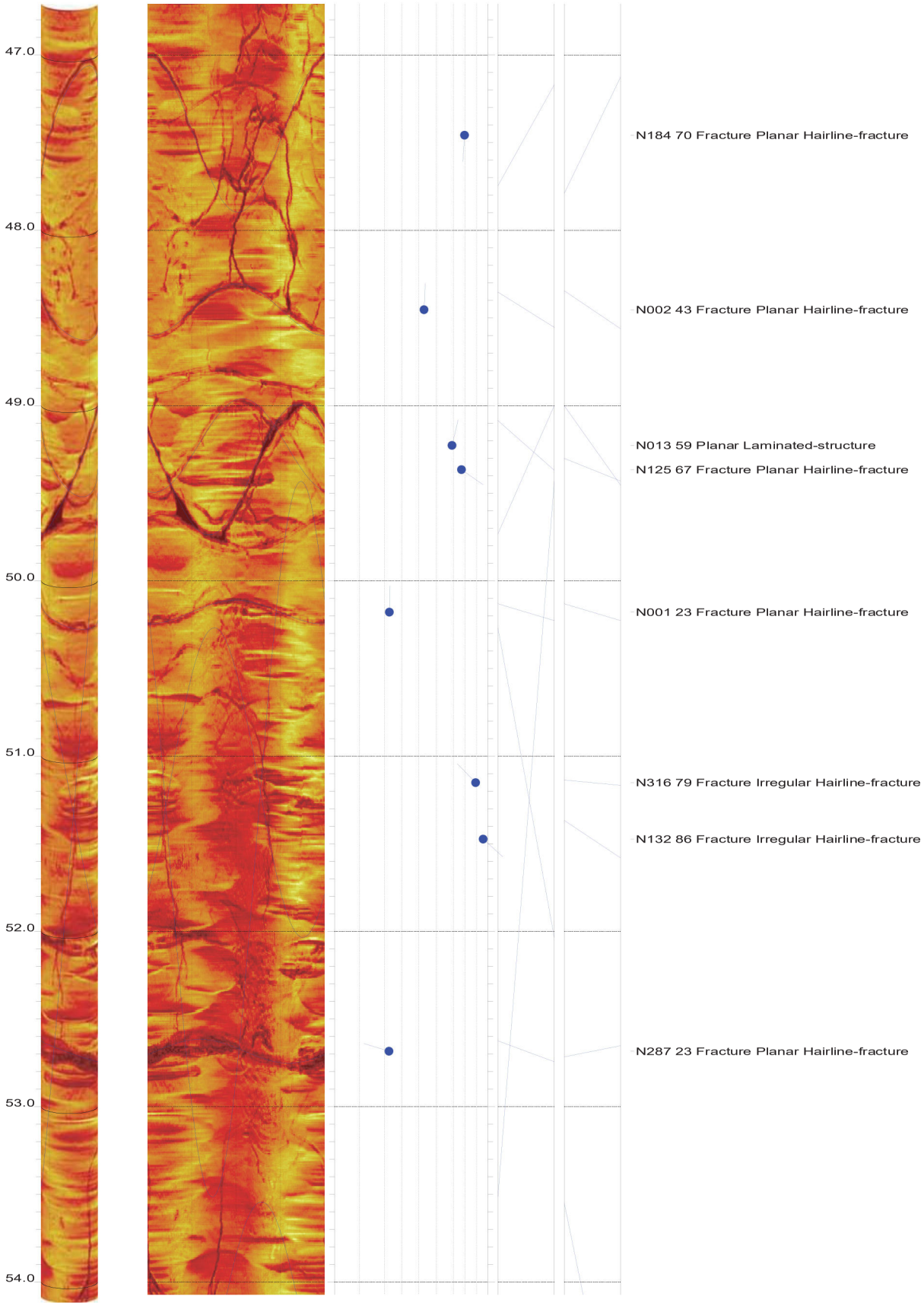

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-N236 76 Fracture Planar Open-fracture
-N230 74 Fracture Planar Hairline-fracture
-N032 22 Fracture Planar Hairline-fracture
-N236 61 Fracture Planar Hairline-fracture
-N254 80 Planar Laminated-structure

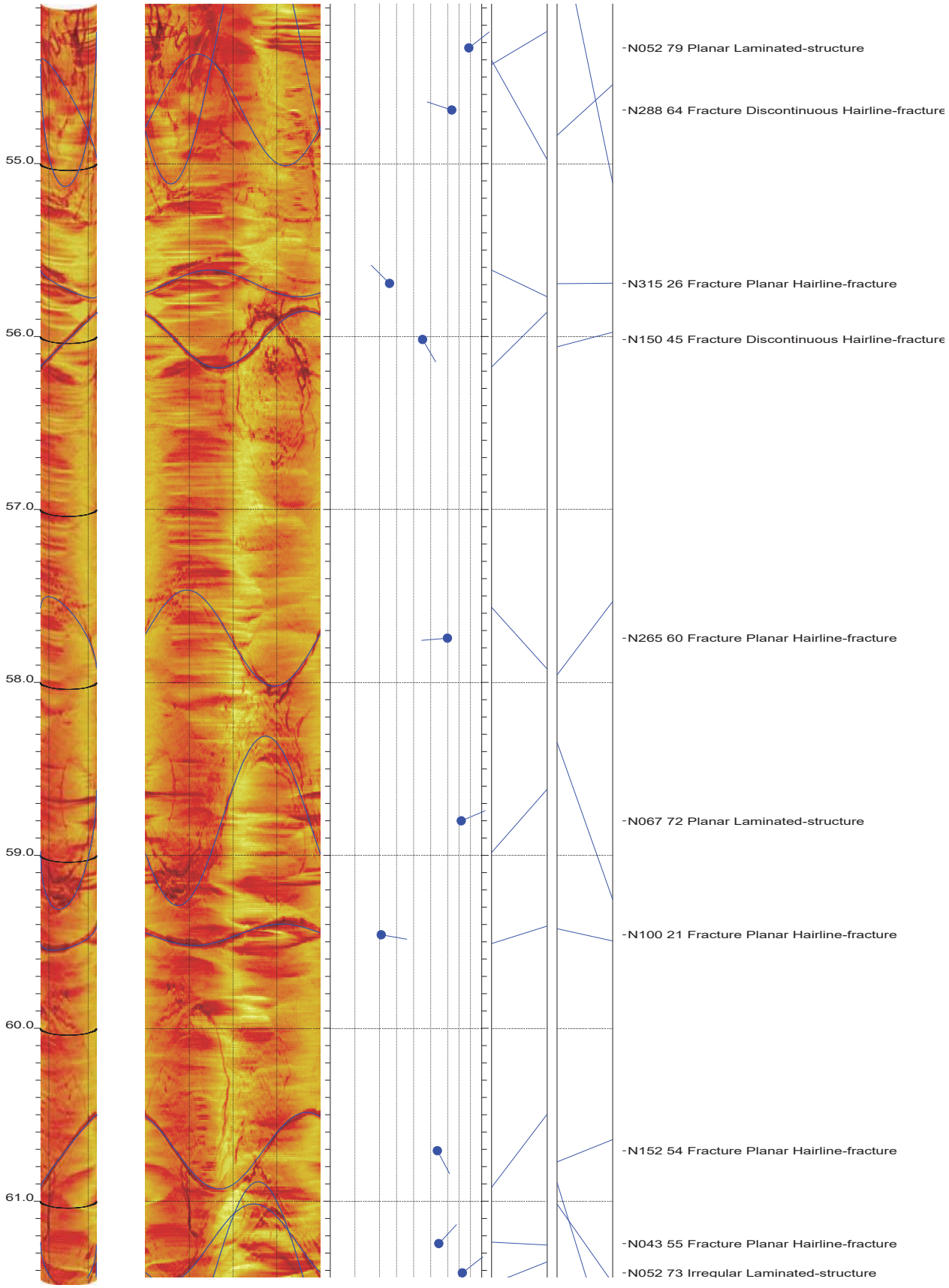

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N007 34 Fracture Planar Hairline-fracture
N007 25 Fracture Planar Hairline-fracture
N057 35 Fracture Planar Hairline-fracture
N072 79 Planar Laminated-structure
N027 33 Fracture Planar Hairline-fracture
N059 49 Fracture Planar Hairline-fracture
N301 87 Fracture Planar Hairline-fracture
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N198 23 Fracture Planar Hairline-fracture

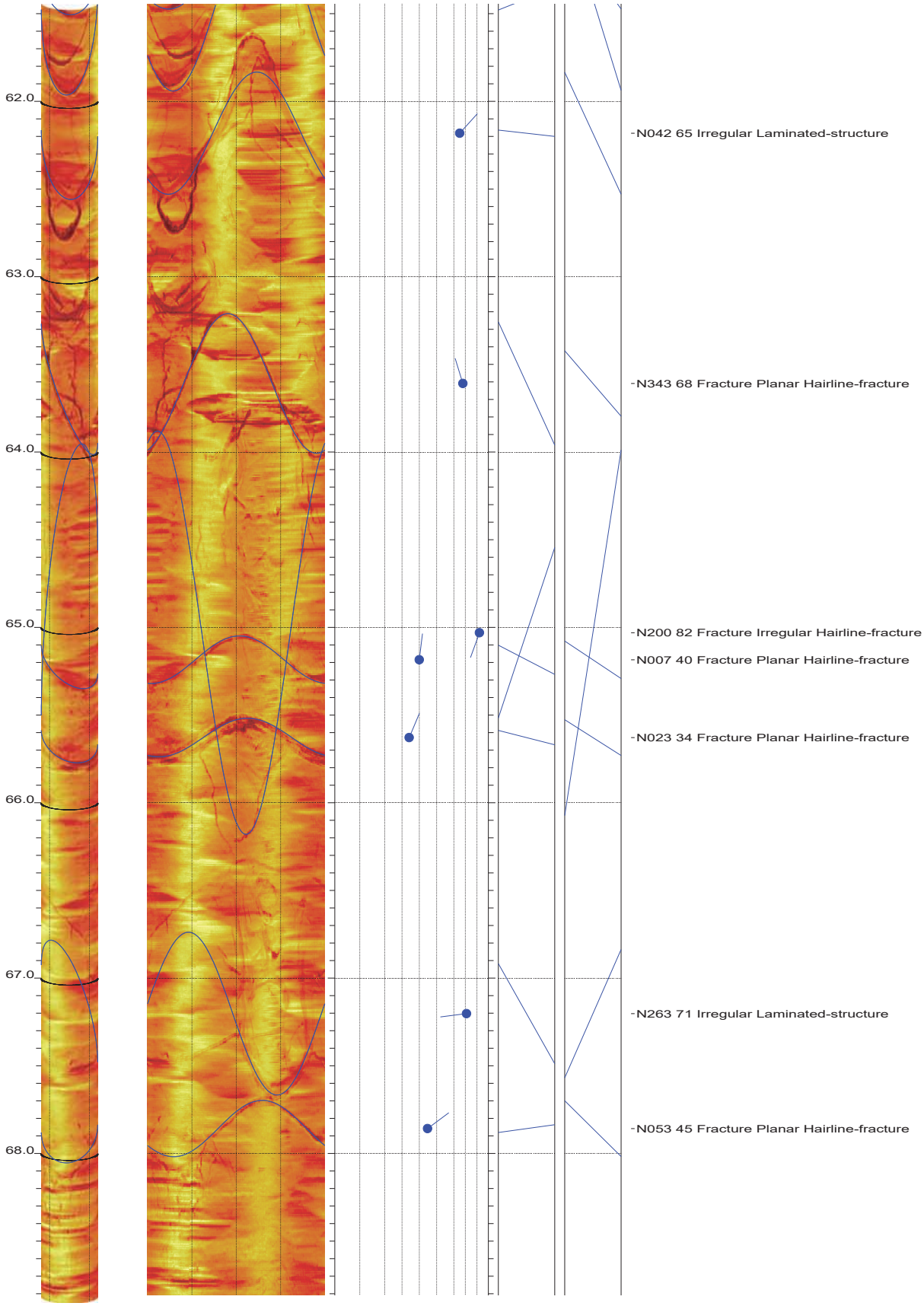

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N357 33 Fracture Planar Hairline-fracture
N134 80 Fracture Planar Hairline-fracture
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N047 53 Fracture Planar Hairline-fracture
N021 13 Fracture Planar Hairline-fracture

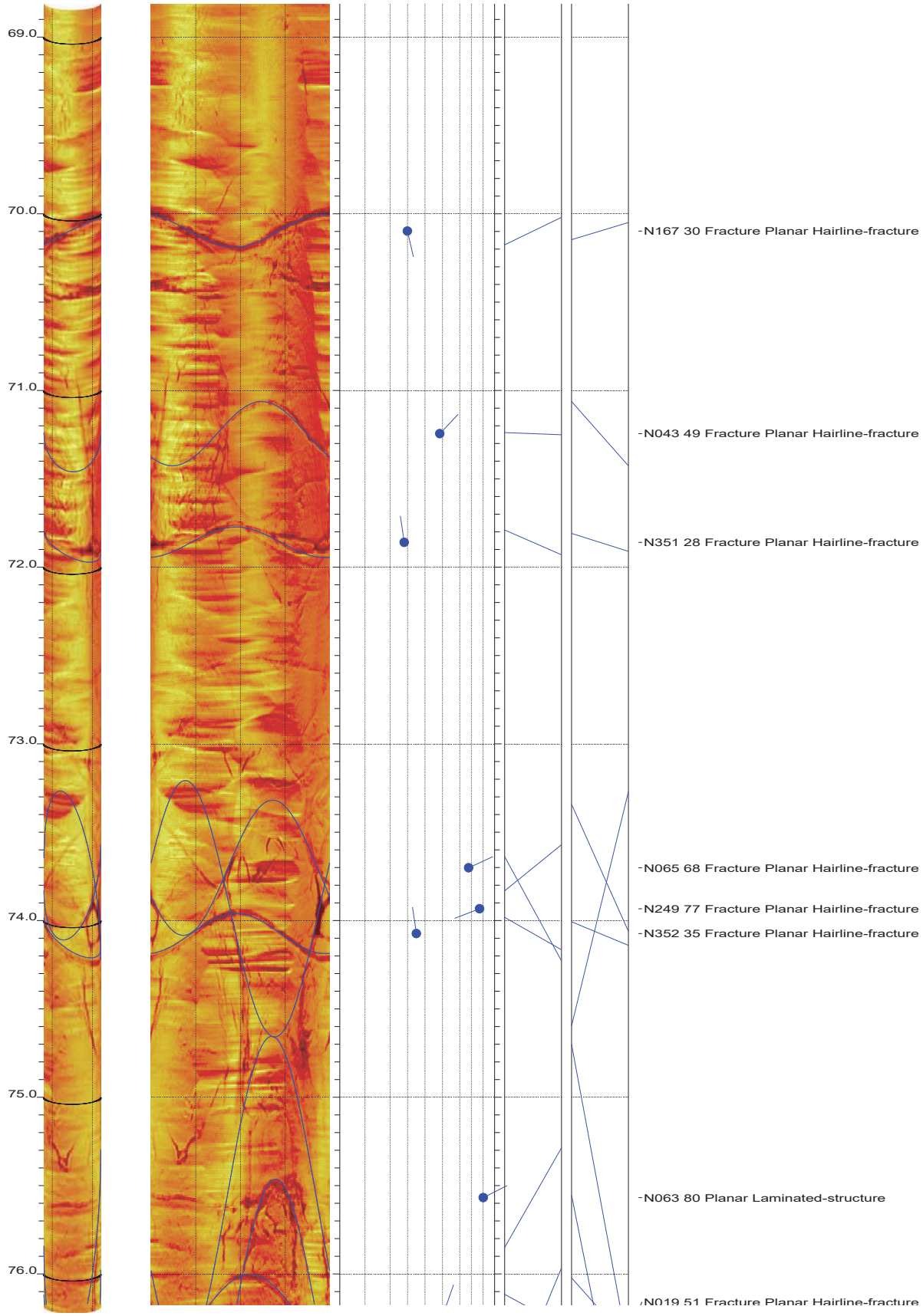

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N057 49 Fracture Planar Hairline-fracture
N190 26 Planar Laminated-structure

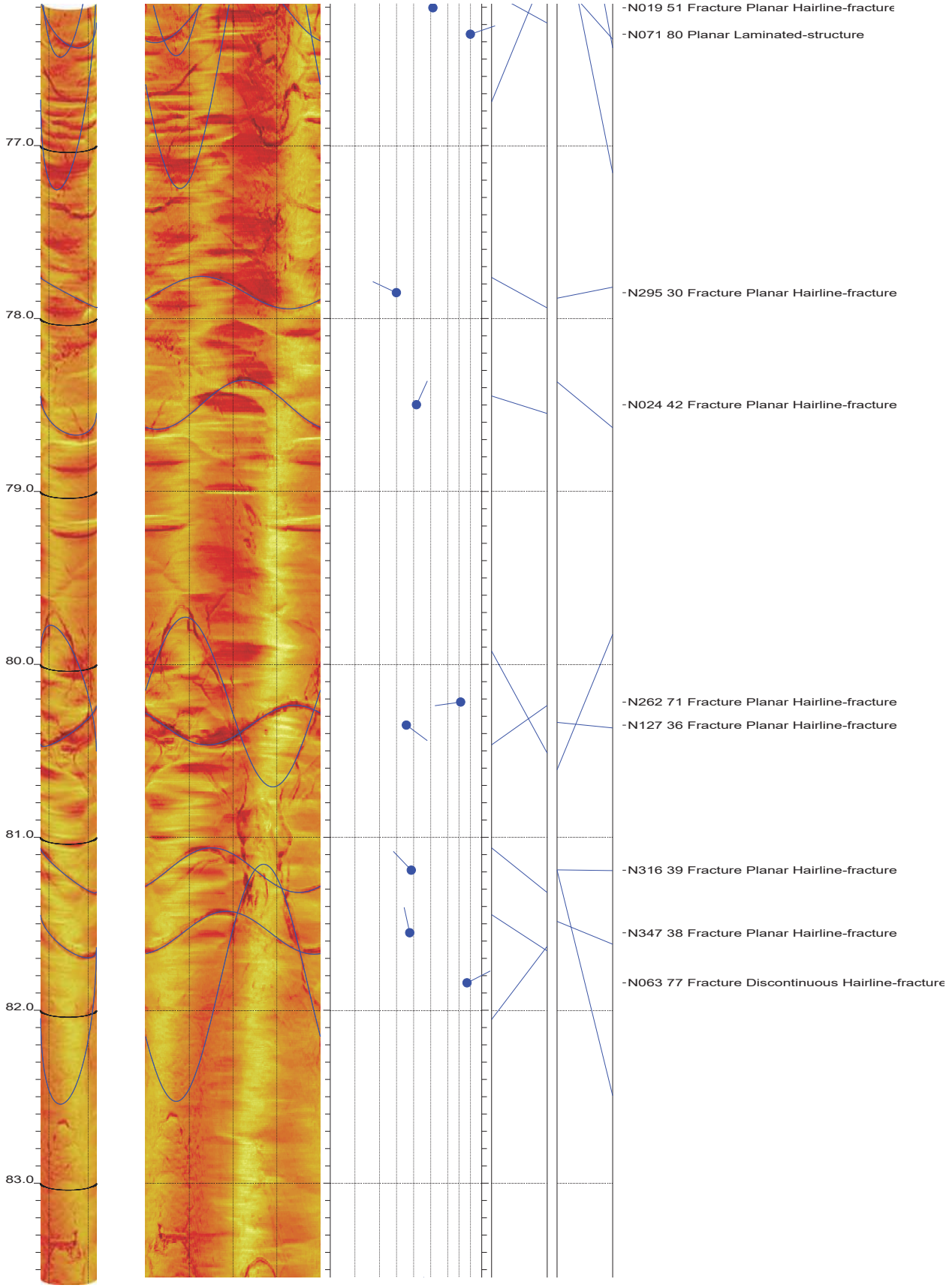

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-N072 61 Planar Laminated-structure
-N059 56 Planar Laminated-structure
-N069 76 Planar Laminated-structure

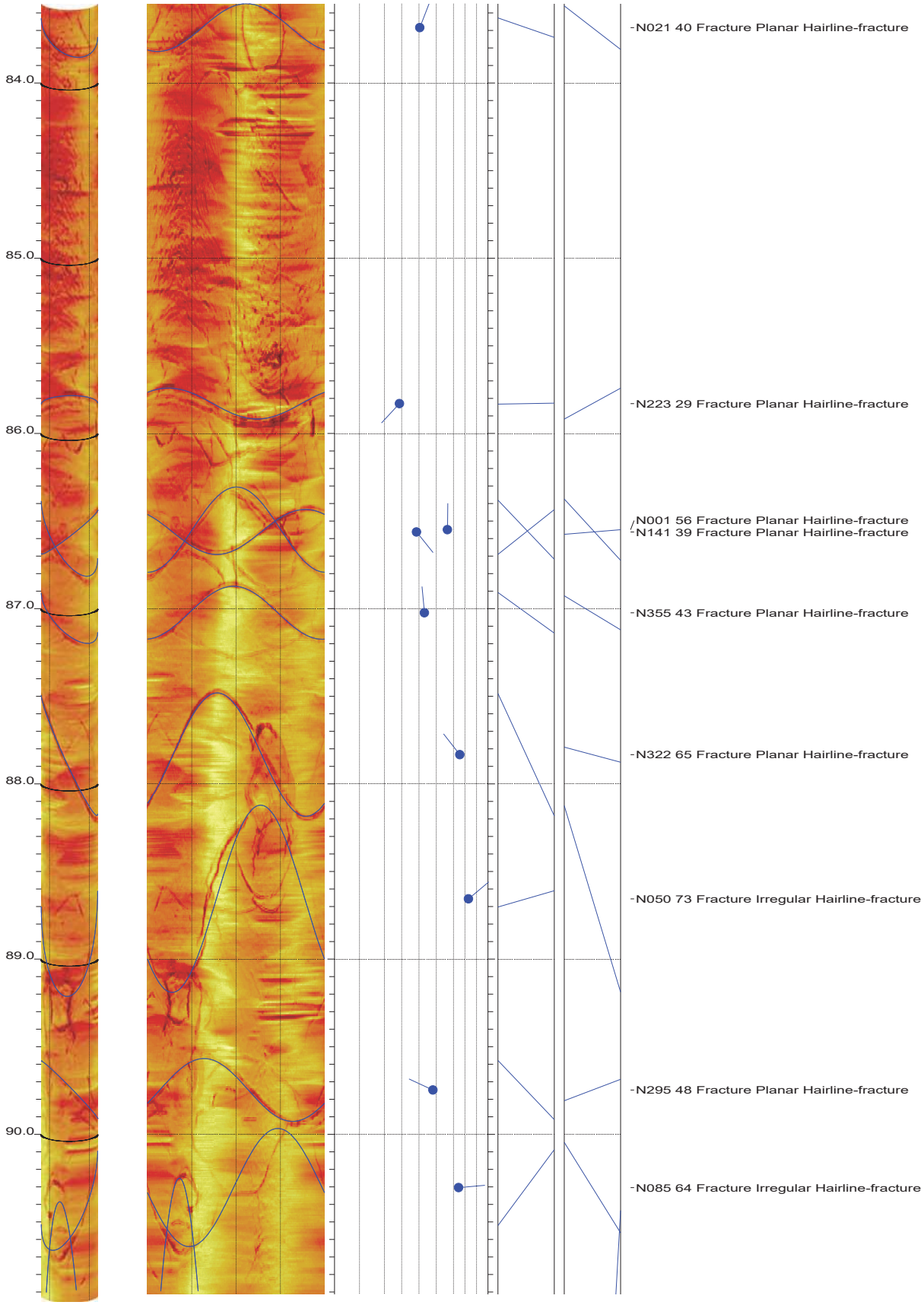

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N013 59 Planar Laminated-structure
N125 67 Fracture Planar Hairline-fracture
N001 23 Fracture Planar Hairline-fracture
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N287 23 Fracture Planar Hairline-fracture

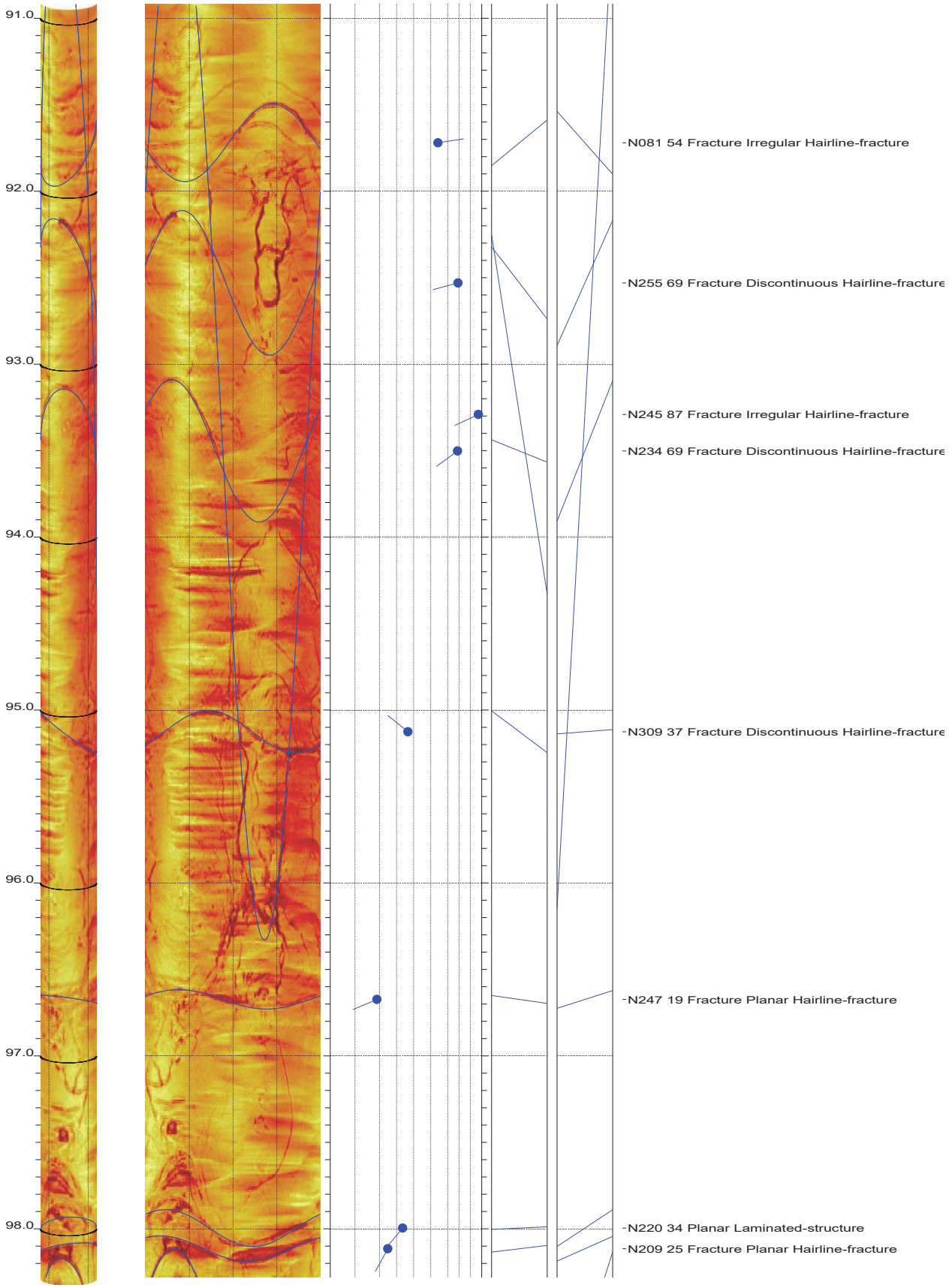

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N315 26 Fracture Planar Hairline-fracture
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N265 60 Fracture Planar Hairline-fracture
N067 72 Planar Laminated-structure
N100 21 Fracture Planar Hairline-fracture
N152 54 Fracture Planar Hairline-fracture
N043 55 Fracture Planar Hairline-fracture
N052 73 Irregular Laminated-structure

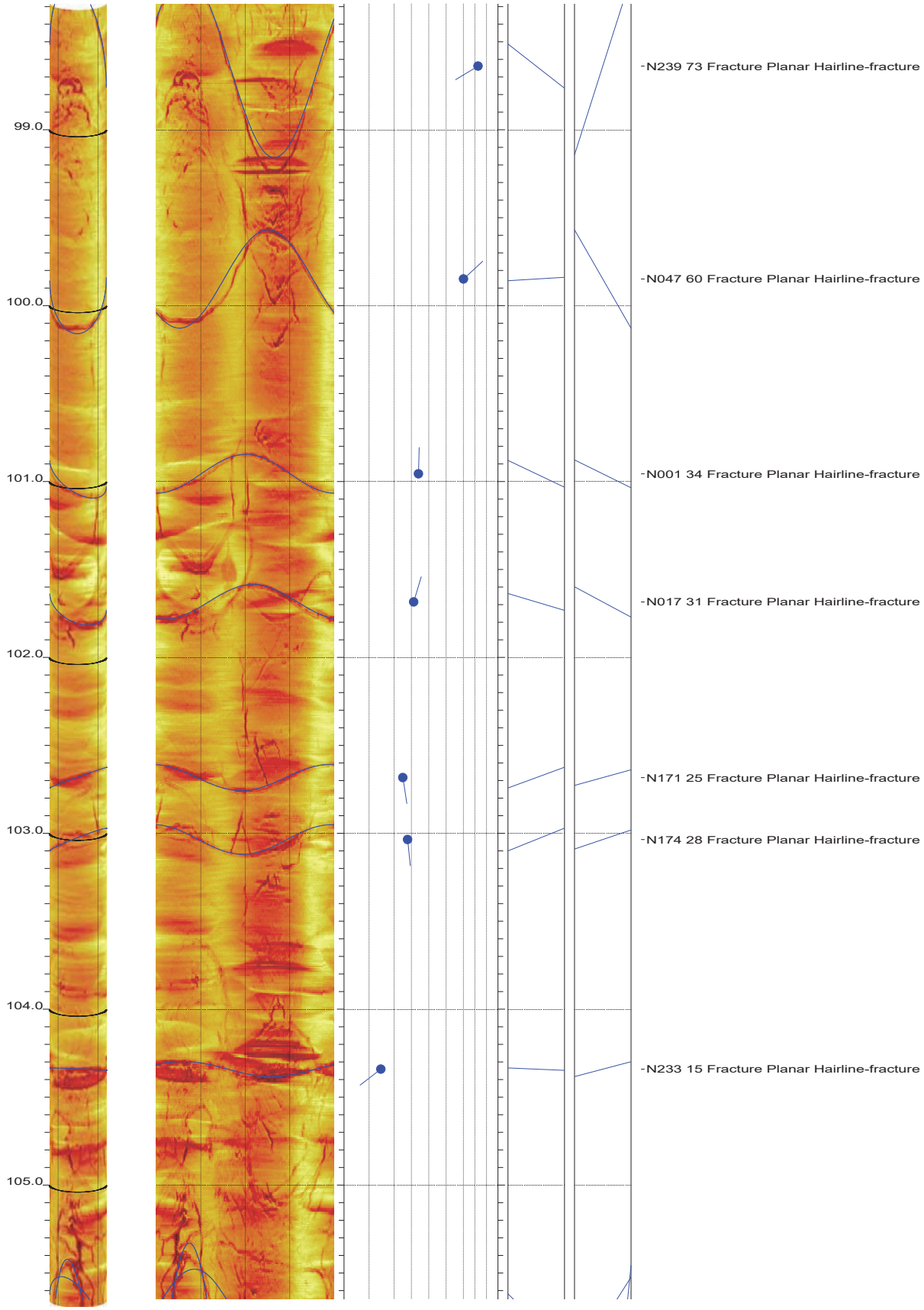

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-N200 82 Fracture Irregular Hairline-fracture
-N007 40 Fracture Planar Hairline-fracture
-N023 34 Fracture Planar Hairline-fracture
-N263 71 Irregular Laminated-structure
-N053 45 Fracture Planar Hairline-fracture

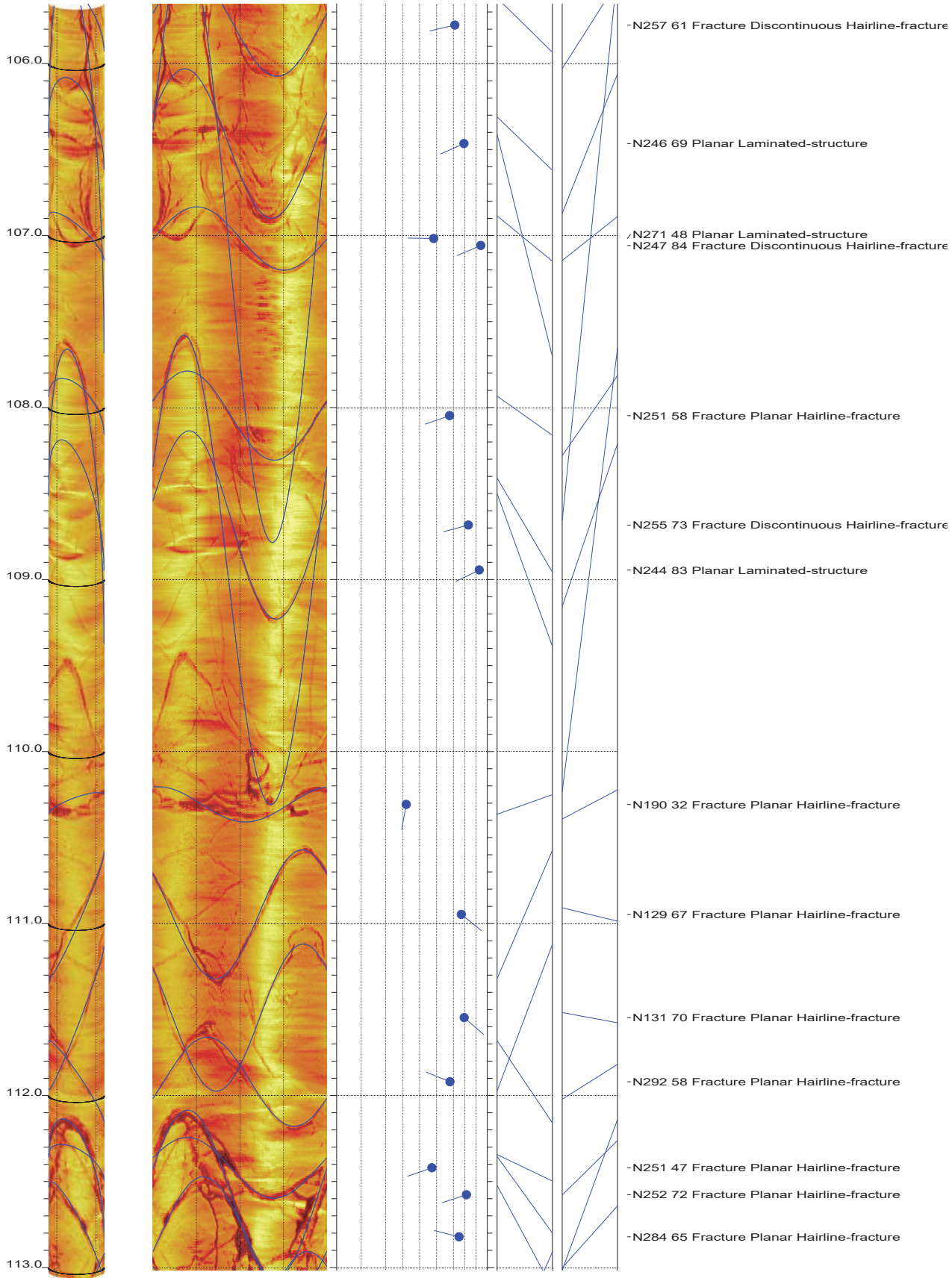

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N351 28 Fracture Planar Hairline-fracture
N065 68 Fracture Planar Hairline-fracture
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N352 35 Fracture Planar Hairline-fracture
N063 80 Planar Laminated-structure
N019 51 Fracture Planar Hairline-fracture

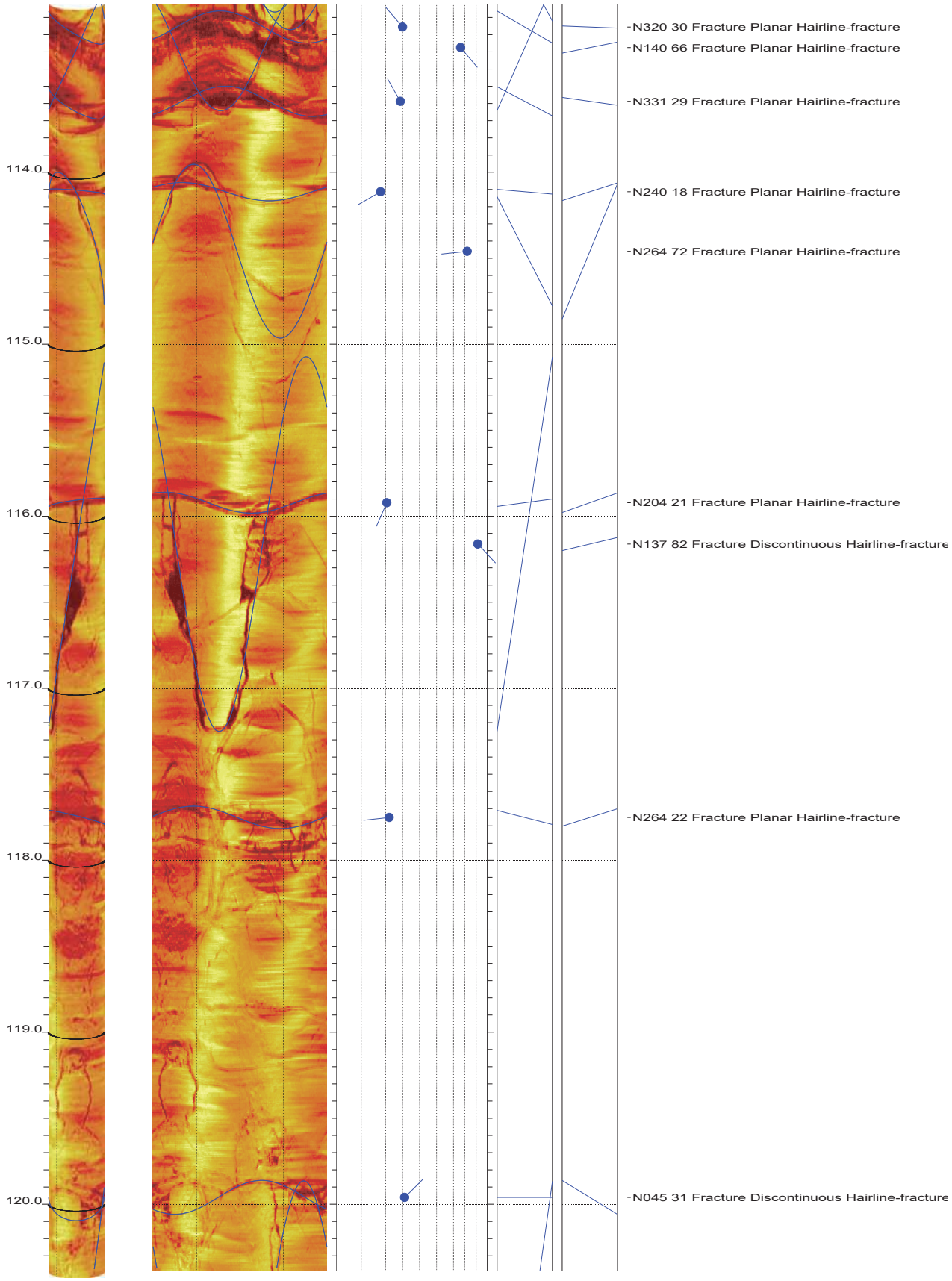

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-N071 80 Planar Laminated-structure
-N295 30 Fracture Planar Hairline-fracture
-N024 42 Fracture Planar Hairline-fracture
-N262 71 Fracture Planar Hairline-fracture
-N127 36 Fracture Planar Hairline-fracture
-N316 39 Fracture Planar Hairline-fracture
-N347 38 Fracture Planar Hairline-fracture
-N063 77 Fracture Discontinuous Hairline-fracture

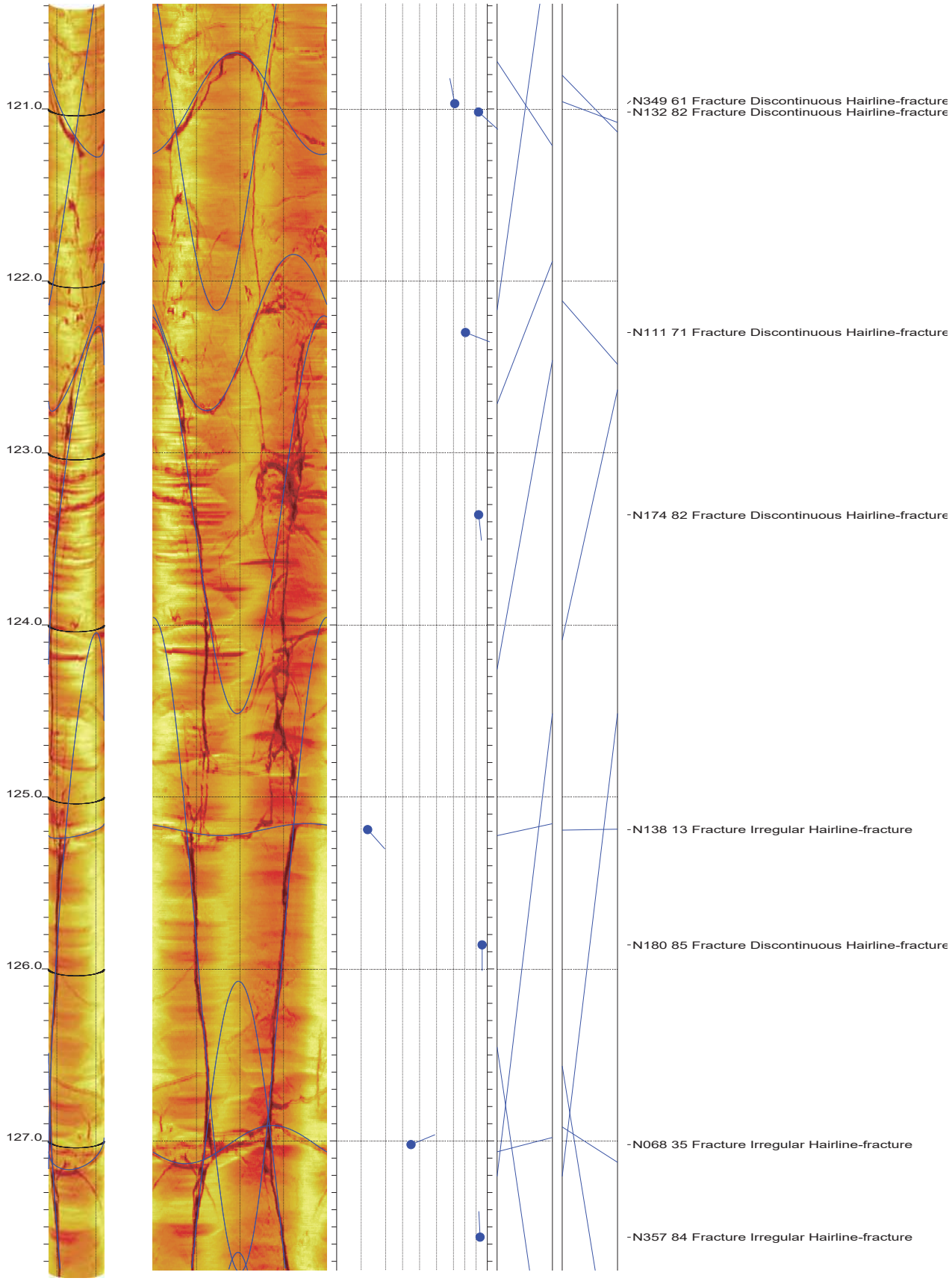

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N001 56 Fracture Planar Hairline-fracture
N141 39 Fracture Planar Hairline-fracture
N355 43 Fracture Planar Hairline-fracture
N322 65 Fracture Planar Hairline-fracture
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N085 64 Fracture Irregular Hairline-fracture

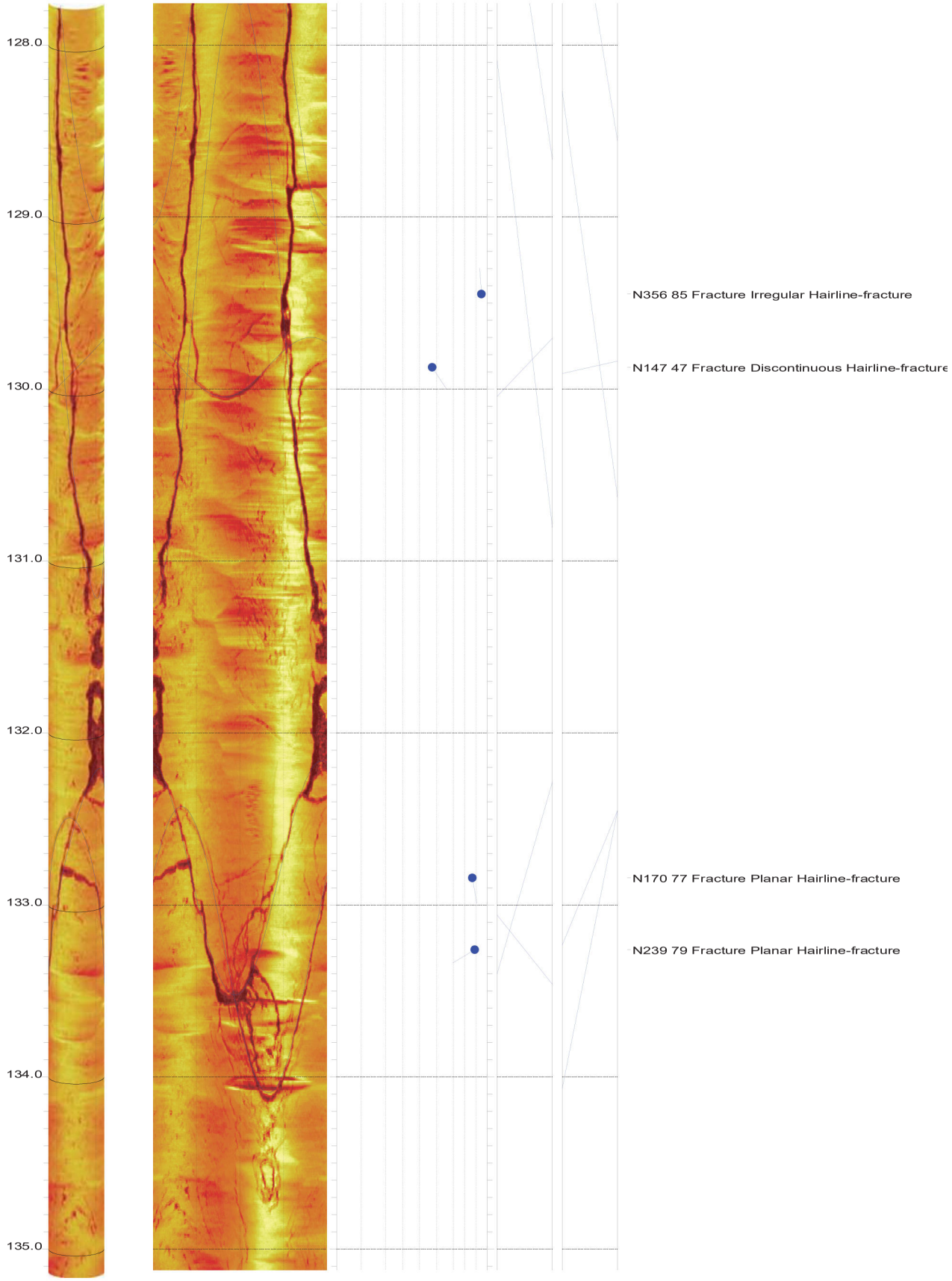

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N245 87 Fracture Irregular Hairline-fracture
N234 69 Fracture Discontinuous Hairline-fracture
N309 37 Fracture Discontinuous Hairline-fracture
N247 19 Fracture Planar Hairline-fracture
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N209 25 Fracture Planar Hairline-fracture

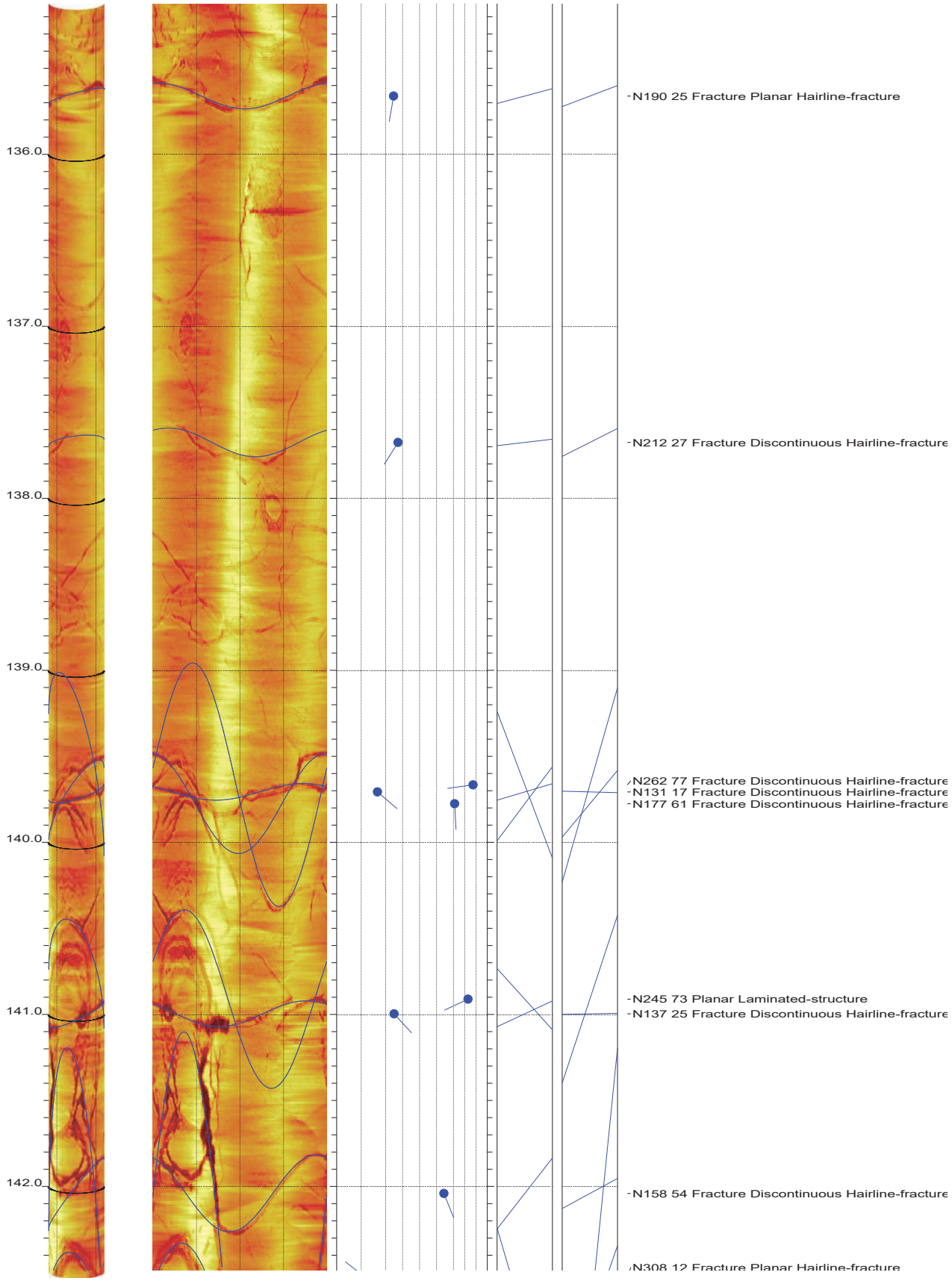

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-N047 60 Fracture Planar Hairline-fracture
-N001 34 Fracture Planar Hairline-fracture
-N017 31 Fracture Planar Hairline-fracture
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-N233 15 Fracture Planar Hairline-fracture

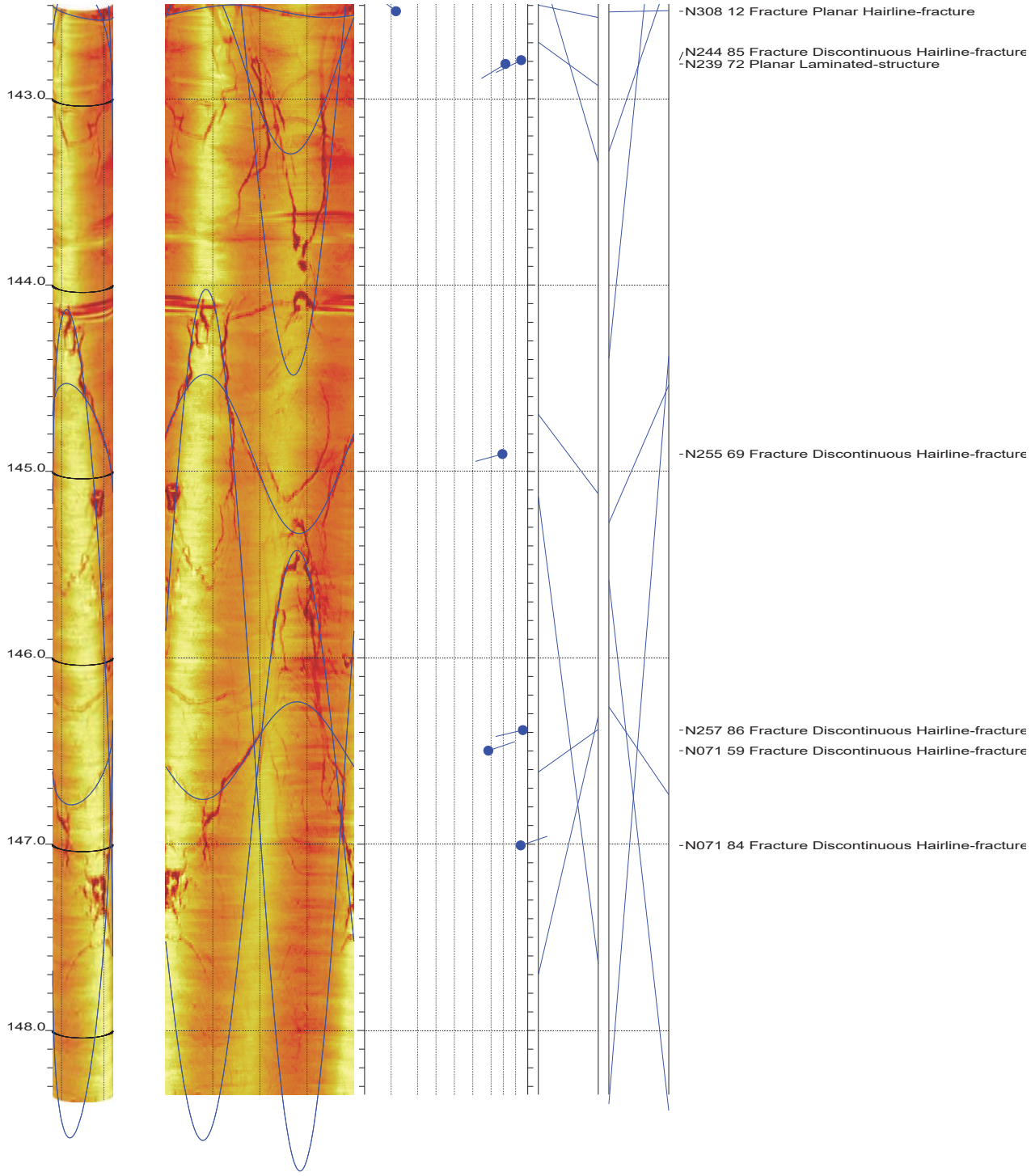

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N247 84 Fracture Discontinuous Hairline-fracture
N251 58 Fracture Planar Hairline-fracture
N255 73 Fracture Discontinuous Hairline-fracture
N244 83 Planar Laminated-structure
N190 32 Fracture Planar Hairline-fracture
N129 67 Fracture Planar Hairline-fracture
N131 70 Fracture Planar Hairline-fracture
N292 58 Fracture Planar Hairline-fracture
N251 47 Fracture Planar Hairline-fracture
N252 72 Fracture Planar Hairline-fracture
N284 65 Fracture Planar Hairline-fracture


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-N331 29 Fracture Planar Hairline-fracture
-N240 18 Fracture Planar Hairline-fracture
-N264 72 Fracture Planar Hairline-fracture
-N204 21 Fracture Planar Hairline-fracture
-N137 82 Fracture Discontinuous Hairline-fracture
-N264 22 Fracture Planar Hairline-fracture
-N045 31 Fracture Discontinuous Hairline-fracture


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N111 71 Fracture Discontinuous Hairline-fracture
N174 82 Fracture Discontinuous Hairline-fracture
N138 13 Fracture Irregular Hairline-fracture
N180 85 Fracture Discontinuous Hairline-fracture
N068 35 Fracture Irregular Hairline-fracture
N357 84 Fracture Irregular Hairline-fracture


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N239 79 Fracture Planar Hairline-fracture


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N190 25 Fracture Planar Hairline-fracture
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N262 77 Fracture Discontinuous Hairline-fracture
N131 17 Fracture Discontinuous Hairline-fracture
N177 61 Fracture Discontinuous Hairline-fracture
N245 73 Planar Laminated-structure
N137 25 Fracture Discontinuous Hairline-fracture
N158 54 Fracture Discontinuous Hairline-fracture
N308 12 Fracture Planar Hairline-fracture


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N244 85 Fracture Discontinuous Hairline-fracture
N239 72 Planar Laminated-structure
N255 69 Fracture Discontinuous Hairline-fracture
N257 86 Fracture Discontinuous Hairline-fracture
N071 59 Fracture Discontinuous Hairline-fracture
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BHTV DATA PROCESSING
RGLDIP vsn 6.2
INTERPRETED BHTV DIPS LOG

AECOM

Borehole: B-105

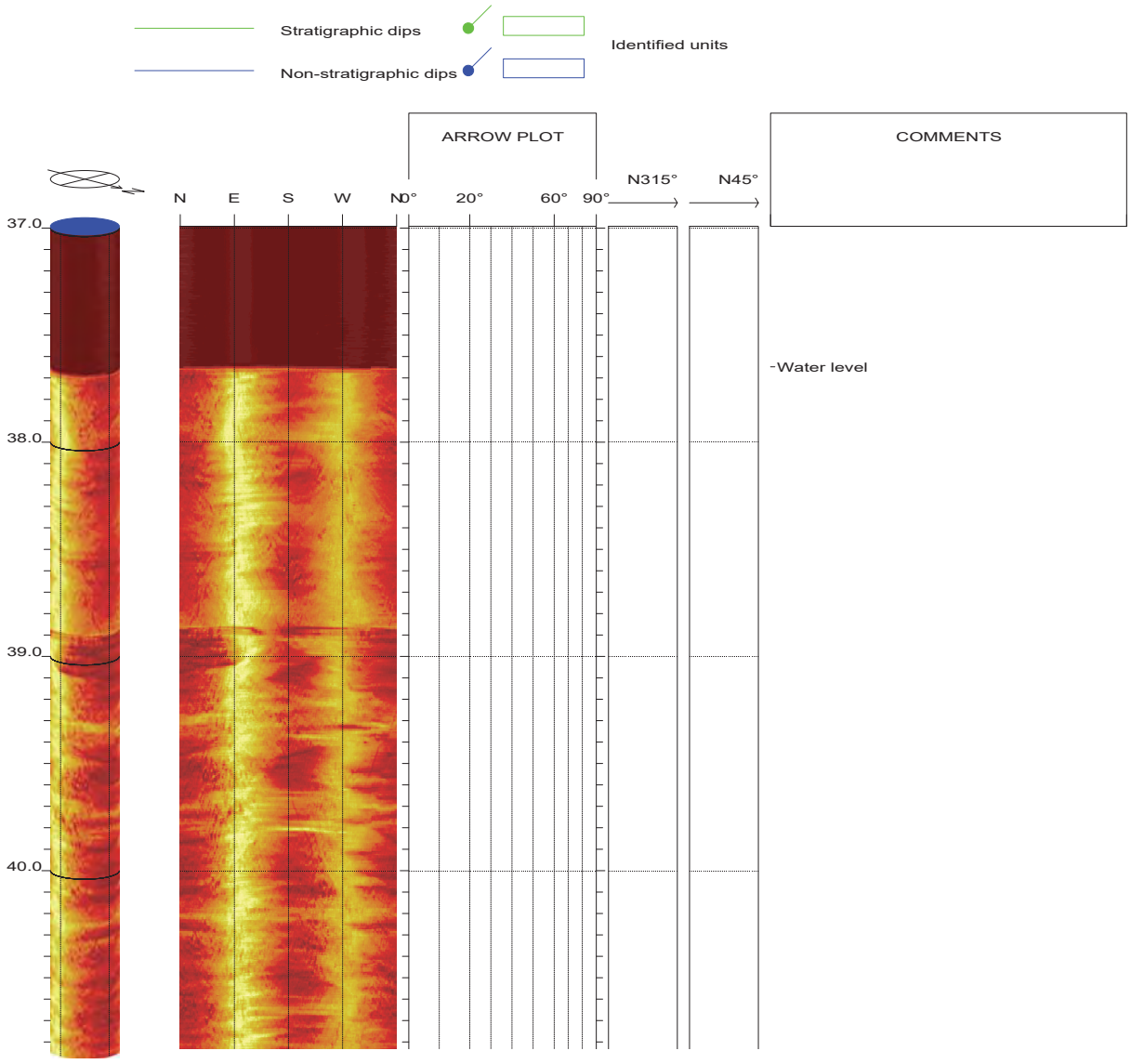
VAIL DAM

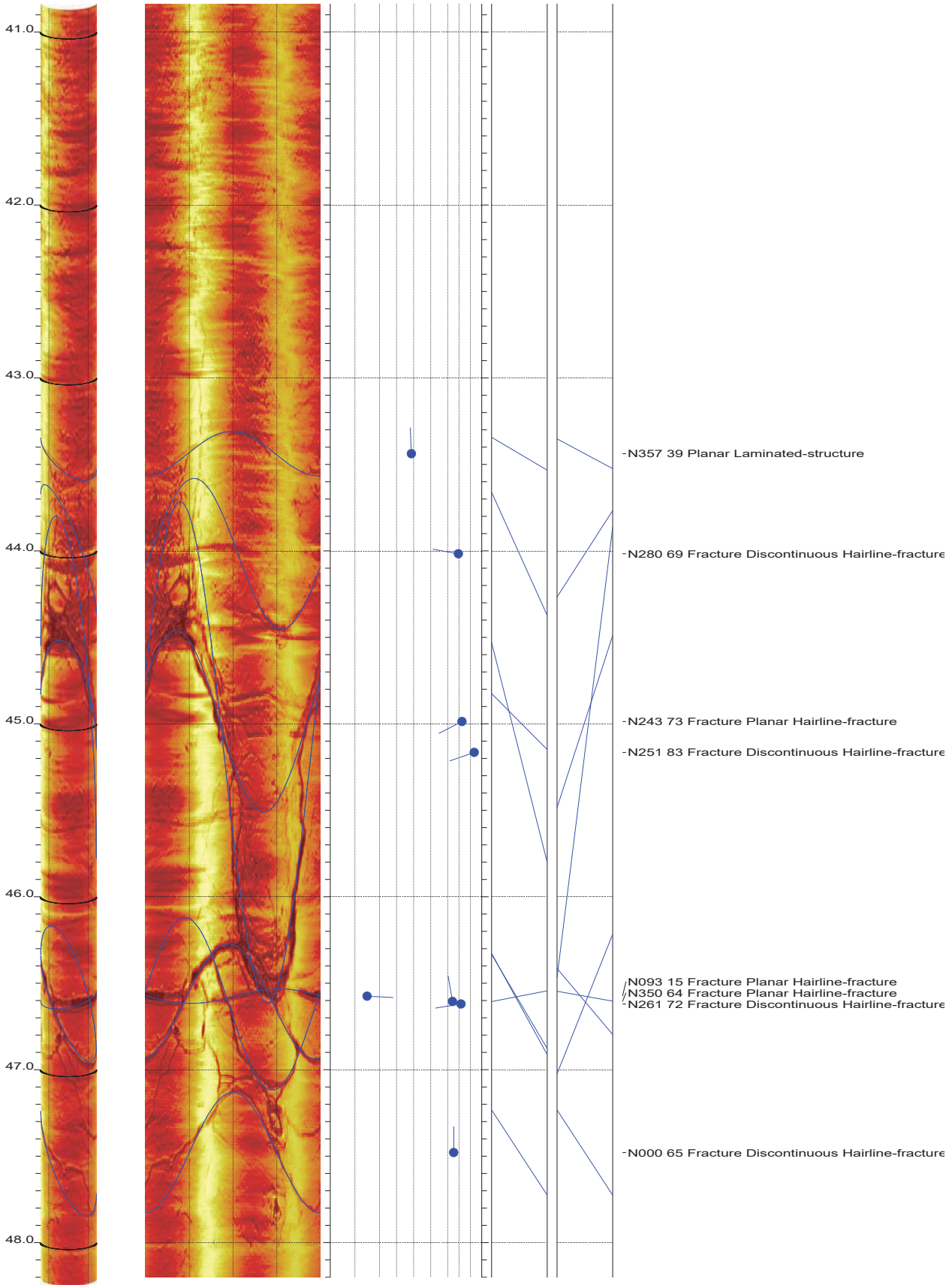
top of borehole.....
East: _
North:_
Elev: _

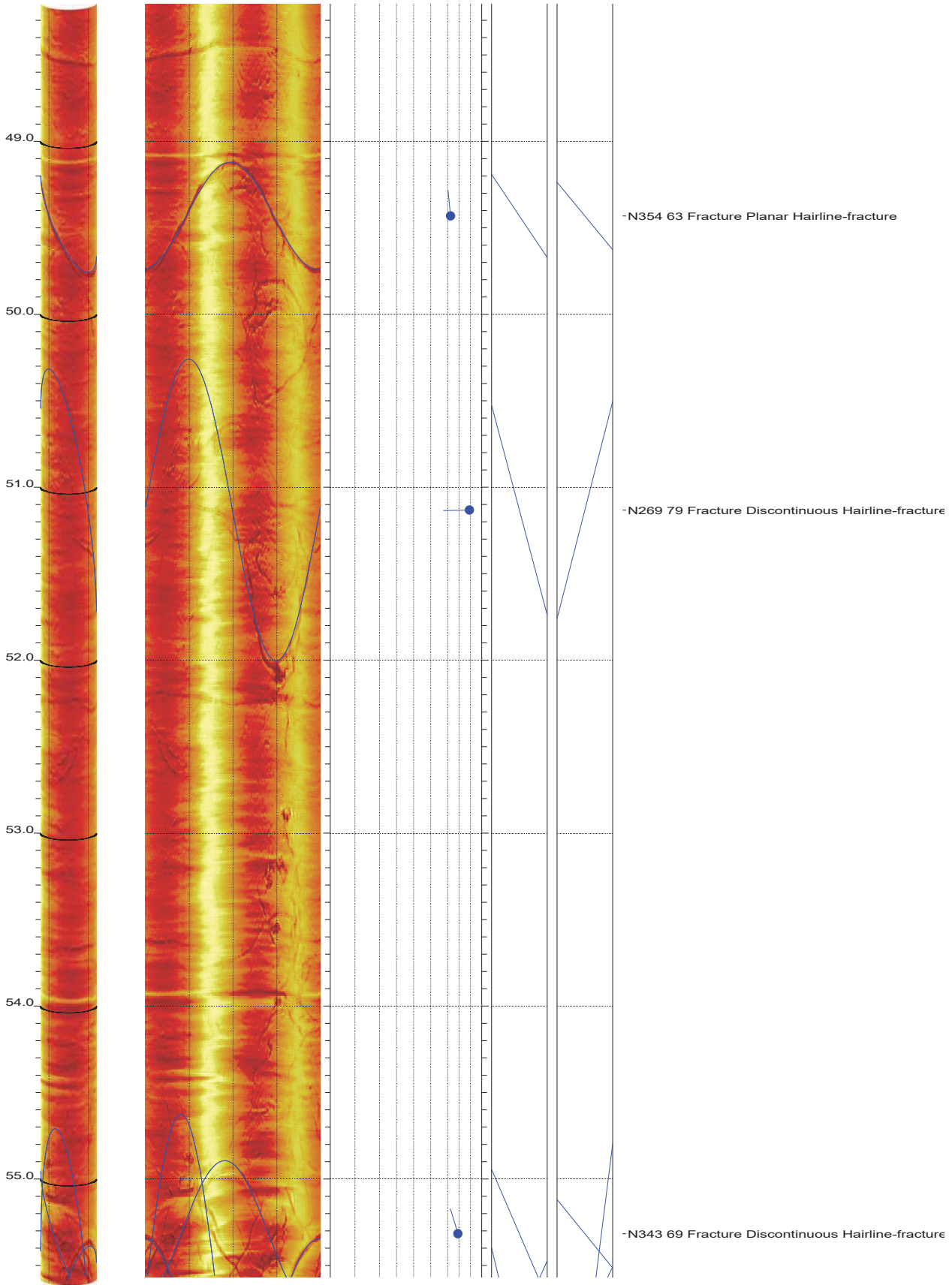
North ref. is true
Depth units are feet
Vertical scale: 1/10
Horiz scale = 1.00x Vert scale

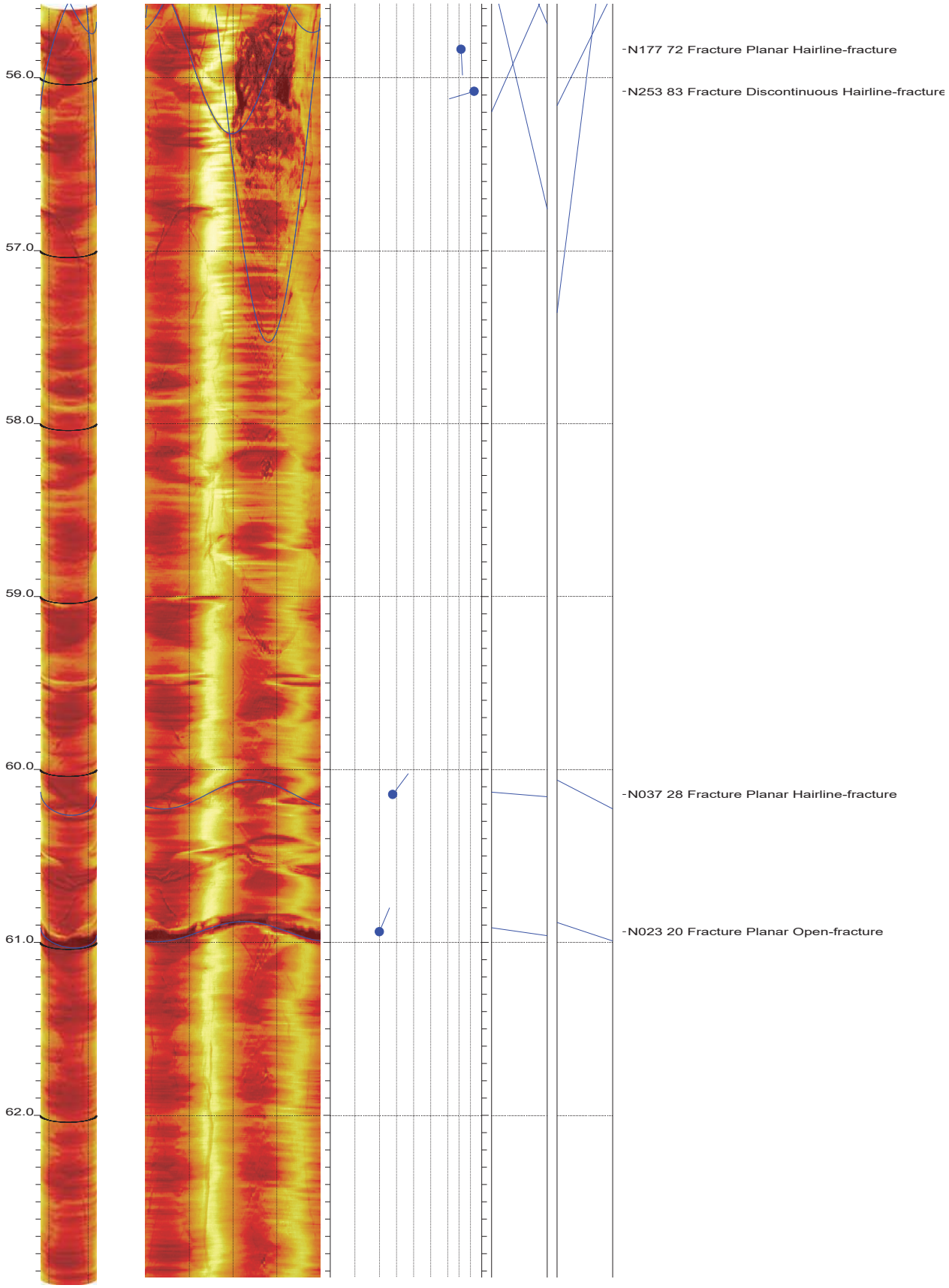
Zone from 100.060 to 36.992ft
Format: BHTV-NESWN

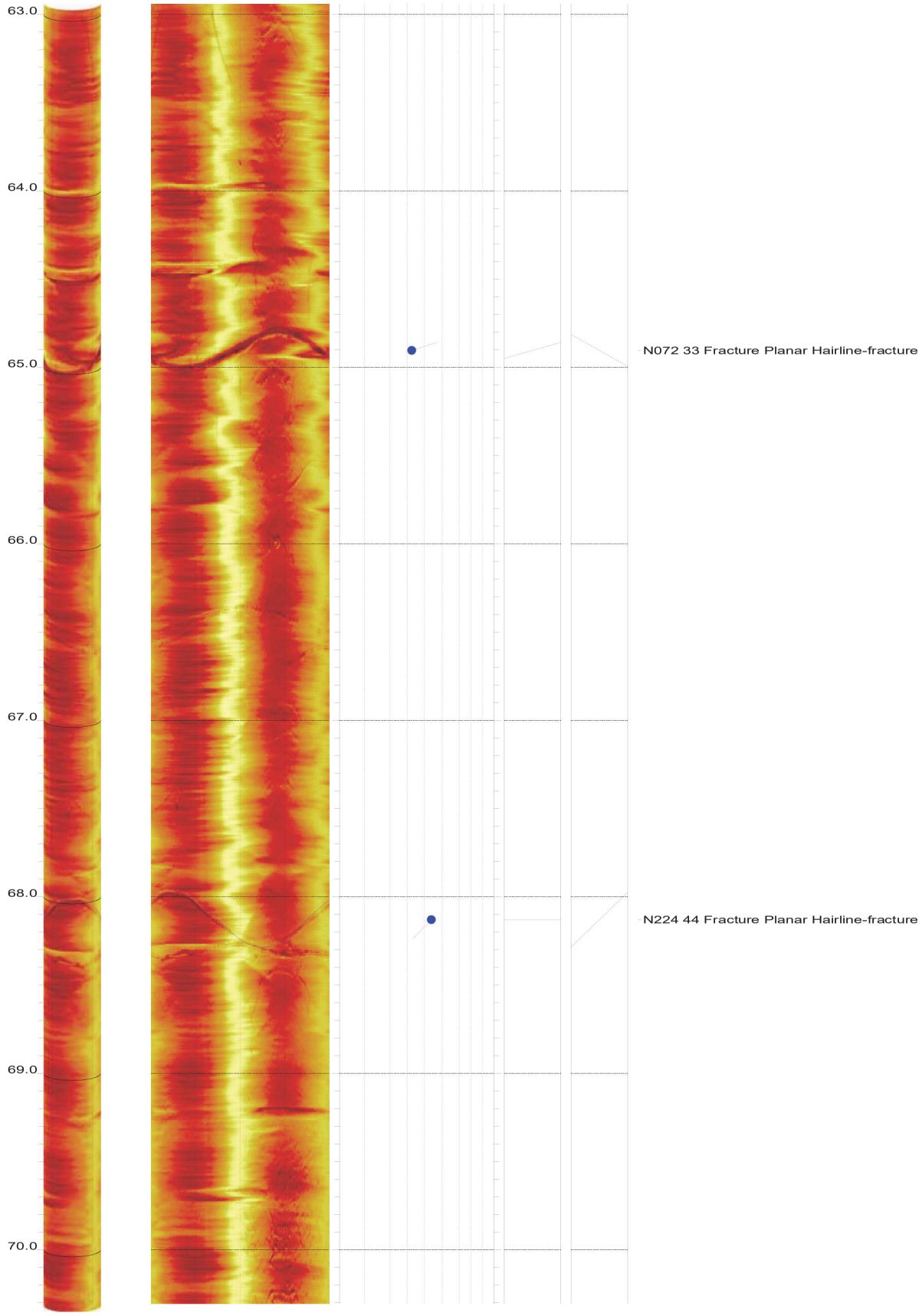
Borehole diam: 3.860inch
Vertical = borehole-axis
Image: Amplitude

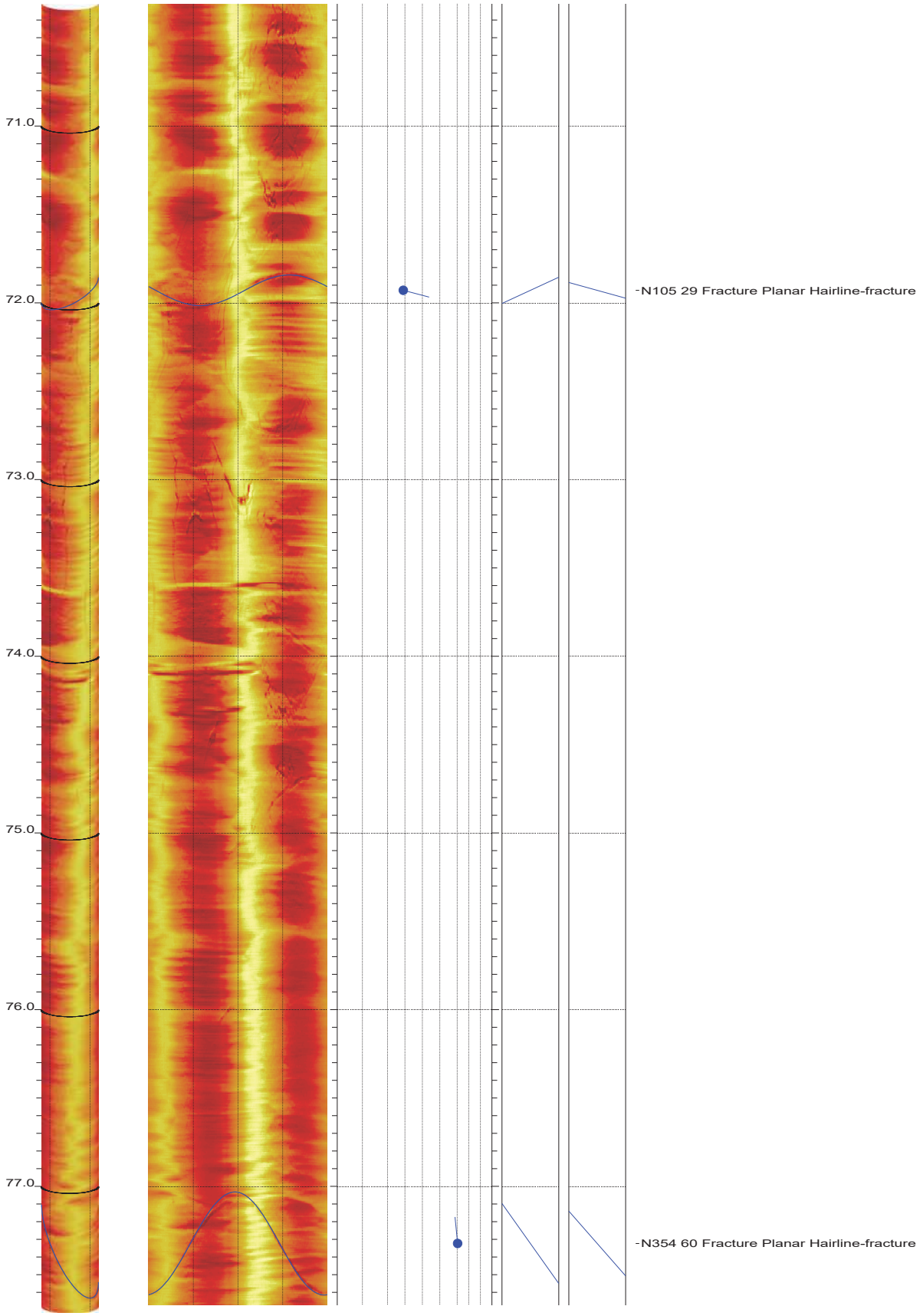


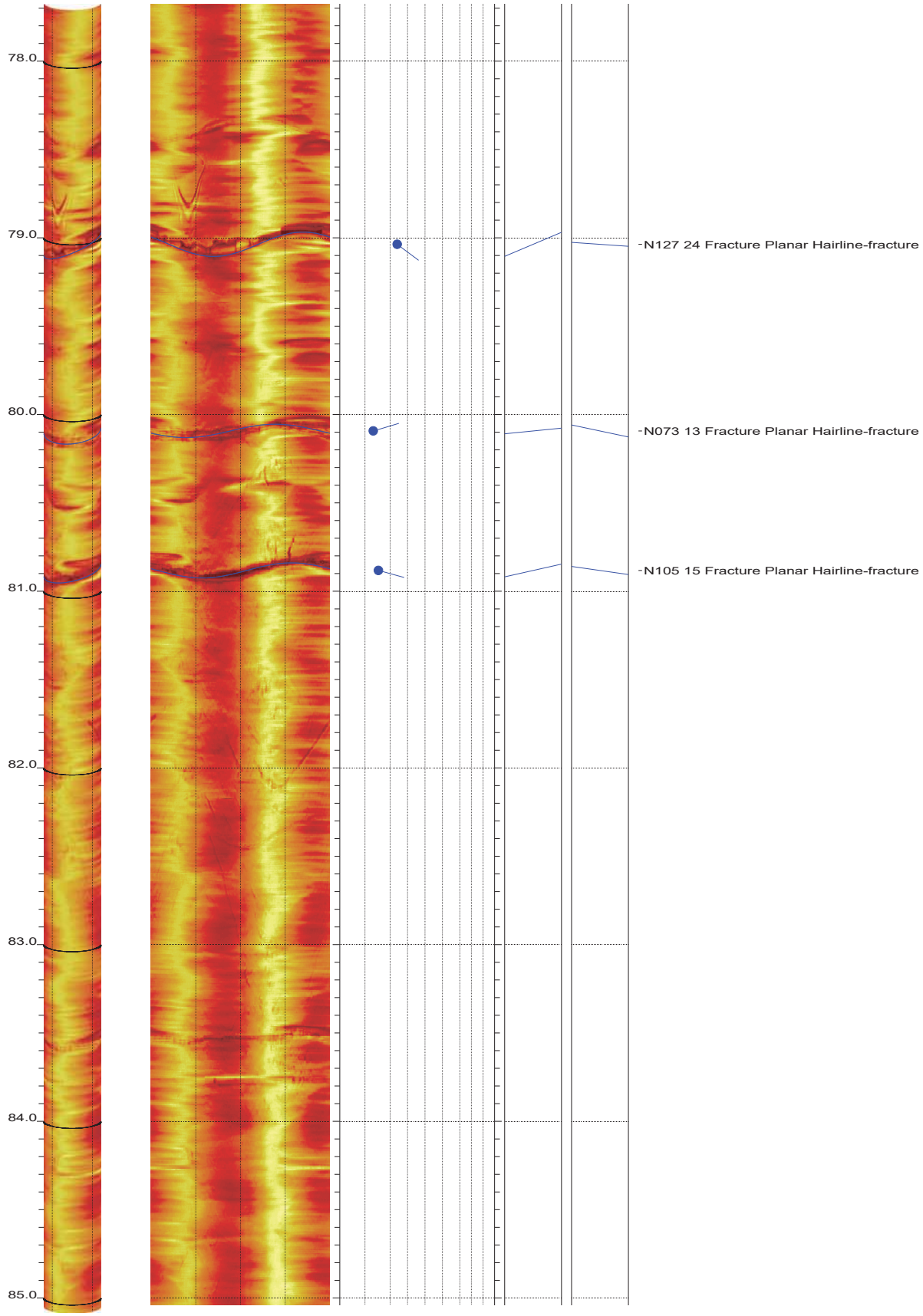

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-N243 73 Fracture Planar Hairline-fracture
-N251 83 Fracture Discontinuous Hairline-fracture
-N093 15 Fracture Planar Hairline-fracture
-N350 64 Fracture Planar Hairline-fracture
-N261 72 Fracture Discontinuous Hairline-fracture
-N000 65 Fracture Discontinuous Hairline-fracture

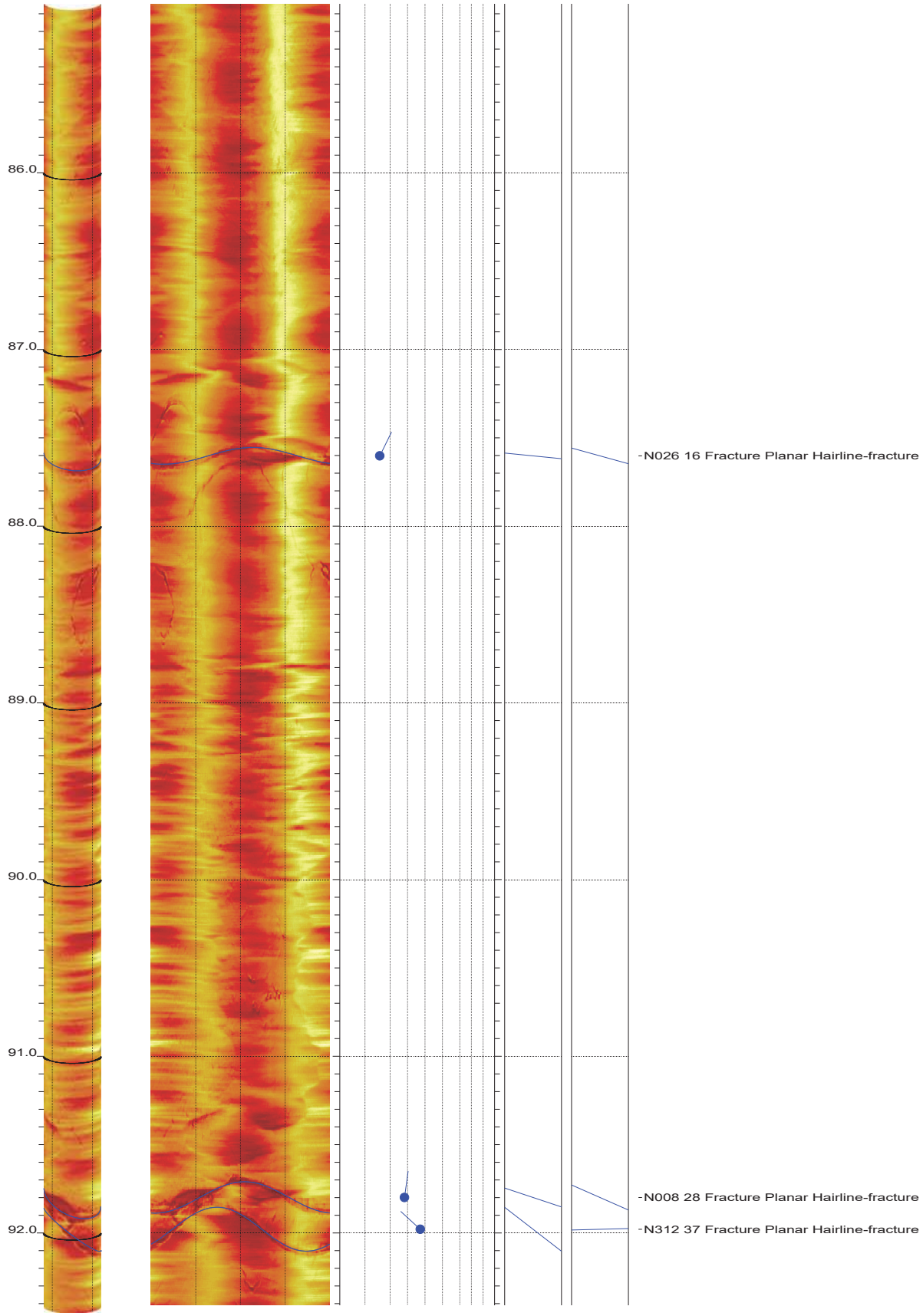

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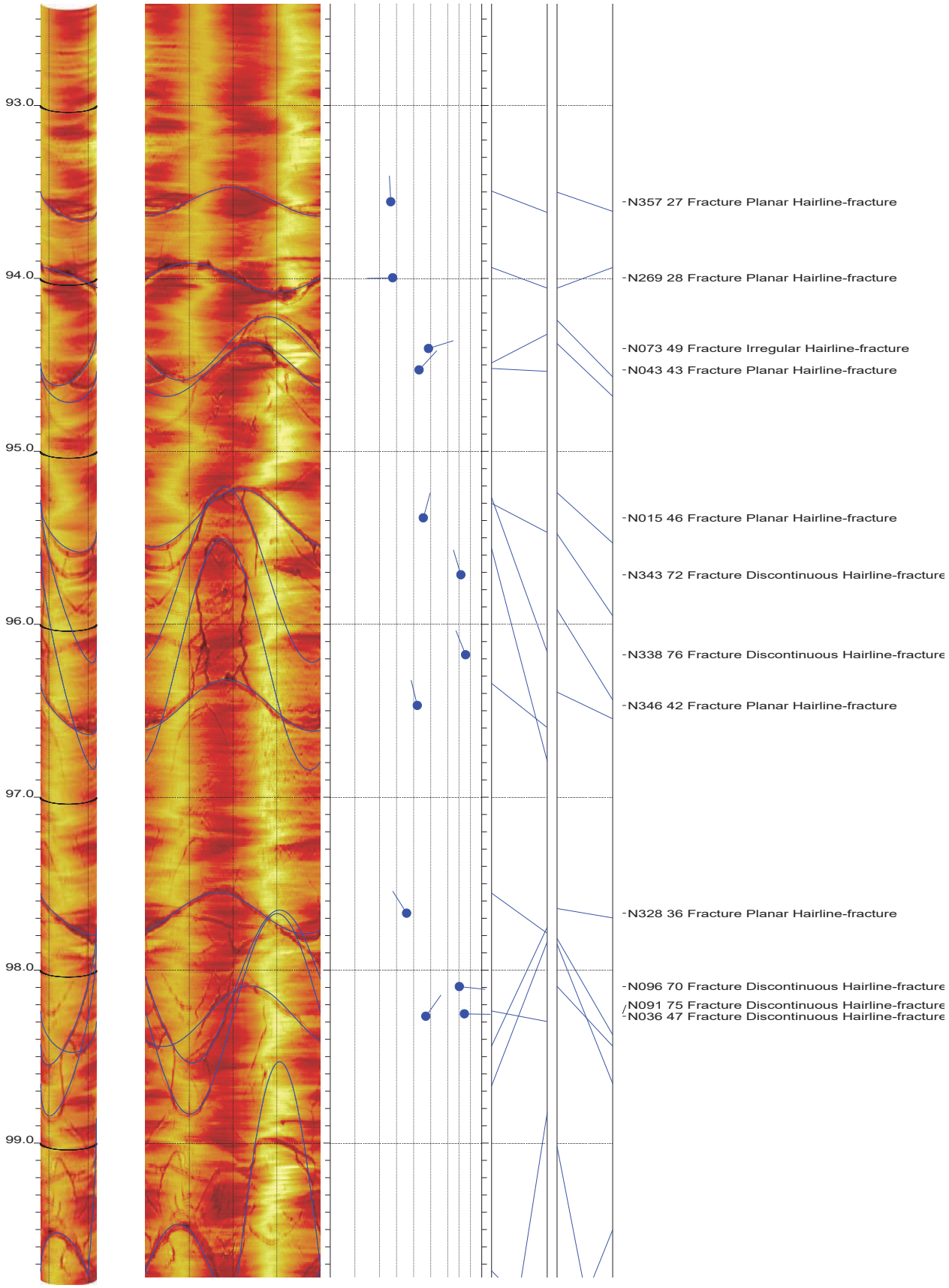

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-N023 20 Fracture Planar Open-fracture

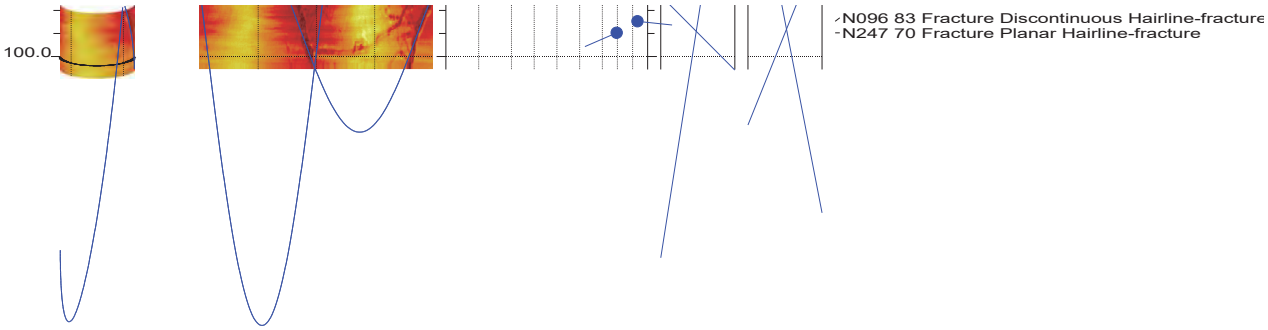

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N105 15 Fracture Planar Hairline-fracture


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-N312 37 Fracture Planar Hairline-fracture


93.0
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N073 49 Fracture Irregular Hairline-fracture
N043 43 Fracture Planar Hairline-fracture
N015 46 Fracture Planar Hairline-fracture
N343 72 Fracture Discontinuous Hairline-fracture
N338 76 Fracture Discontinuous Hairline-fracture
N346 42 Fracture Planar Hairline-fracture
N328 36 Fracture Planar Hairline-fracture
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N091 75 Fracture Discontinuous Hairline-fracture
N036 47 Fracture Discontinuous Hairline-fracture


100.0
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OPTV DATA PROCESSING
RGLDIP vsn 6.2
INTERPRETED OPTV DIPS LOG

AECOM

Borehole: B-105

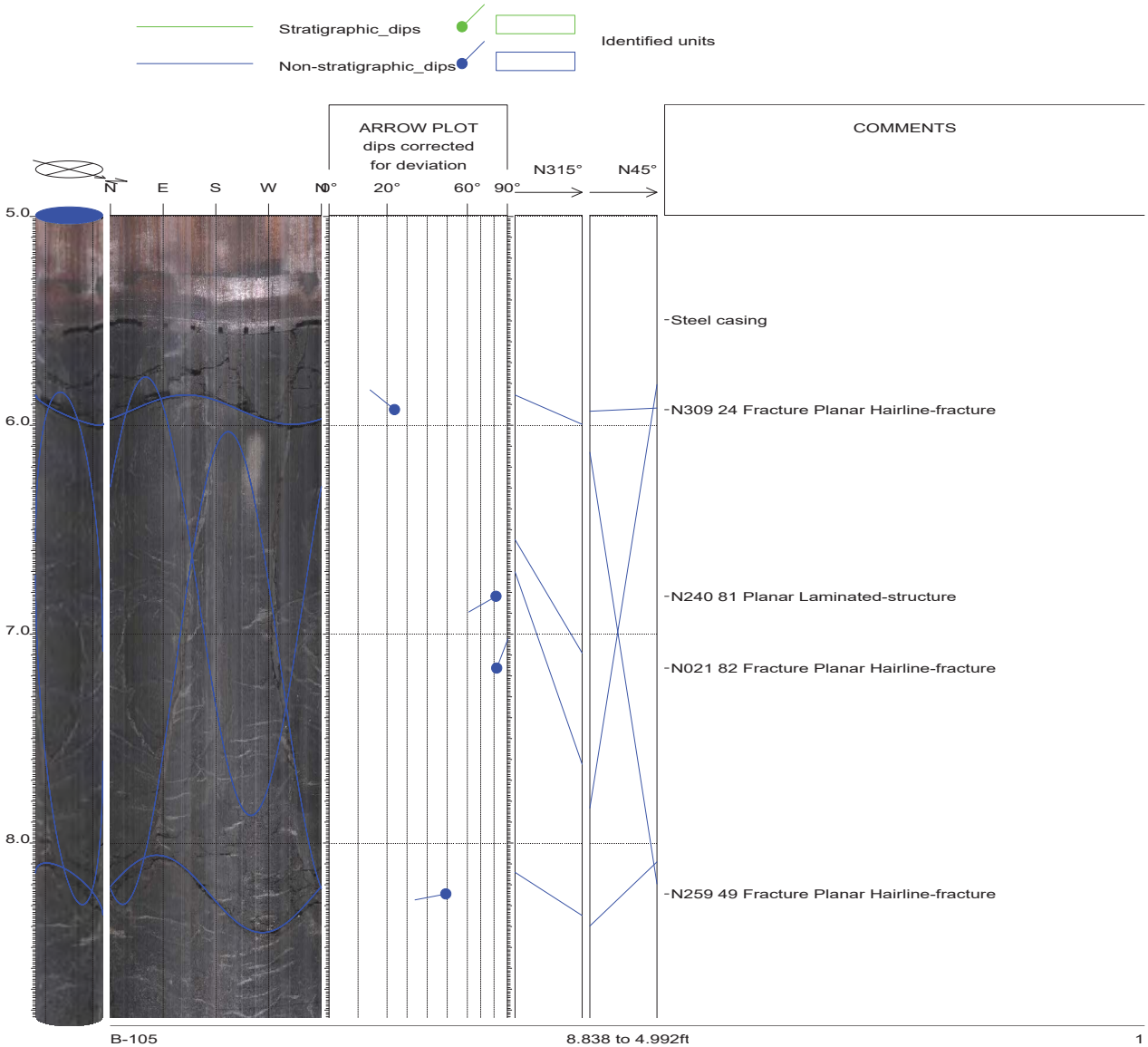
VAIL DAM

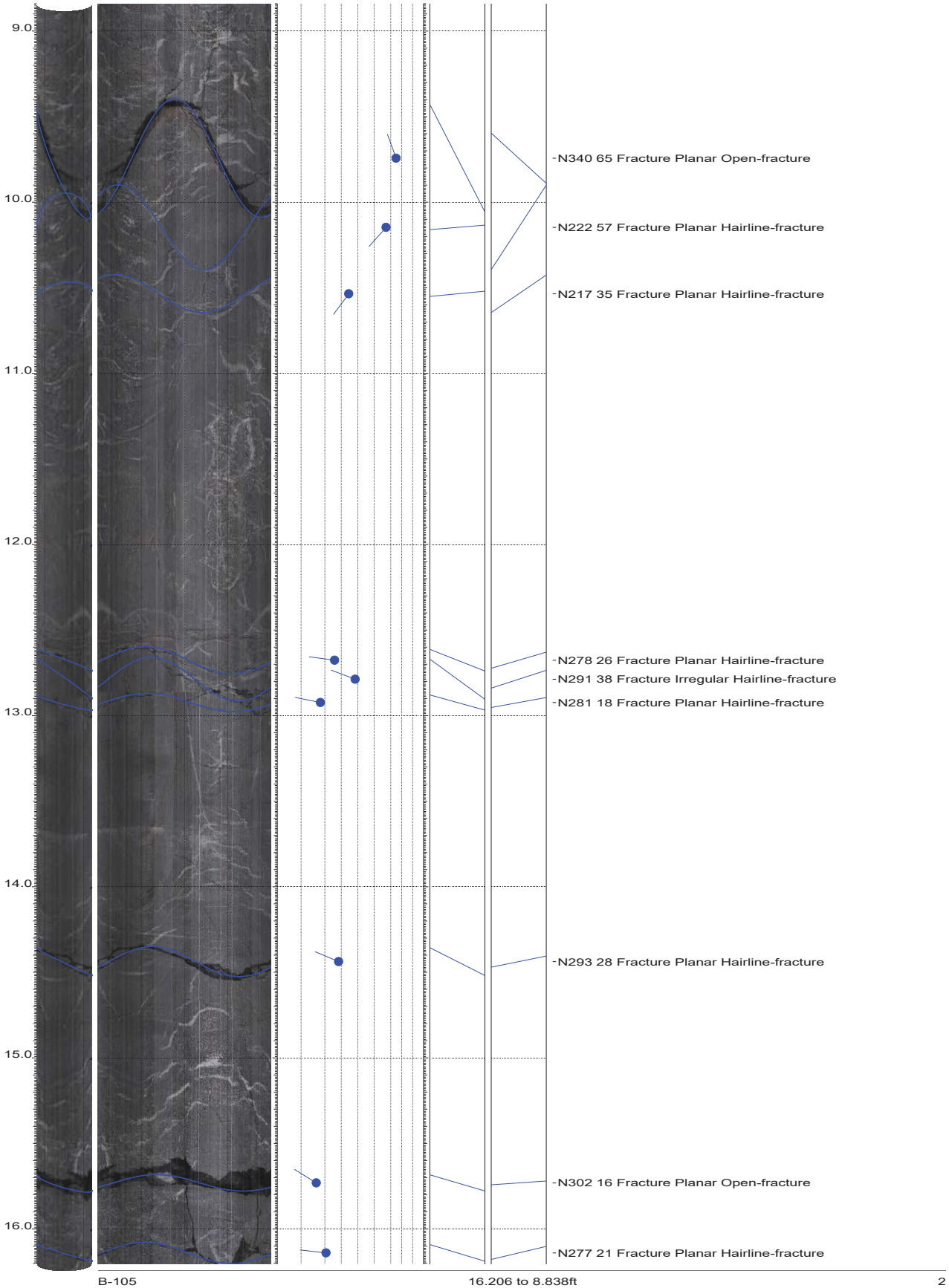
top of borehole.....
East:
North:
Elev:

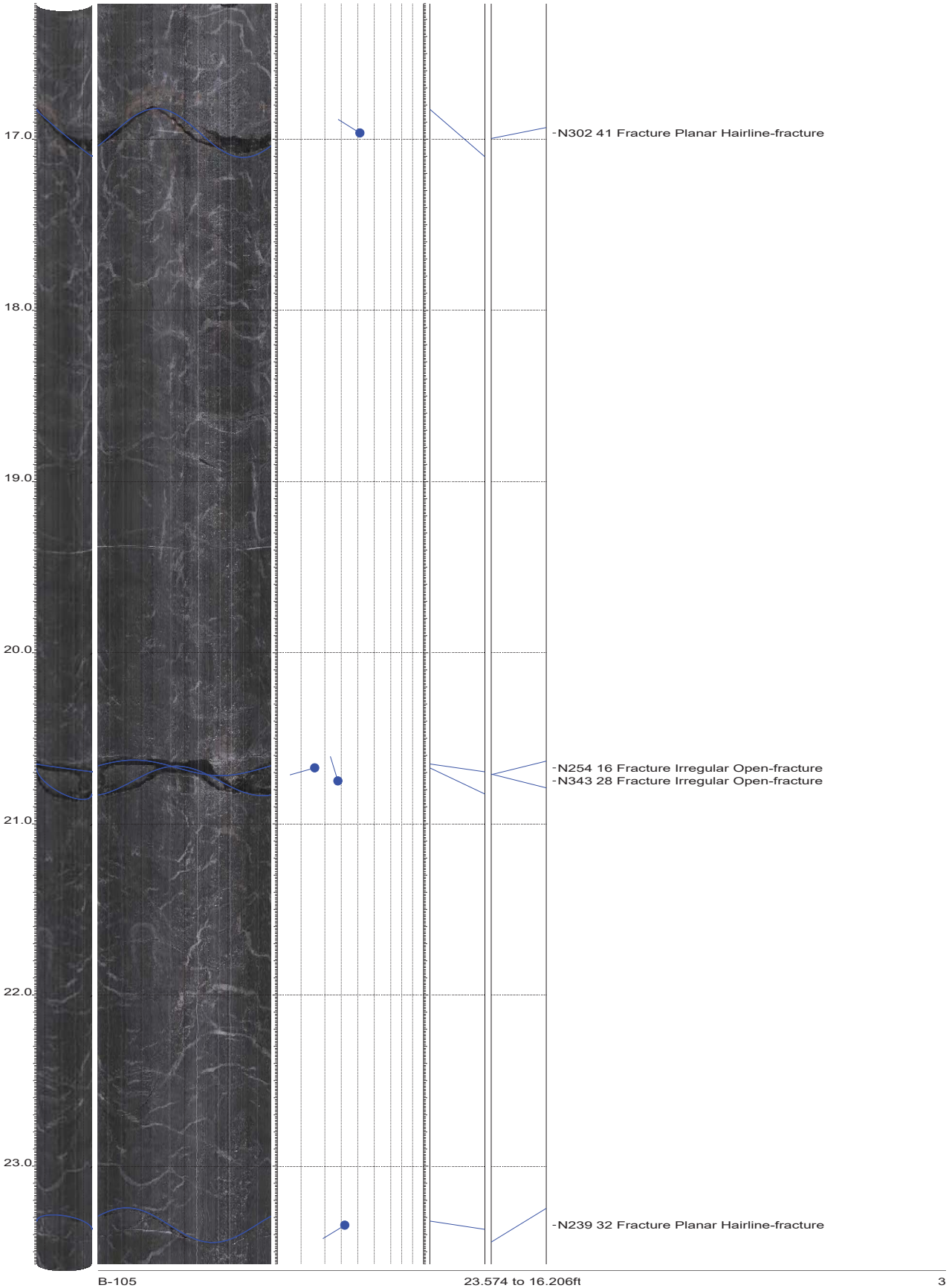
North ref. is true
Depth units are feet
Vertical scale: 1/10
Horiz scale = vert scale

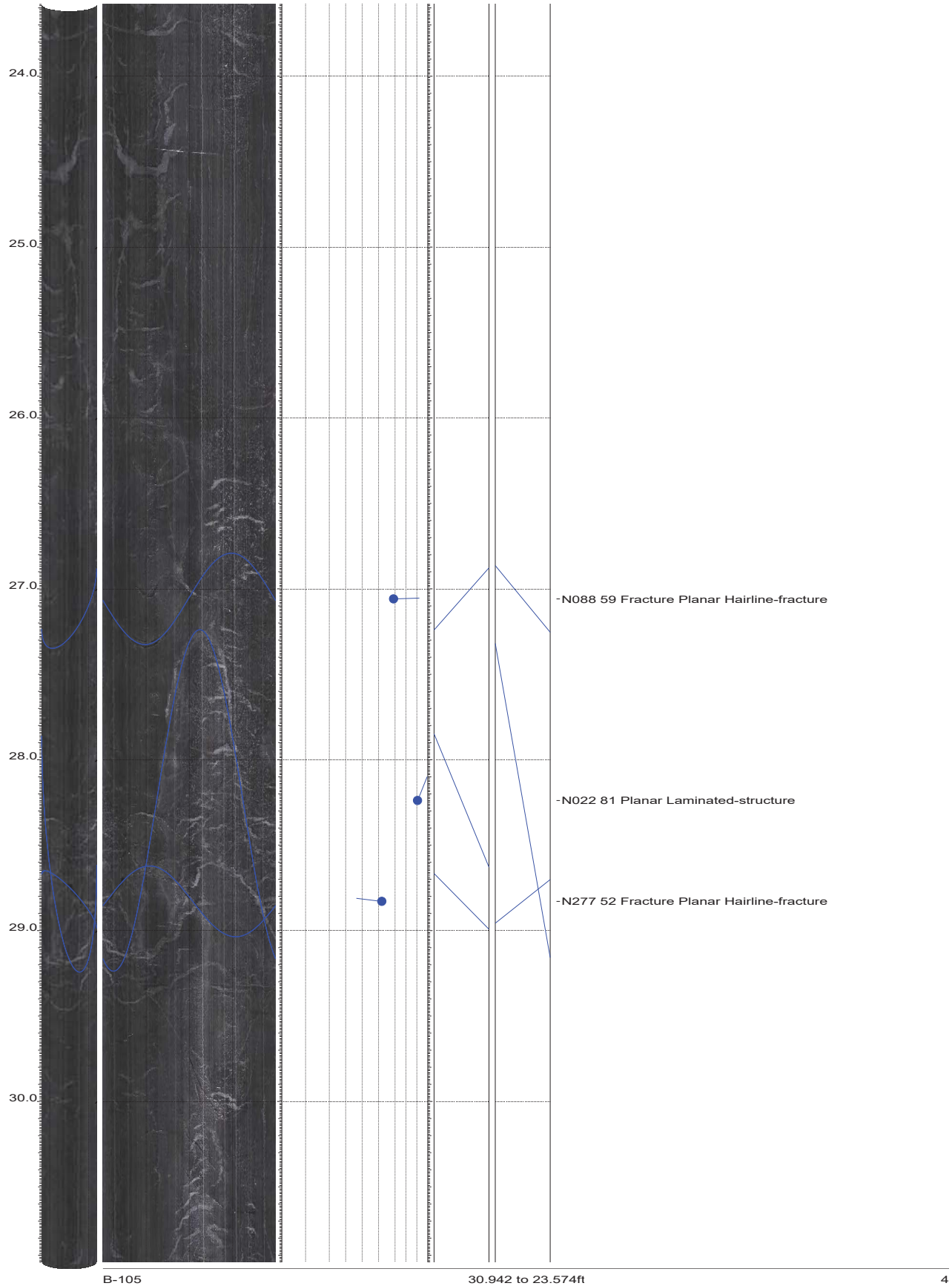
Zone from 50.004 to 4.992ft
Format: BHTV-NESWN

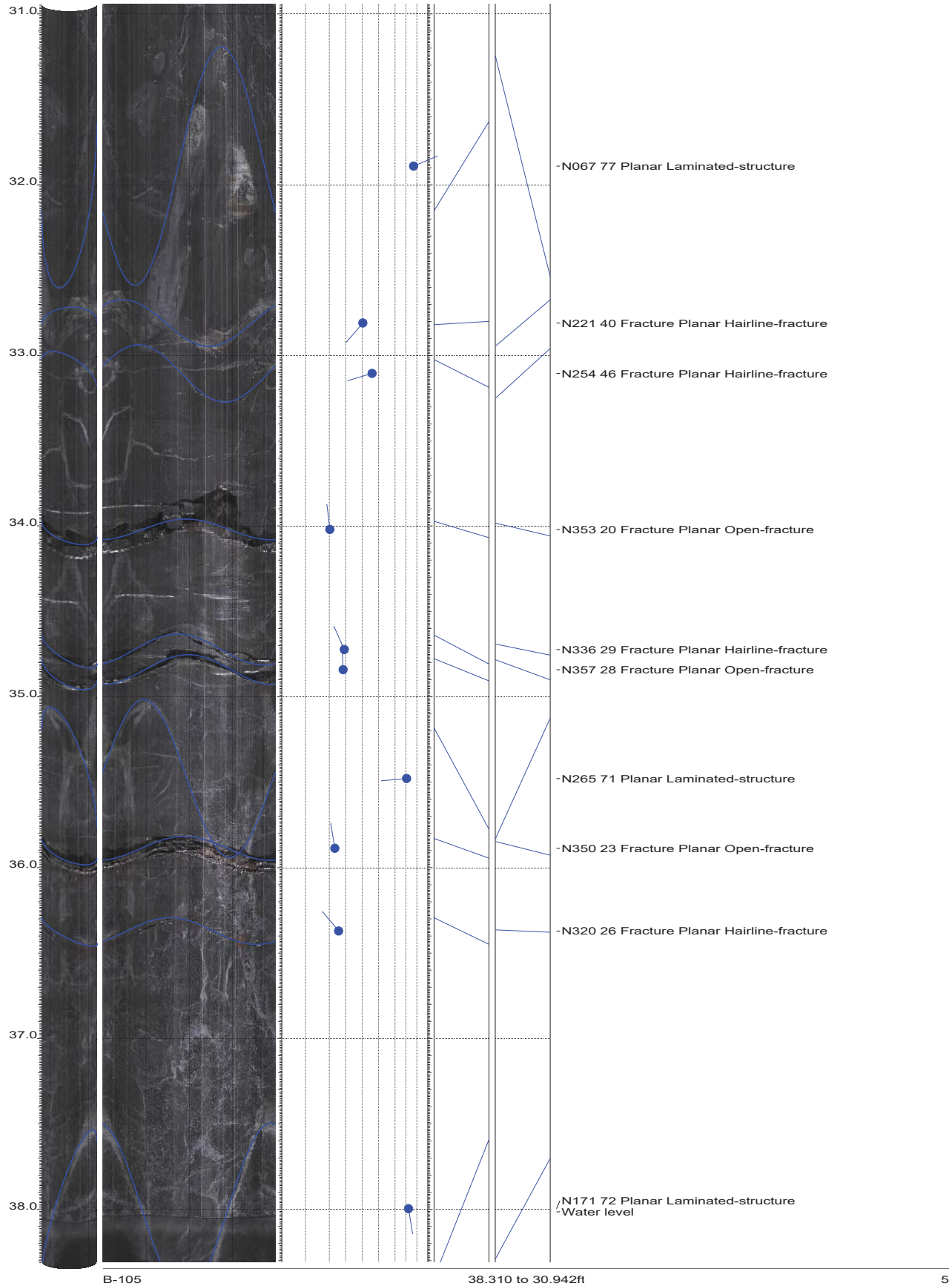
Borehole diam: 3.860inch
Vertical = borehole-axis

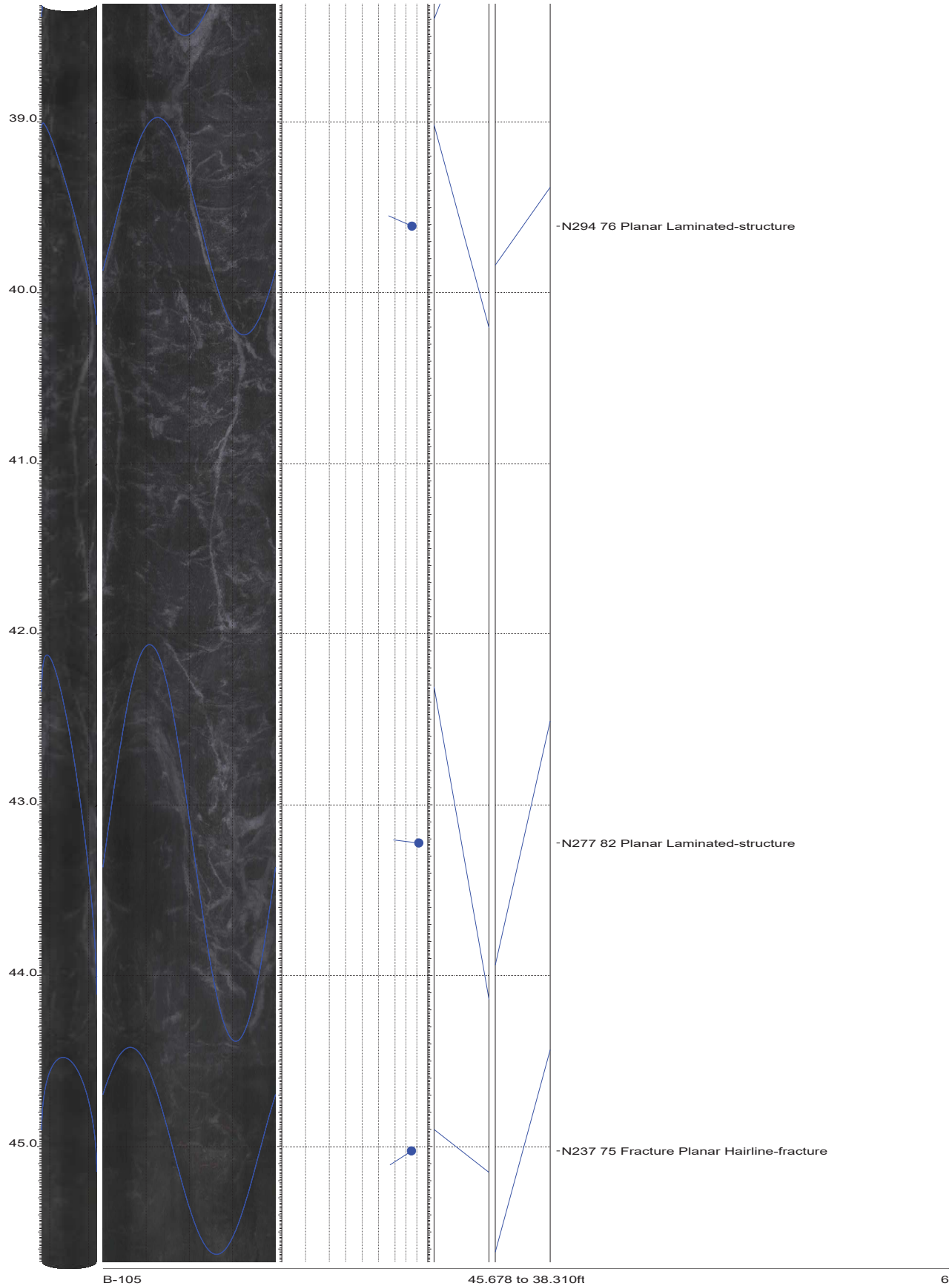


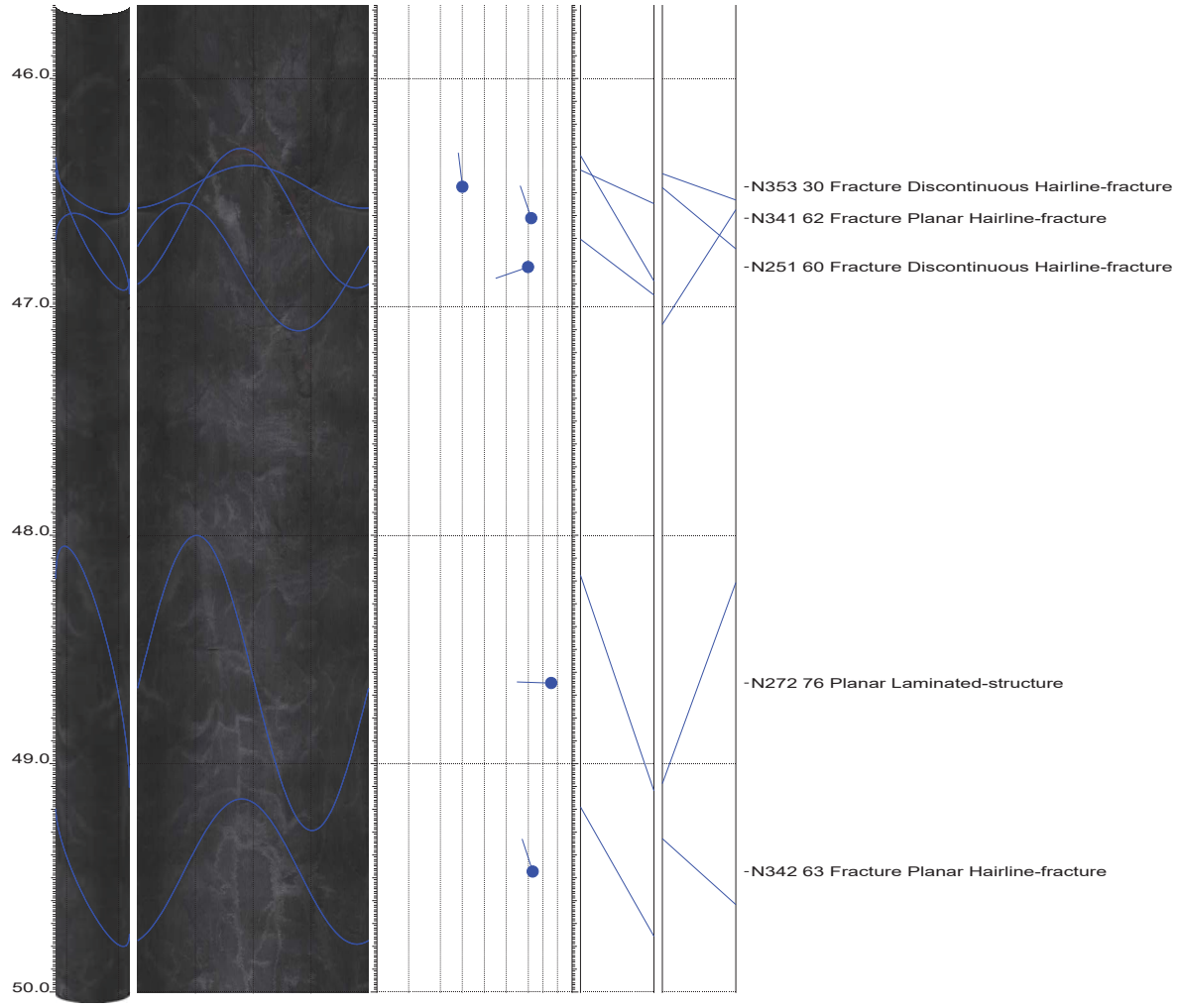

9.0
10.0
11.0
12.0
13.0
14.0
15.0
16.0
N340 65 Fracture Planar Open-fracture
N222 57 Fracture Planar Hairline-fracture
N217 35 Fracture Planar Hairline-fracture
N278 26 Fracture Planar Hairline-fracture
N291 38 Fracture Irregular Hairline-fracture
N281 18 Fracture Planar Hairline-fracture
N293 28 Fracture Planar Hairline-fracture
N302 16 Fracture Planar Open-fracture
N277 21 Fracture Planar Hairline-fracture
B-105
16.206 to 8.838ft
2


17.0
18.0
19.0
20.0
21.0
22.0
23.0
N302 41 Fracture Planar Hairline-fracture
N254 16 Fracture Irregular Open-fracture
N343 28 Fracture Irregular Open-fracture
N239 32 Fracture Planar Hairline-fracture
B-105
23.574 to 16.206ft
3


24.0
25.0
26.0
27.0
28.0
29.0
30.0
N088 59 Fracture Planar Hairline-fracture
N022 81 Planar Laminated-structure
N277 52 Fracture Planar Hairline-fracture
B-105
30.942 to 23.574ft
4


31.0
32.0
33.0
34.0
35.0
36.0
37.0
38.0
N067 77 Planar Laminated-structure
N221 40 Fracture Planar Hairline-fracture
N254 46 Fracture Planar Hairline-fracture
N353 20 Fracture Planar Open-fracture
N336 29 Fracture Planar Hairline-fracture
N357 28 Fracture Planar Open-fracture
N265 71 Planar Laminated-structure
N350 23 Fracture Planar Open-fracture
N320 26 Fracture Planar Hairline-fracture
N171 72 Planar Laminated-structure
Water level
B-105
38.310 to 30.942ft
5


39.0
40.0
41.0
42.0
43.0
44.0
45.0
N294 76 Planar Laminated-structure
N277 82 Planar Laminated-structure
N237 75 Fracture Planar Hairline-fracture
B-105
45.678 to 38.310ft
6


46.0
47.0
48.0
49.0
50.0
-N353 30 Fracture Discontinuous Hairline-fracture
-N341 62 Fracture Planar Hairline-fracture
-N251 60 Fracture Discontinuous Hairline-fracture
-N272 76 Planar Laminated-structure
-N342 63 Fracture Planar Hairline-fracture

BHTV DATA PROCESSING
RGLDIP vsn 6.2
INTERPRETED BHTV DIPS LOG

AECOM

Borehole: B-106 UPPER SECTION

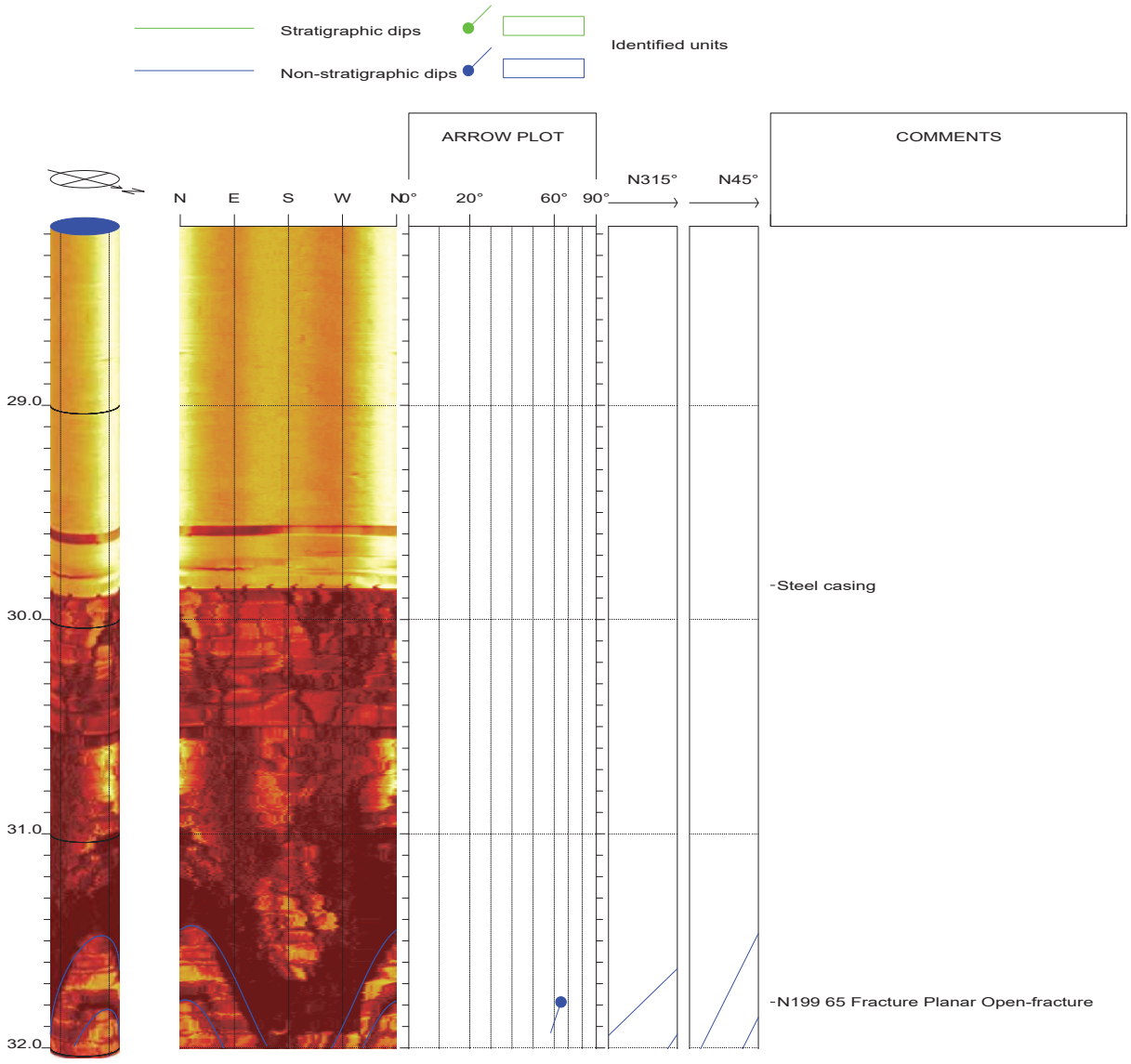
VAIL DAM

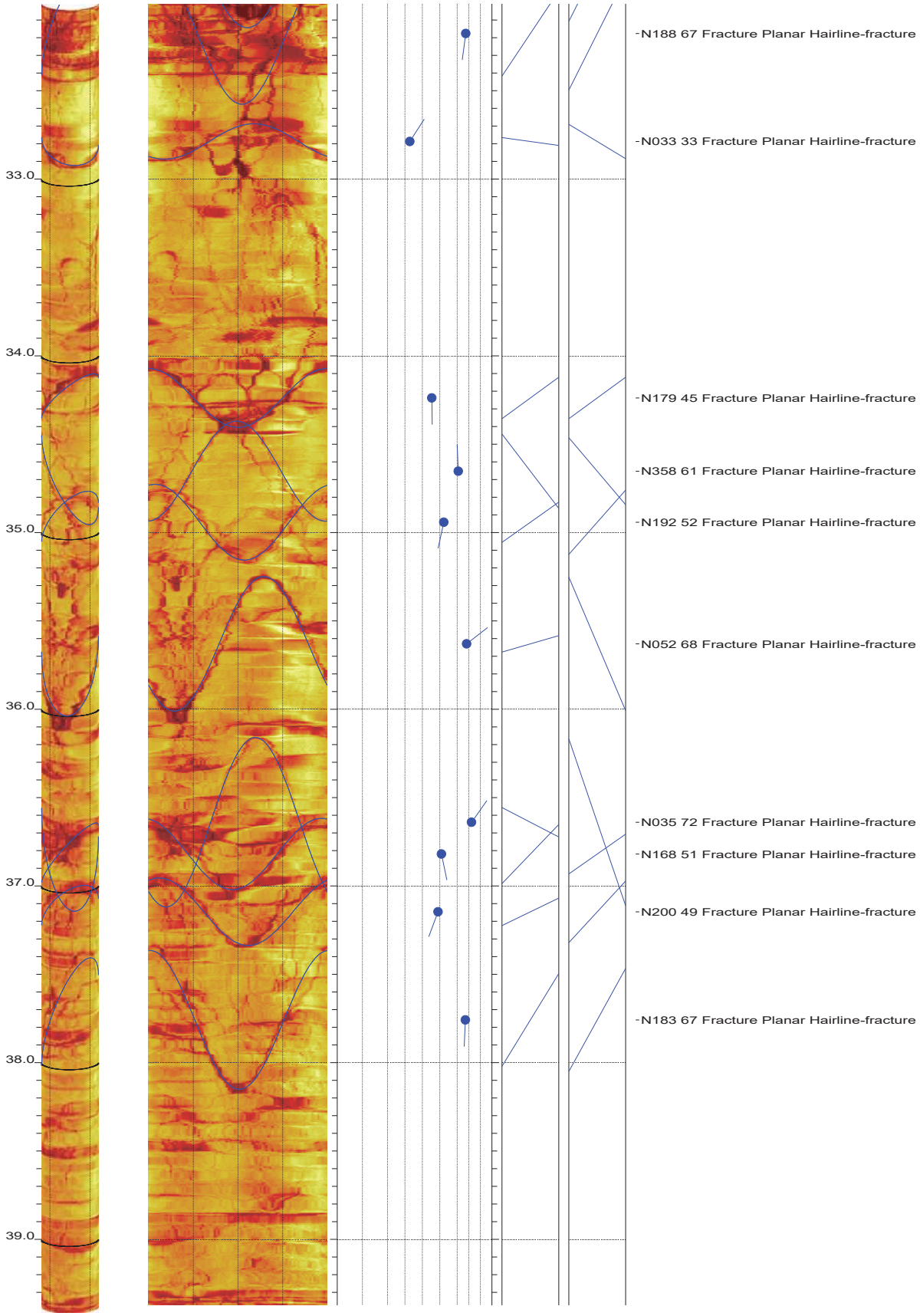
top of borehole.....
East: _
North:_
Elev: _

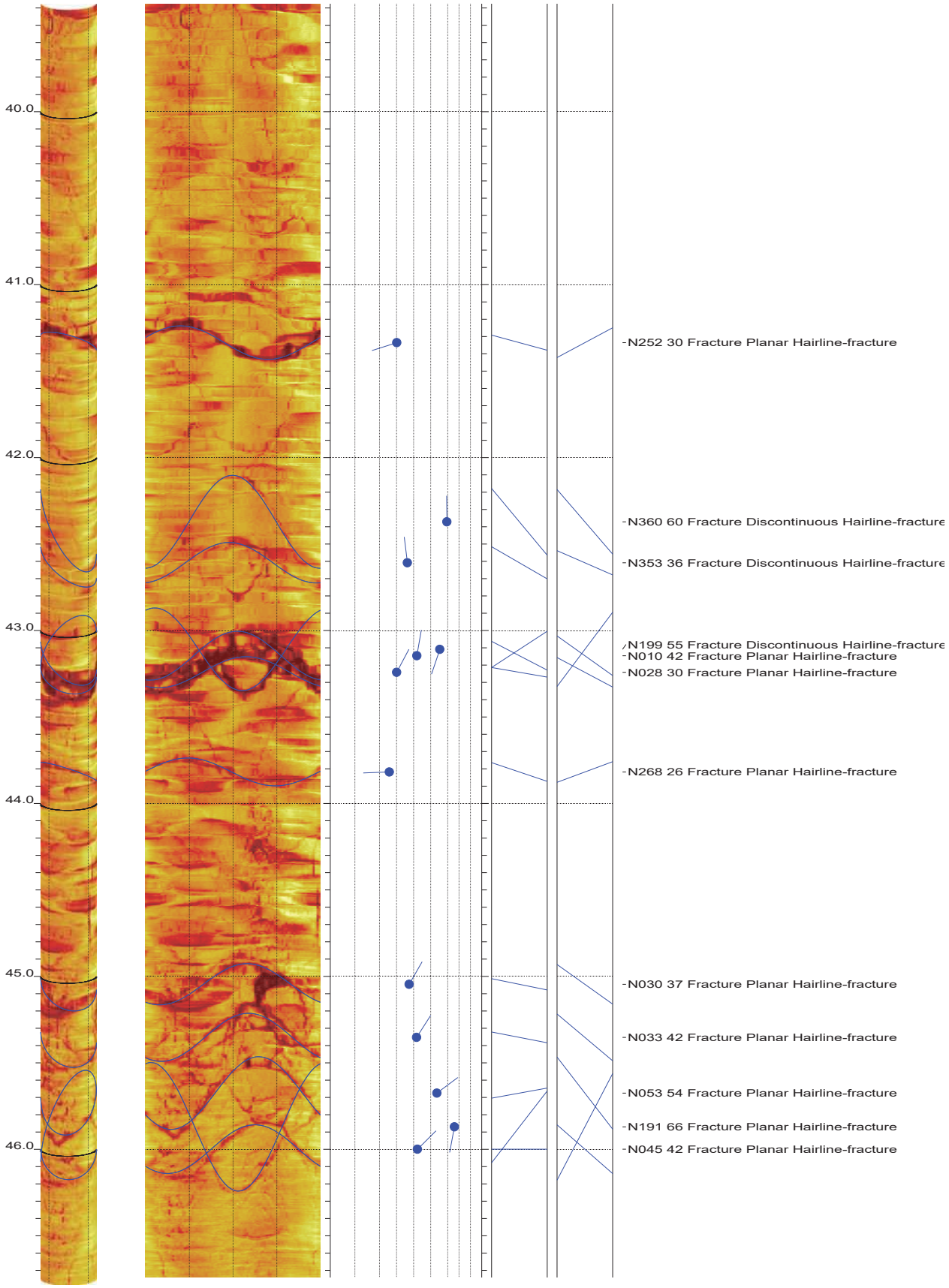
North ref. is true
Depth units are feet
Vertical scale: 1/10
Horiz scale = 1.00x Vert scale

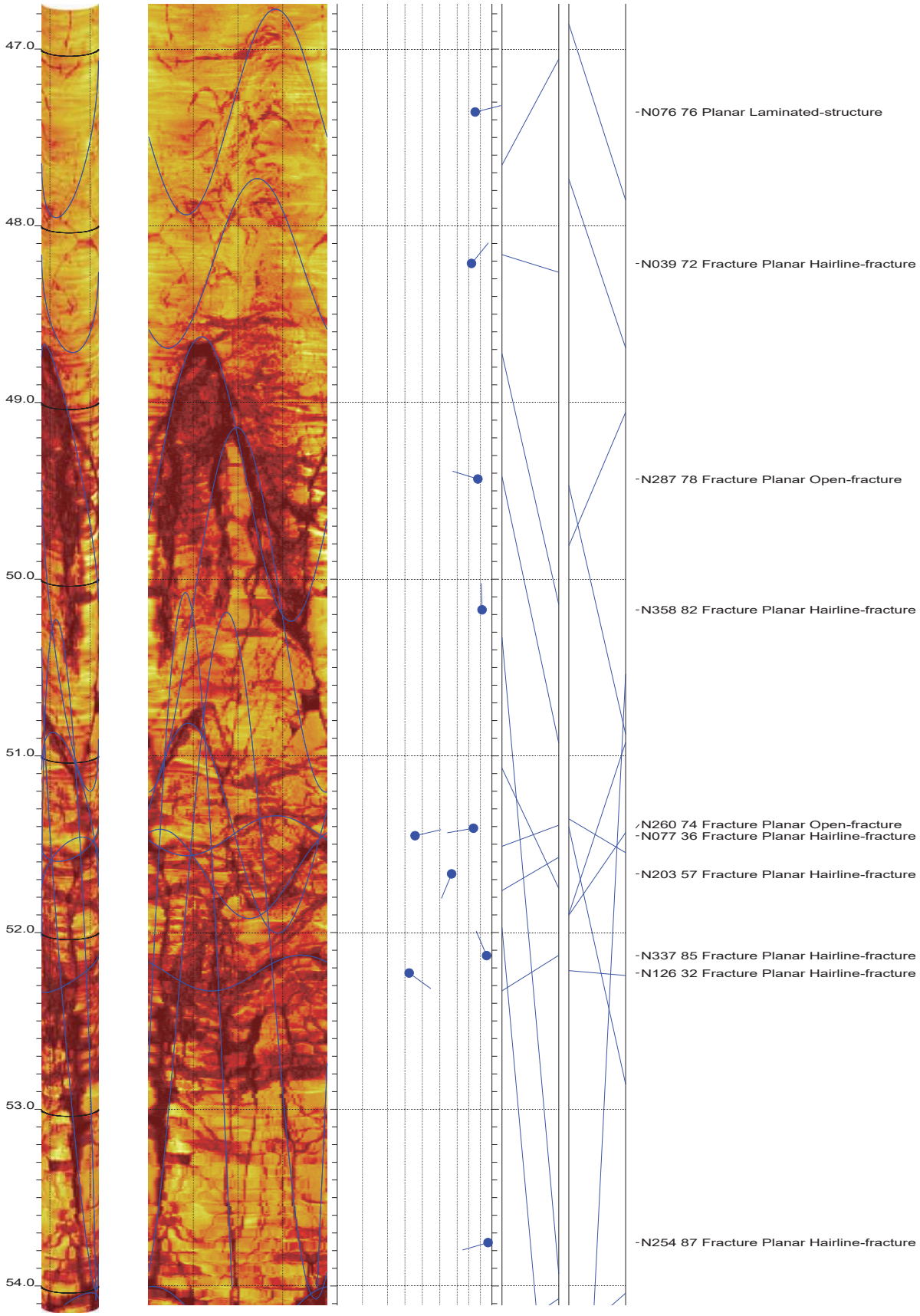
Zone from 62.656 to 28.164ft
Format: BHTV-NESWN

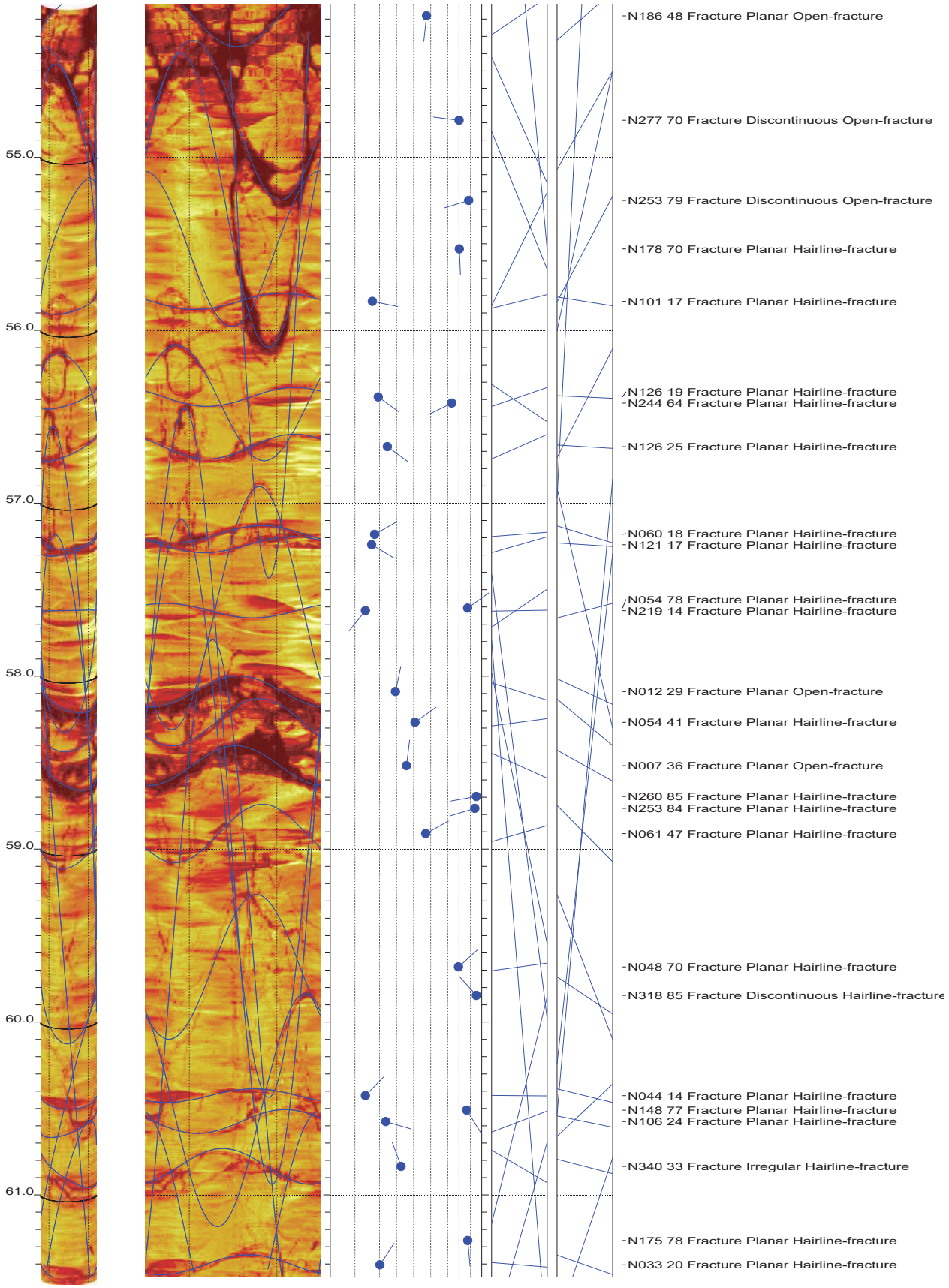
Borehole diam: 3.860inch
Vertical = borehole-axis
Image: Amplitude

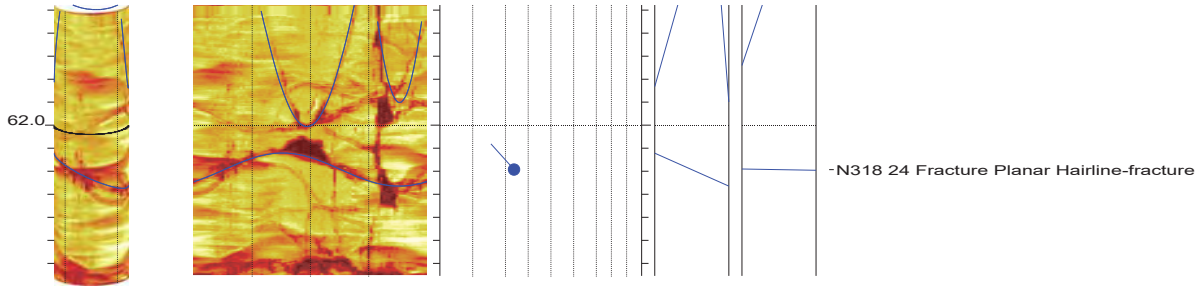



33.0
34.0
35.0
36.0
37.0
38.0
39.0
-N188 67 Fracture Planar Hairline-fracture
-N033 33 Fracture Planar Hairline-fracture
-N179 45 Fracture Planar Hairline-fracture
-N358 61 Fracture Planar Hairline-fracture
-N192 52 Fracture Planar Hairline-fracture
-N052 68 Fracture Planar Hairline-fracture
-N035 72 Fracture Planar Hairline-fracture
-N168 51 Fracture Planar Hairline-fracture
-N200 49 Fracture Planar Hairline-fracture
-N183 67 Fracture Planar Hairline-fracture


40.0
41.0
42.0
43.0
44.0
45.0
46.0
N252 30 Fracture Planar Hairline-fracture
N360 60 Fracture Discontinuous Hairline-fracture
N353 36 Fracture Discontinuous Hairline-fracture
N199 55 Fracture Discontinuous Hairline-fracture
N010 42 Fracture Planar Hairline-fracture
N028 30 Fracture Planar Hairline-fracture
N268 26 Fracture Planar Hairline-fracture
N030 37 Fracture Planar Hairline-fracture
N033 42 Fracture Planar Hairline-fracture
N053 54 Fracture Planar Hairline-fracture
N191 66 Fracture Planar Hairline-fracture
N045 42 Fracture Planar Hairline-fracture


47.0
48.0
49.0
50.0
51.0
52.0
53.0
54.0
N076 76 Planar Laminated-structure
N039 72 Fracture Planar Hairline-fracture
N287 78 Fracture Planar Open-fracture
N358 82 Fracture Planar Hairline-fracture
N260 74 Fracture Planar Open-fracture
N077 36 Fracture Planar Hairline-fracture
N203 57 Fracture Planar Hairline-fracture
N337 85 Fracture Planar Hairline-fracture
N126 32 Fracture Planar Hairline-fracture
N254 87 Fracture Planar Hairline-fracture


55.0
56.0
57.0
58.0
59.0
60.0
61.0
N186 48 Fracture Planar Open-fracture
N277 70 Fracture Discontinuous Open-fracture
N253 79 Fracture Discontinuous Open-fracture
N178 70 Fracture Planar Hairline-fracture
N101 17 Fracture Planar Hairline-fracture
N126 19 Fracture Planar Hairline-fracture
N244 64 Fracture Planar Hairline-fracture
N126 25 Fracture Planar Hairline-fracture
N060 18 Fracture Planar Hairline-fracture
N121 17 Fracture Planar Hairline-fracture
N054 78 Fracture Planar Hairline-fracture
N219 14 Fracture Planar Hairline-fracture
N012 29 Fracture Planar Open-fracture
N054 41 Fracture Planar Hairline-fracture
N007 36 Fracture Planar Open-fracture
N260 85 Fracture Planar Hairline-fracture
N253 84 Fracture Planar Hairline-fracture
N061 47 Fracture Planar Hairline-fracture
N048 70 Fracture Planar Hairline-fracture
N318 85 Fracture Discontinuous Hairline-fracture
N044 14 Fracture Planar Hairline-fracture
N148 77 Fracture Planar Hairline-fracture
N106 24 Fracture Planar Hairline-fracture
N340 33 Fracture Irregular Hairline-fracture
N175 78 Fracture Planar Hairline-fracture
N033 20 Fracture Planar Hairline-fracture


62.0
N318 24 Fracture Planar Hairline-fracture

BHTV DATA PROCESSING
RGLDIP vsn 6.2
INTERPRETED BHTV DIPS LOG

AECOM

Borehole: B-106 MIDDLE SECTION

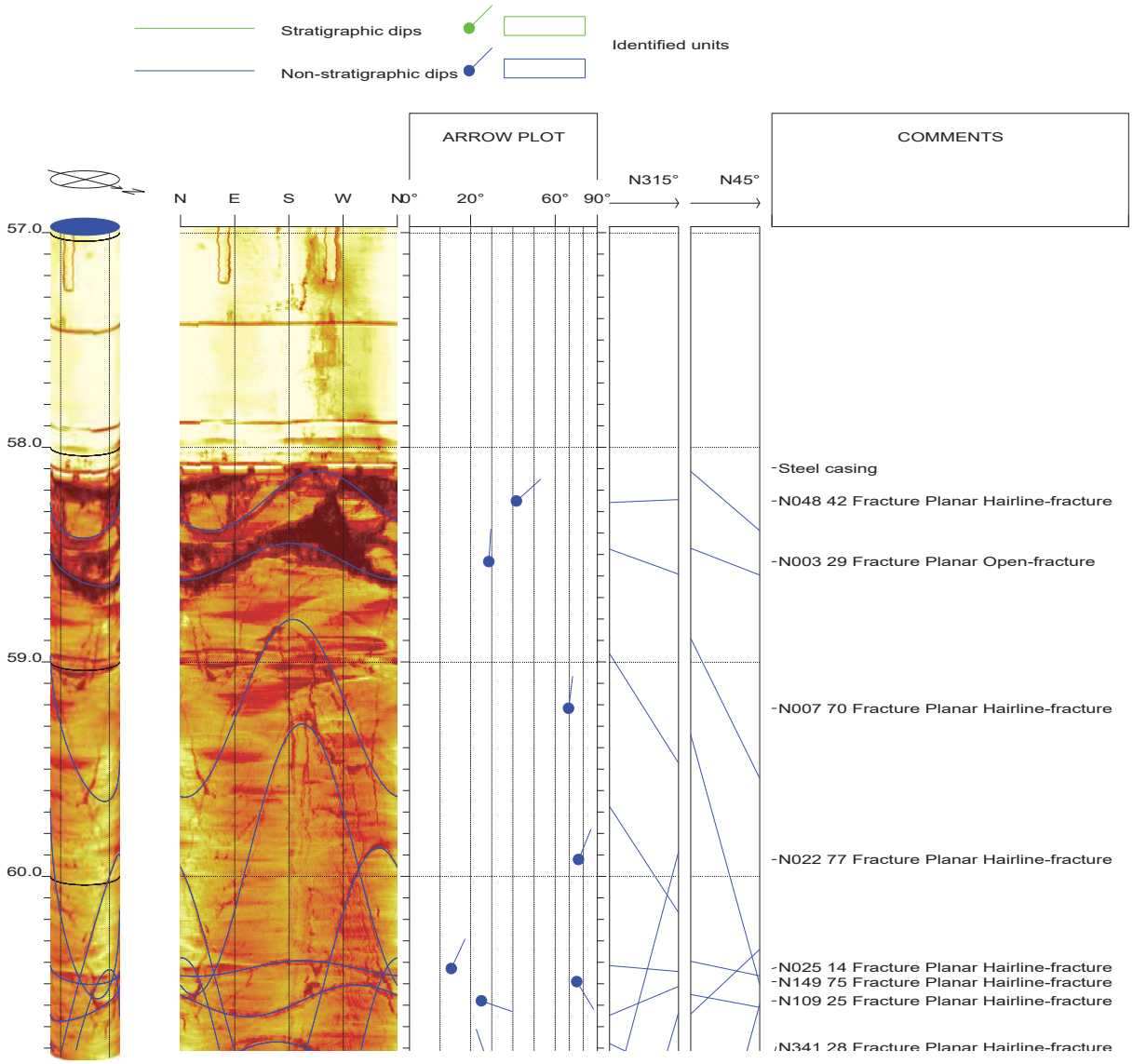
VAIL DAM

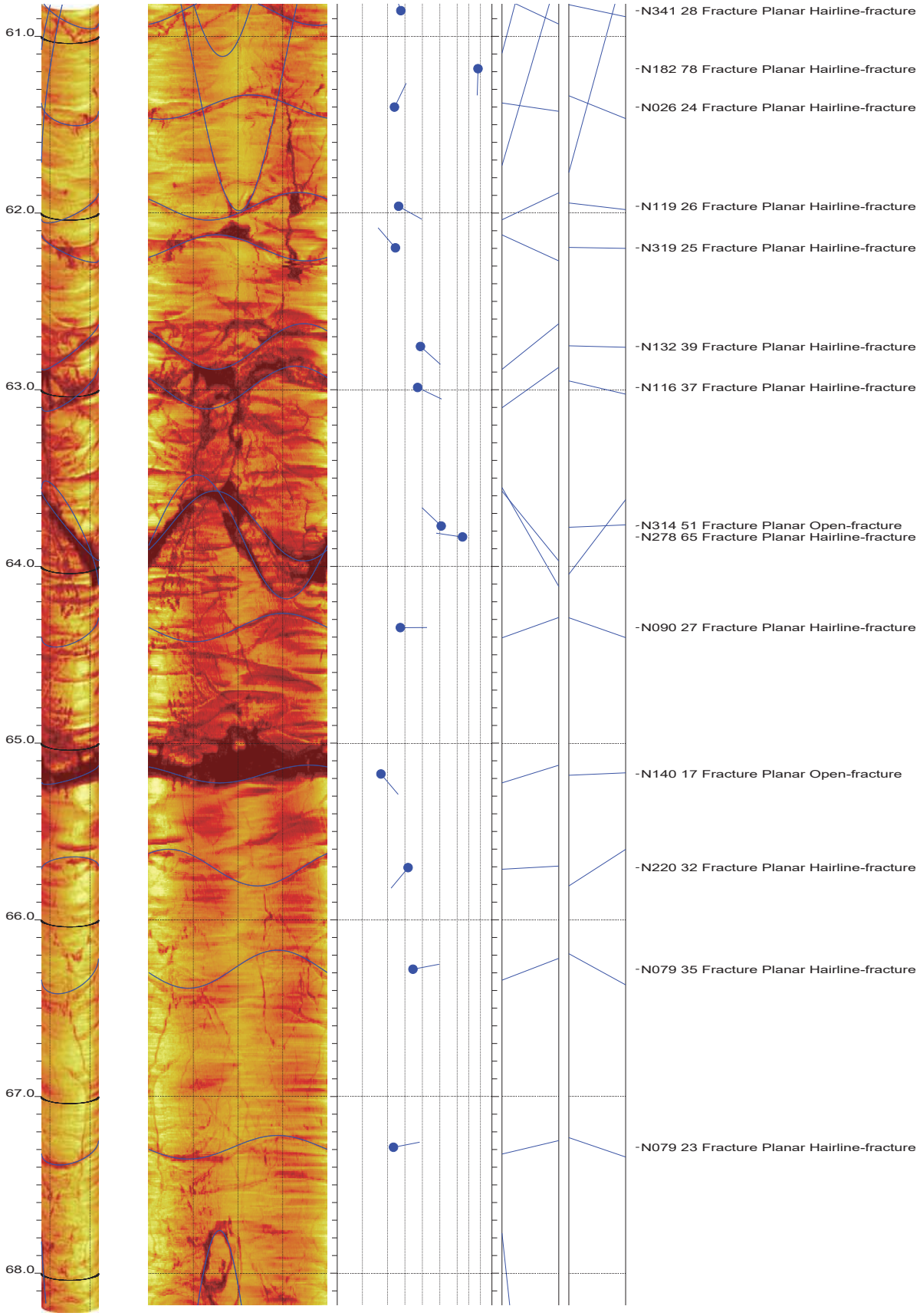
top of borehole.....
East: _
North:_
Elev: _

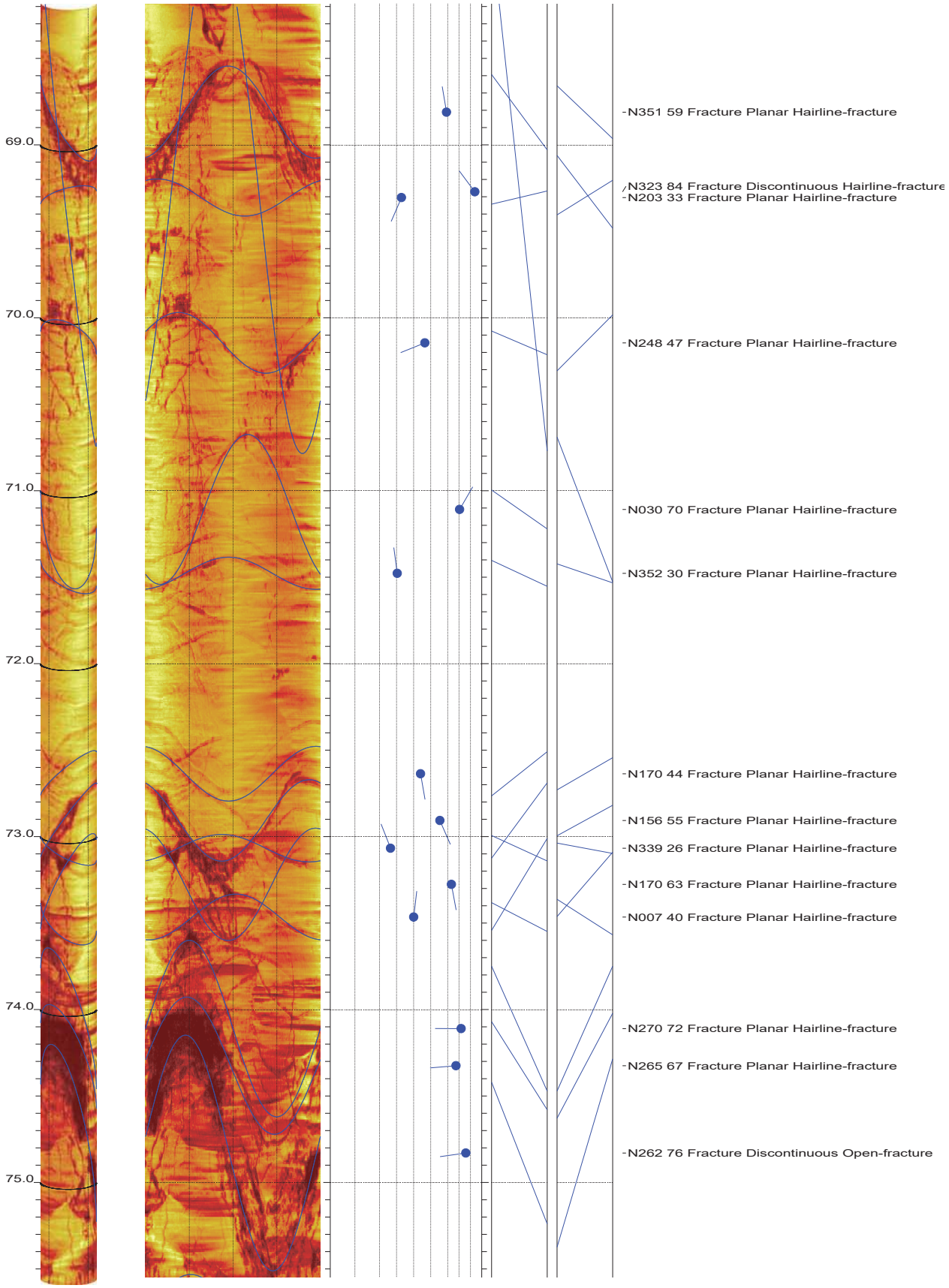
North ref. is true
Depth units are feet
Vertical scale: 1/10
Horiz scale = 1.00x Vert scale

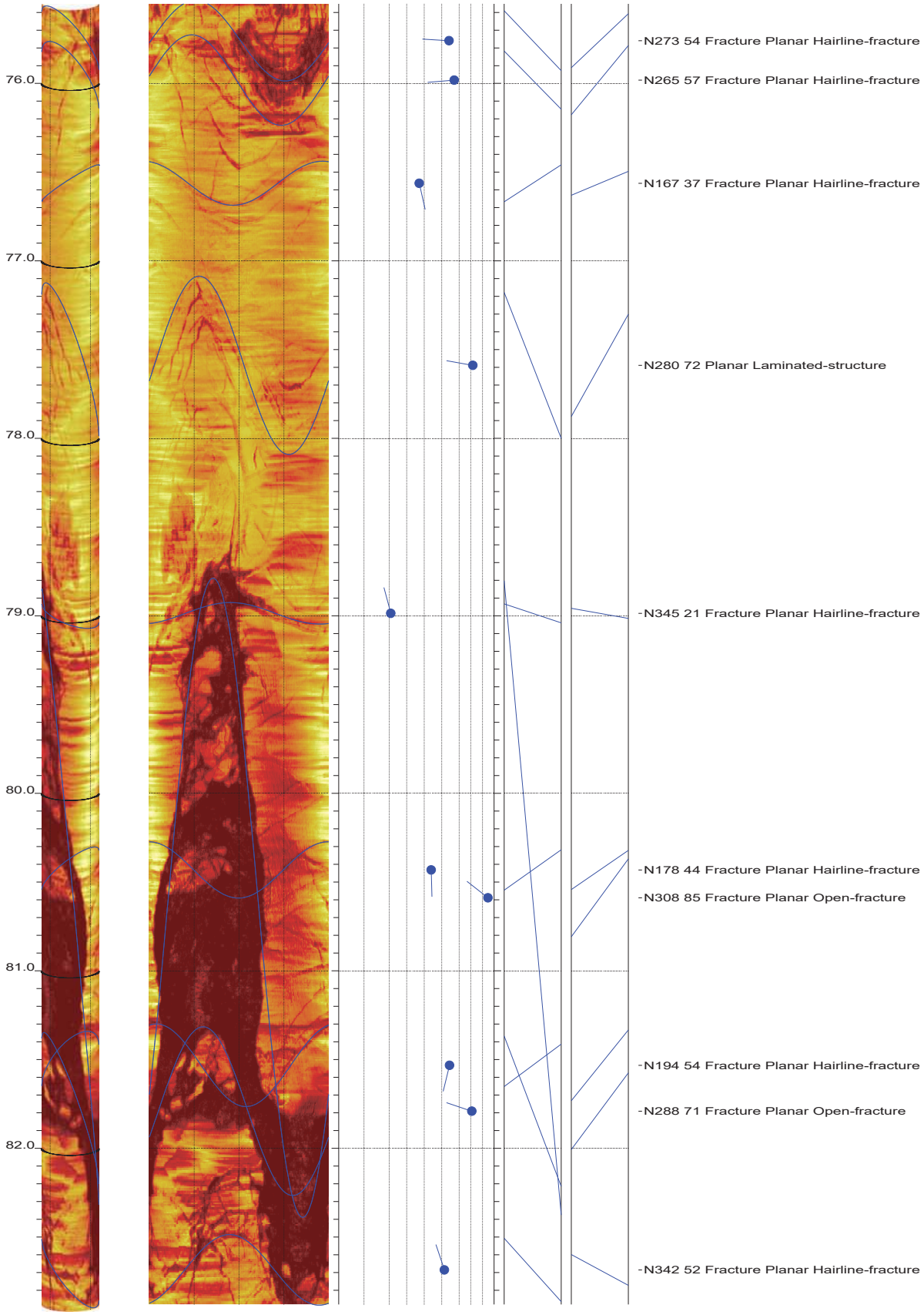
Zone from 82.880 to 56.972ft
Format: BHTV-NESWN

Borehole diam: 3.860inch
Vertical = borehole-axis
Image: Amplitude




61.0
62.0
63.0
64.0
65.0
66.0
67.0
68.0
-N341 28 Fracture Planar Hairline-fracture
-N182 78 Fracture Planar Hairline-fracture
-N026 24 Fracture Planar Hairline-fracture
-N119 26 Fracture Planar Hairline-fracture
-N319 25 Fracture Planar Hairline-fracture
-N132 39 Fracture Planar Hairline-fracture
-N116 37 Fracture Planar Hairline-fracture
-N314 51 Fracture Planar Open-fracture
-N278 65 Fracture Planar Hairline-fracture
-N090 27 Fracture Planar Hairline-fracture
-N140 17 Fracture Planar Open-fracture
-N220 32 Fracture Planar Hairline-fracture
-N079 35 Fracture Planar Hairline-fracture
-N079 23 Fracture Planar Hairline-fracture


69.0
70.0
71.0
72.0
73.0
74.0
75.0
N351 59 Fracture Planar Hairline-fracture
N323 84 Fracture Discontinuous Hairline-fracture
N203 33 Fracture Planar Hairline-fracture
N248 47 Fracture Planar Hairline-fracture
N030 70 Fracture Planar Hairline-fracture
N352 30 Fracture Planar Hairline-fracture
N170 44 Fracture Planar Hairline-fracture
N156 55 Fracture Planar Hairline-fracture
N339 26 Fracture Planar Hairline-fracture
N170 63 Fracture Planar Hairline-fracture
N007 40 Fracture Planar Hairline-fracture
N270 72 Fracture Planar Hairline-fracture
N265 67 Fracture Planar Hairline-fracture
N262 76 Fracture Discontinuous Open-fracture


76.0
77.0
78.0
79.0
80.0
81.0
82.0
N273 54 Fracture Planar Hairline-fracture
N265 57 Fracture Planar Hairline-fracture
N167 37 Fracture Planar Hairline-fracture
N280 72 Planar Laminated-structure
N345 21 Fracture Planar Hairline-fracture
N178 44 Fracture Planar Hairline-fracture
N308 85 Fracture Planar Open-fracture
N194 54 Fracture Planar Hairline-fracture
N288 71 Fracture Planar Open-fracture
N342 52 Fracture Planar Hairline-fracture

BHTV DATA PROCESSING
RGLDIP vsn 6.2
INTERPRETED BHTV DIPS LOG

AECOM

Borehole: B-106 LOWER SECTION

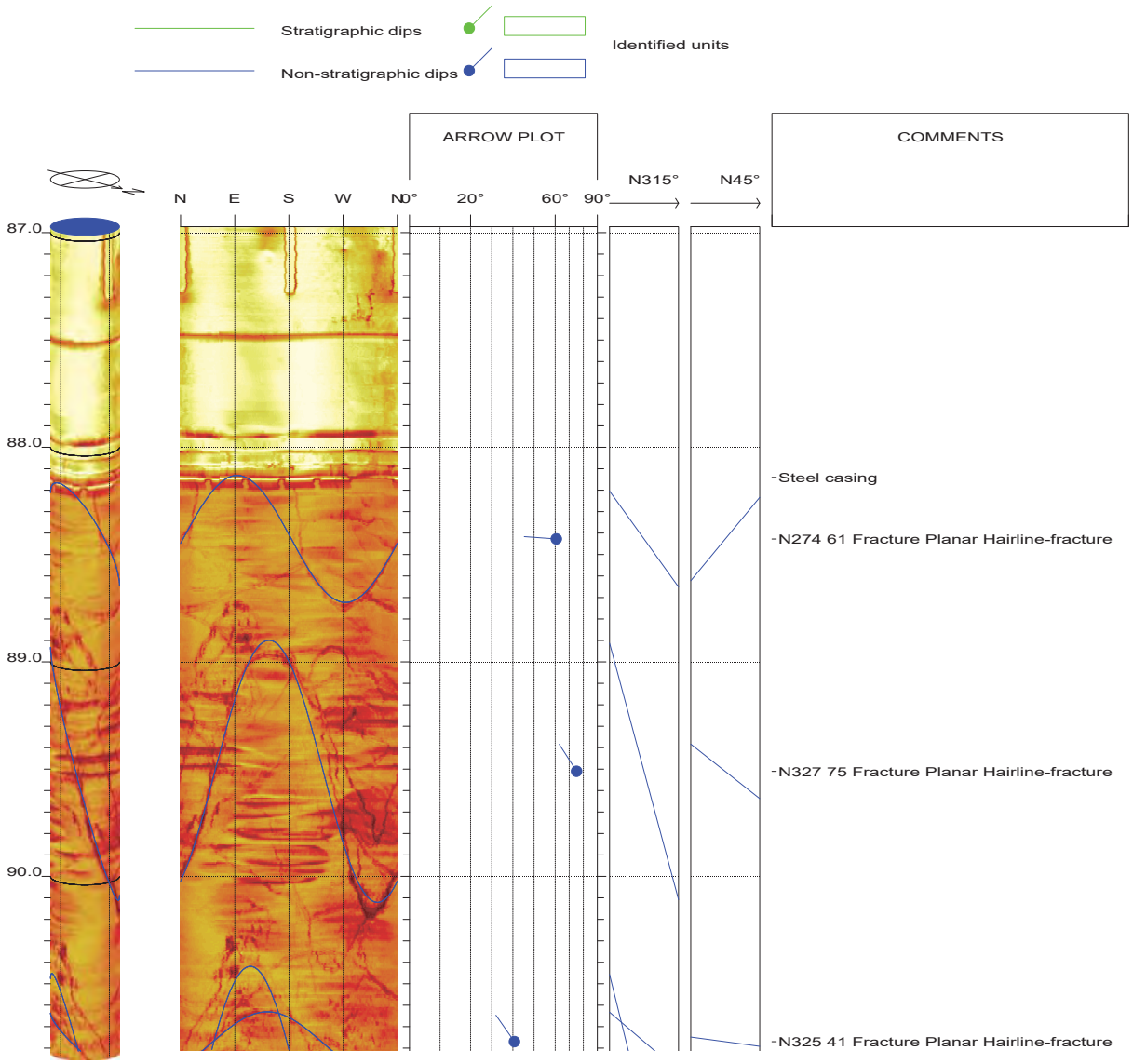
VAIL DAM

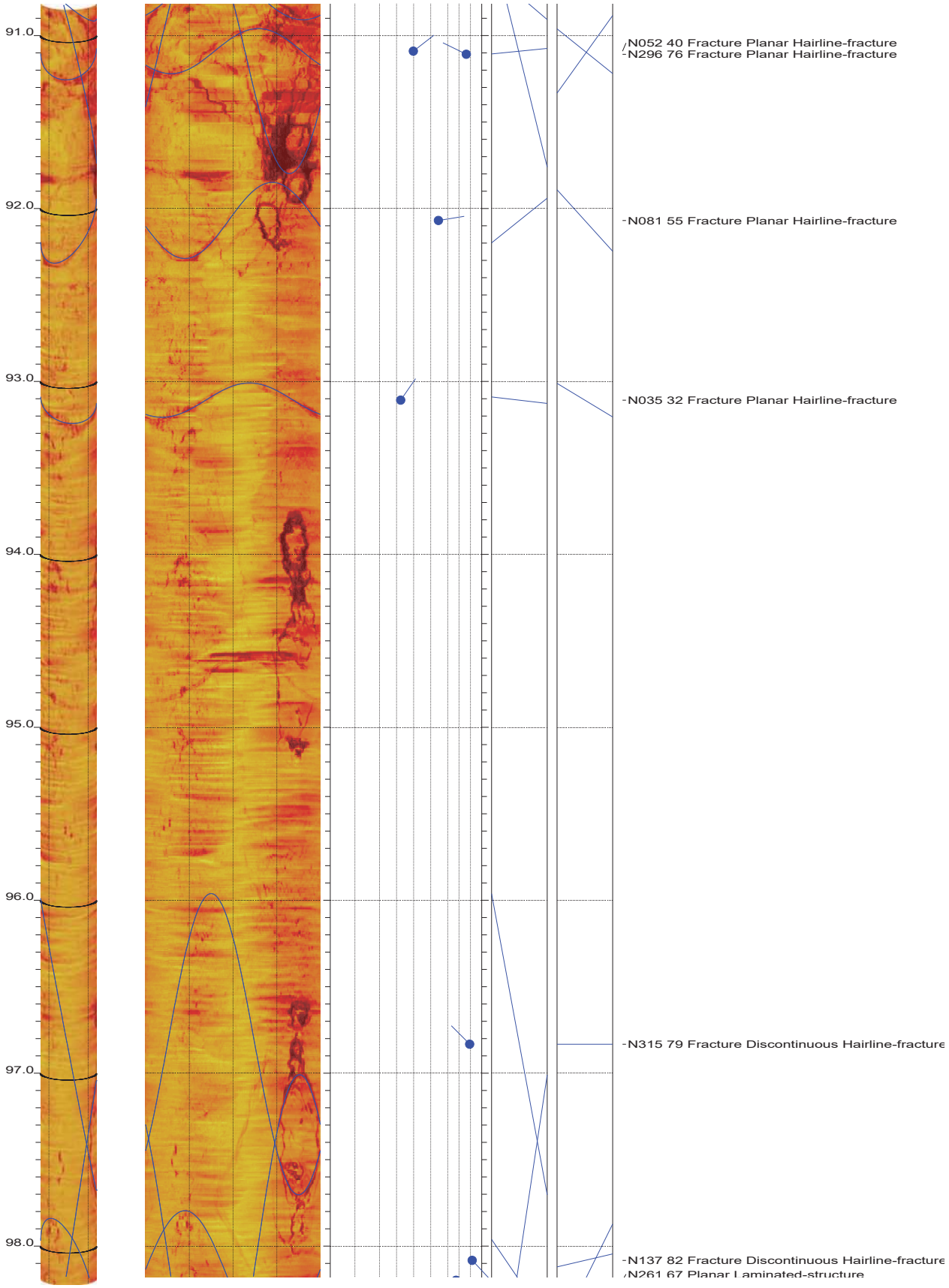
top of borehole.....
East: _
North:_
Elev: _

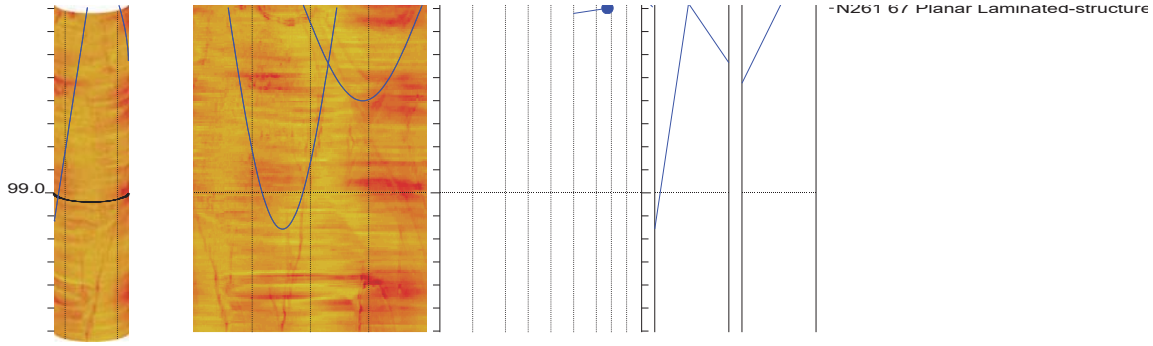
North ref. is true
Depth units are feet
Vertical scale: 1/10
Horiz scale = 1.00x Vert scale

Zone from 99.604 to 86.972ft
Format: BHTV-NESWN

Borehole diam: 3.860inch
Vertical = borehole-axis
Image: Amplitude




91.0
92.0
93.0
94.0
95.0
96.0
97.0
98.0
N052 40 Fracture Planar Hairline-fracture
N296 76 Fracture Planar Hairline-fracture
N081 55 Fracture Planar Hairline-fracture
N035 32 Fracture Planar Hairline-fracture
N315 79 Fracture Discontinuous Hairline-fracture
N137 82 Fracture Discontinuous Hairline-fracture
N261 67 Planar Laminated-structure


99.0
N261 67 Planar Laminated-structure

APPENDIX D

TELEVIEWER FEATURE DISTRIBUTION HISTOGRAMS

DIP DATA INTERPRETATION
RGLDIP vsn 6.2
FRACTURE ANALYSIS LOG

AECOM

Borehole: B-101

VAIL DAM

top of borehole.....
East:_
North:_
Elev:_

North ref: true
Depth units are feet
Vertical scale: 1/100

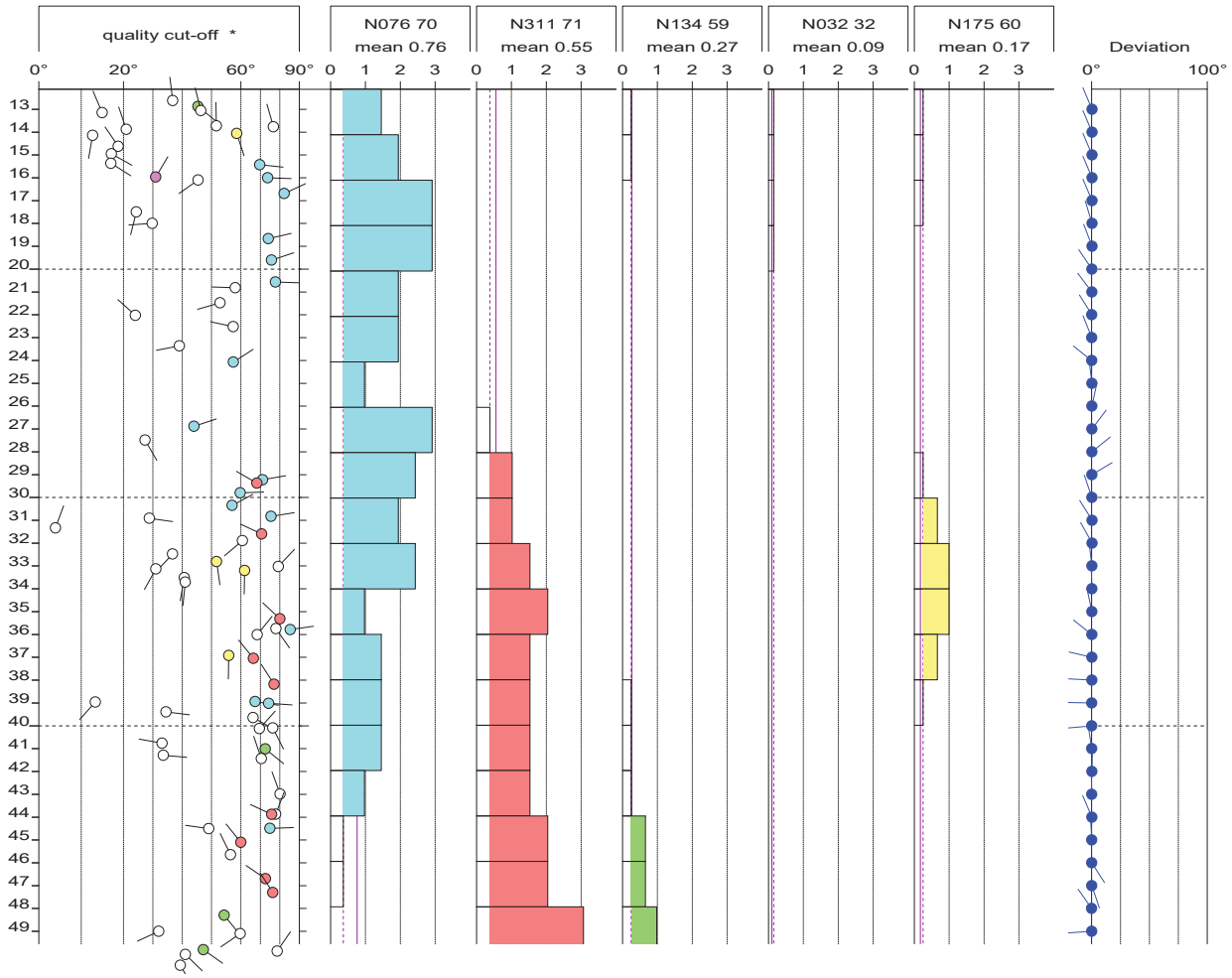
Zone from 149.583 to 12.118ft
Mean dip format: dip-azimuth and dip
Frequency histogram parameters:

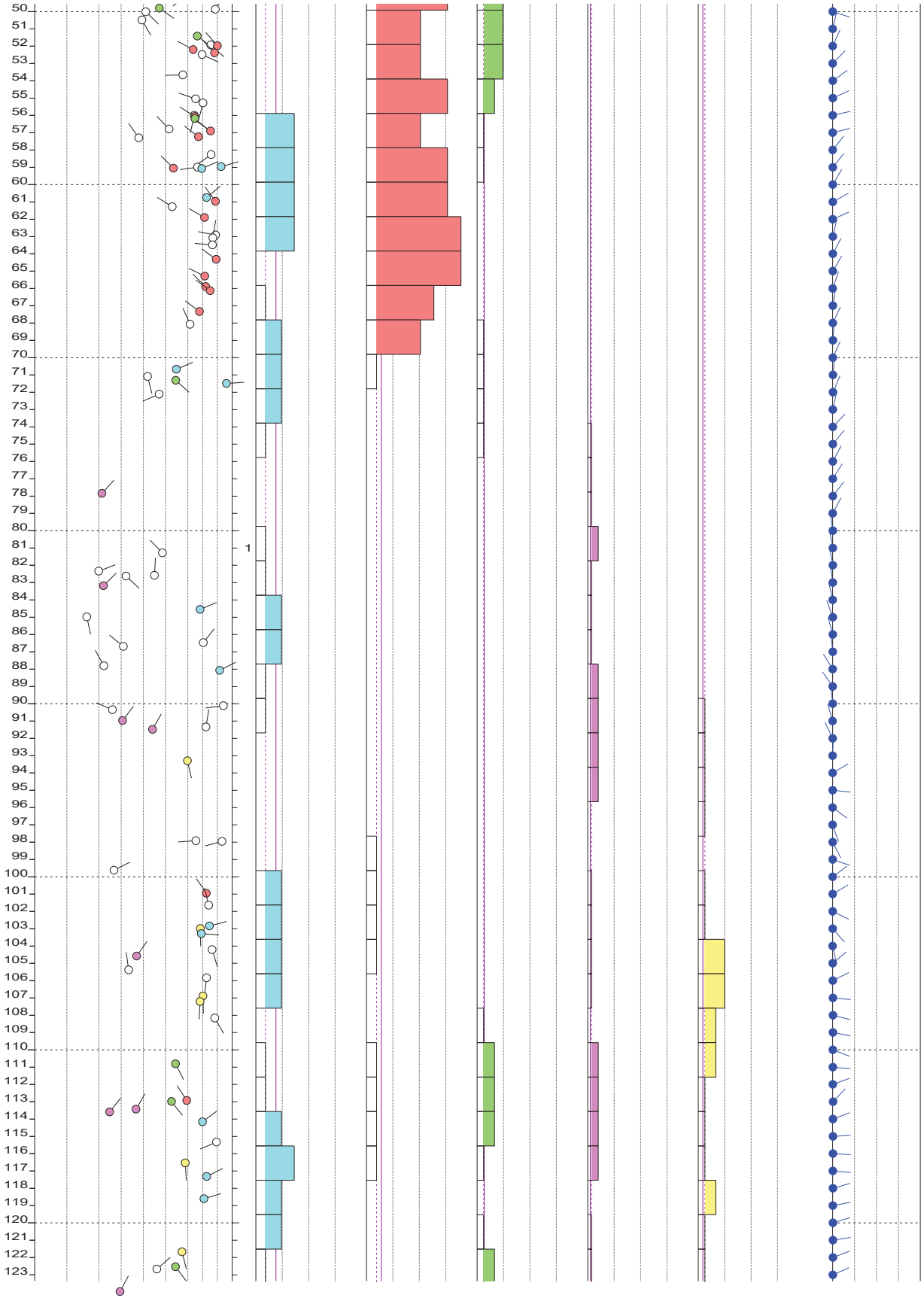
measurement distance 0.000ft
step distance 0.000ft

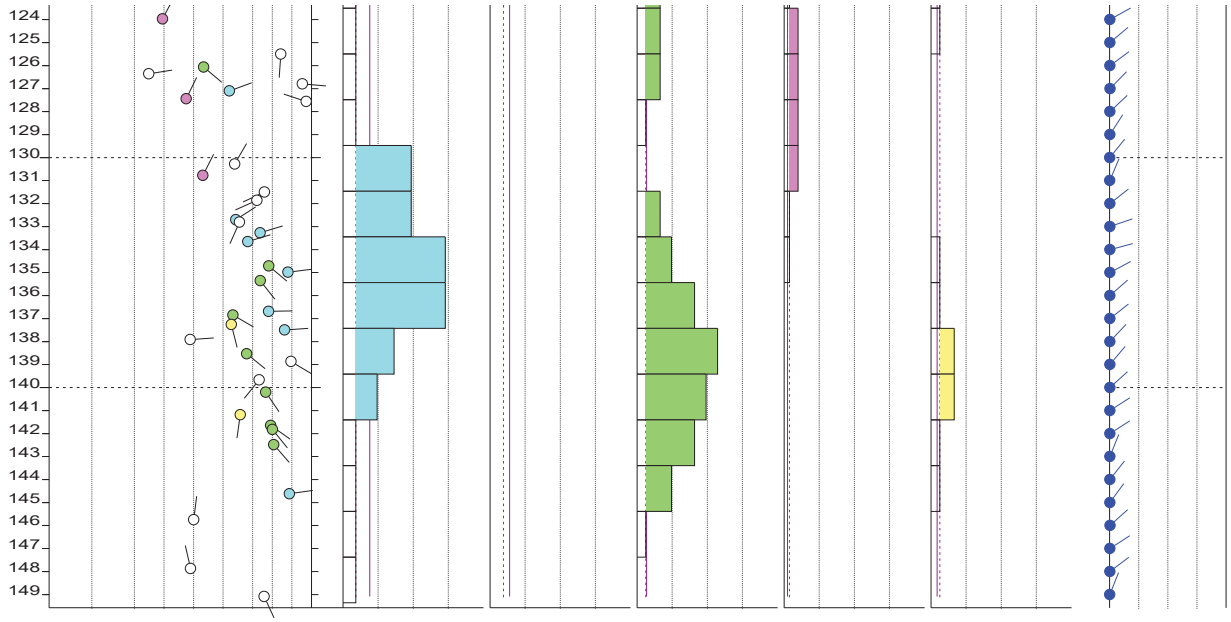
Interpretation 1

Dip data sets .....
BHTV dips

open symbols not used in mean-dip/zone-axis calculation




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148
149

DIP DATA INTERPRETATION
RGLDIP vsn 6.2
FRACTURE ANALYSIS LOG

AECOM

Borehole: B-102

VAIL DAM

top of borehole.....
East:_
North:_
Elev:_

North ref: true
Depth units are feet
Vertical scale: 1/100

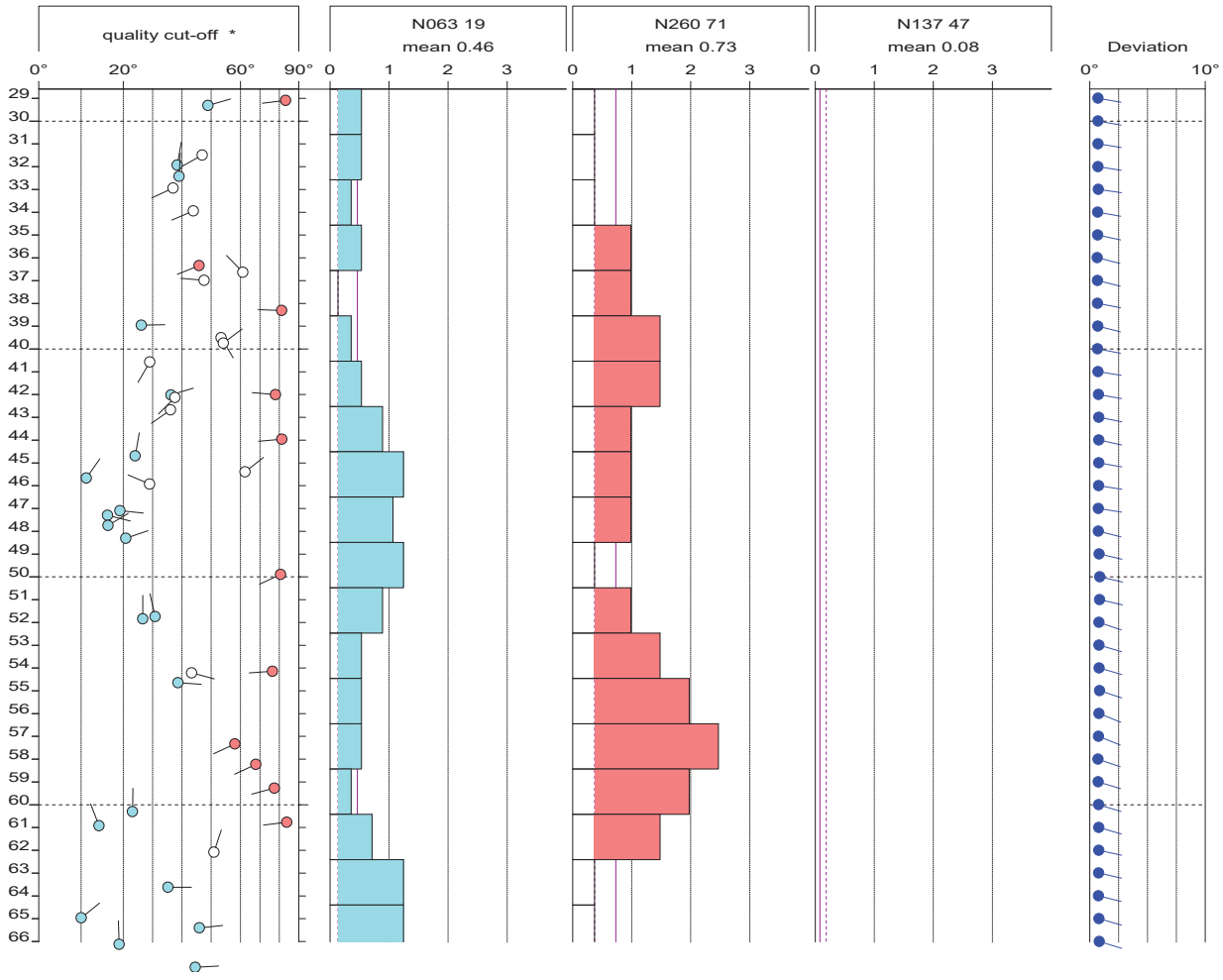
Zone from 198.024 to 28.590ft
Mean dip format: dip-azimuth and dip
Frequency histogram parameters:

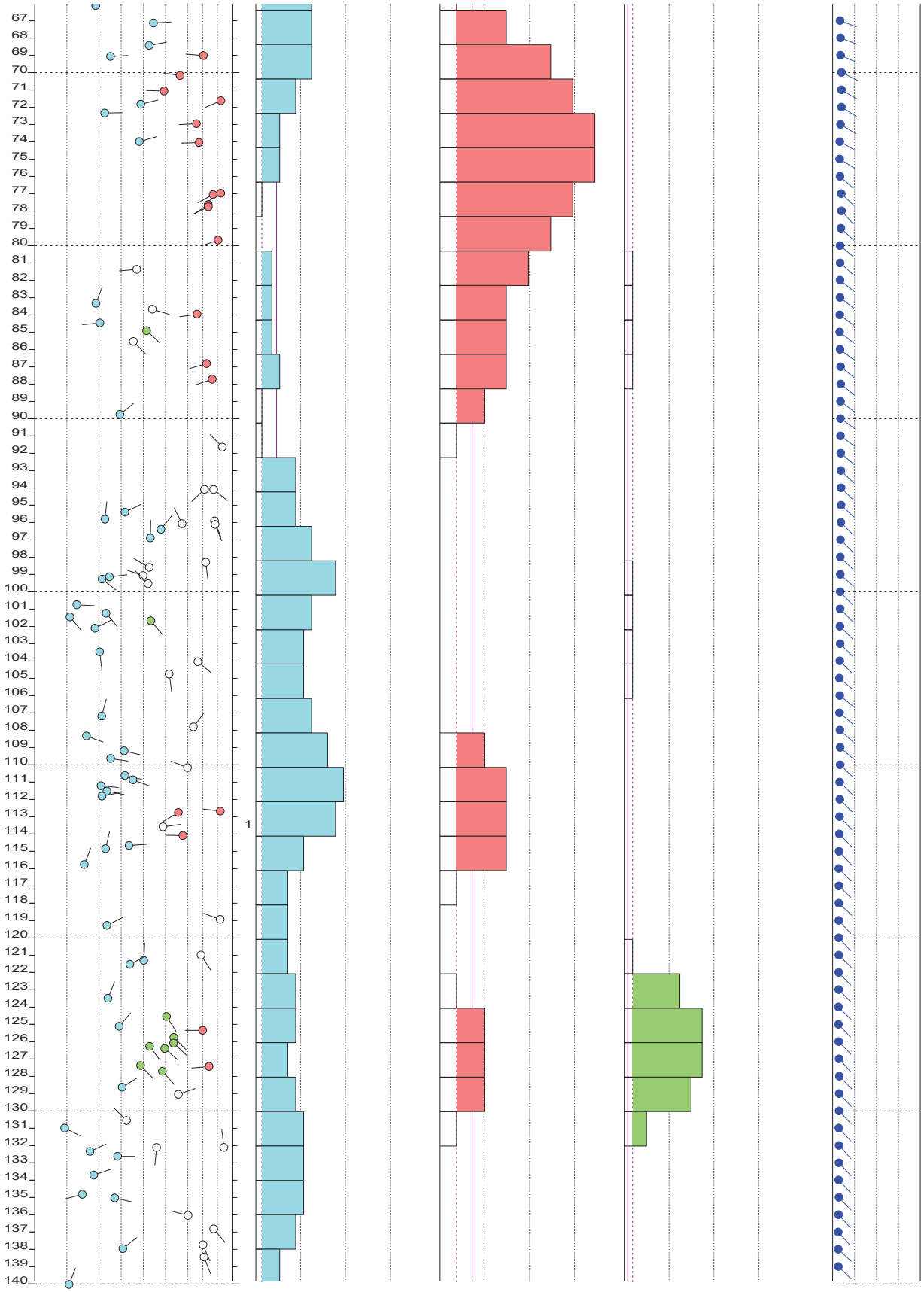
measurement distance 0.000ft
step distance 0.000ft

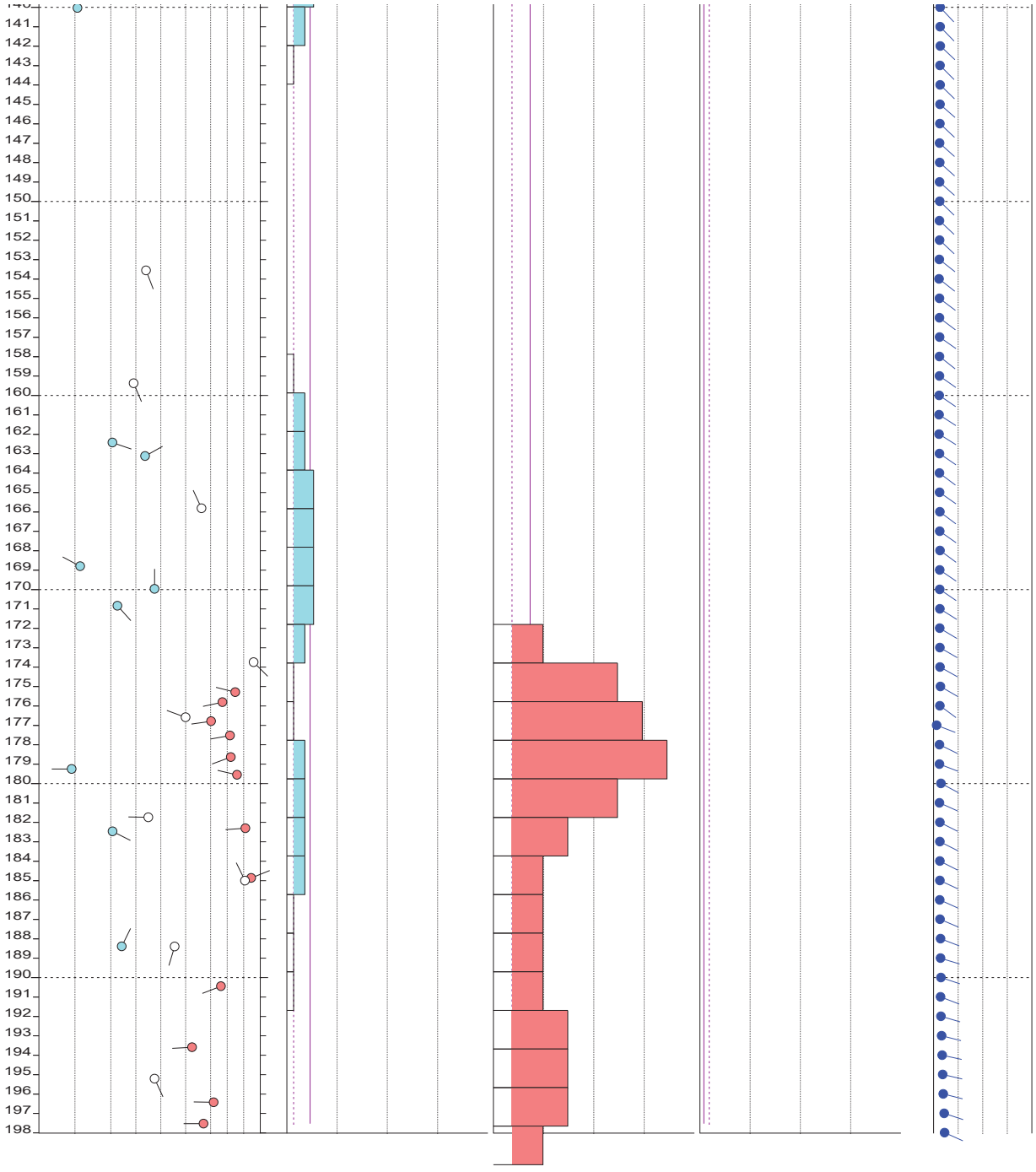
Interpretation 1

Dip data sets .....
BHTV dips

open symbols not used in mean-dip/zone-axis calculation




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DIP DATA INTERPRETATION
RGLDIP vsn 6.2
FRACTURE ANALYSIS LOG

AECOM

Borehole: B-103

VAIL DAM

top of borehole.....
East:_
North:_
Elev:_

North ref: true
Depth units are feet
Vertical scale: 1/100

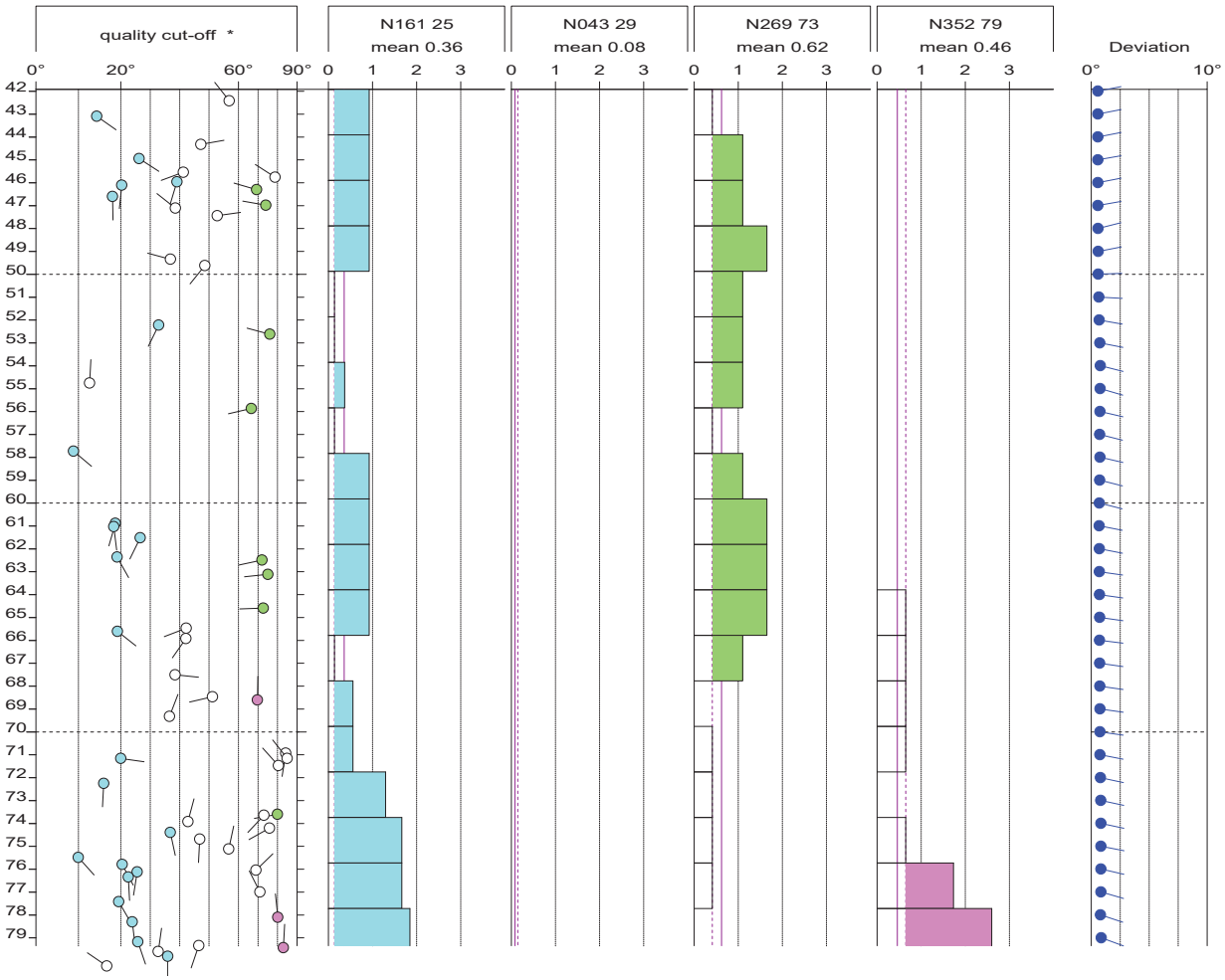
Zone from 200.000 to 41.916ft
Mean dip format: dip-azimuth and dip
Frequency histogram parameters:

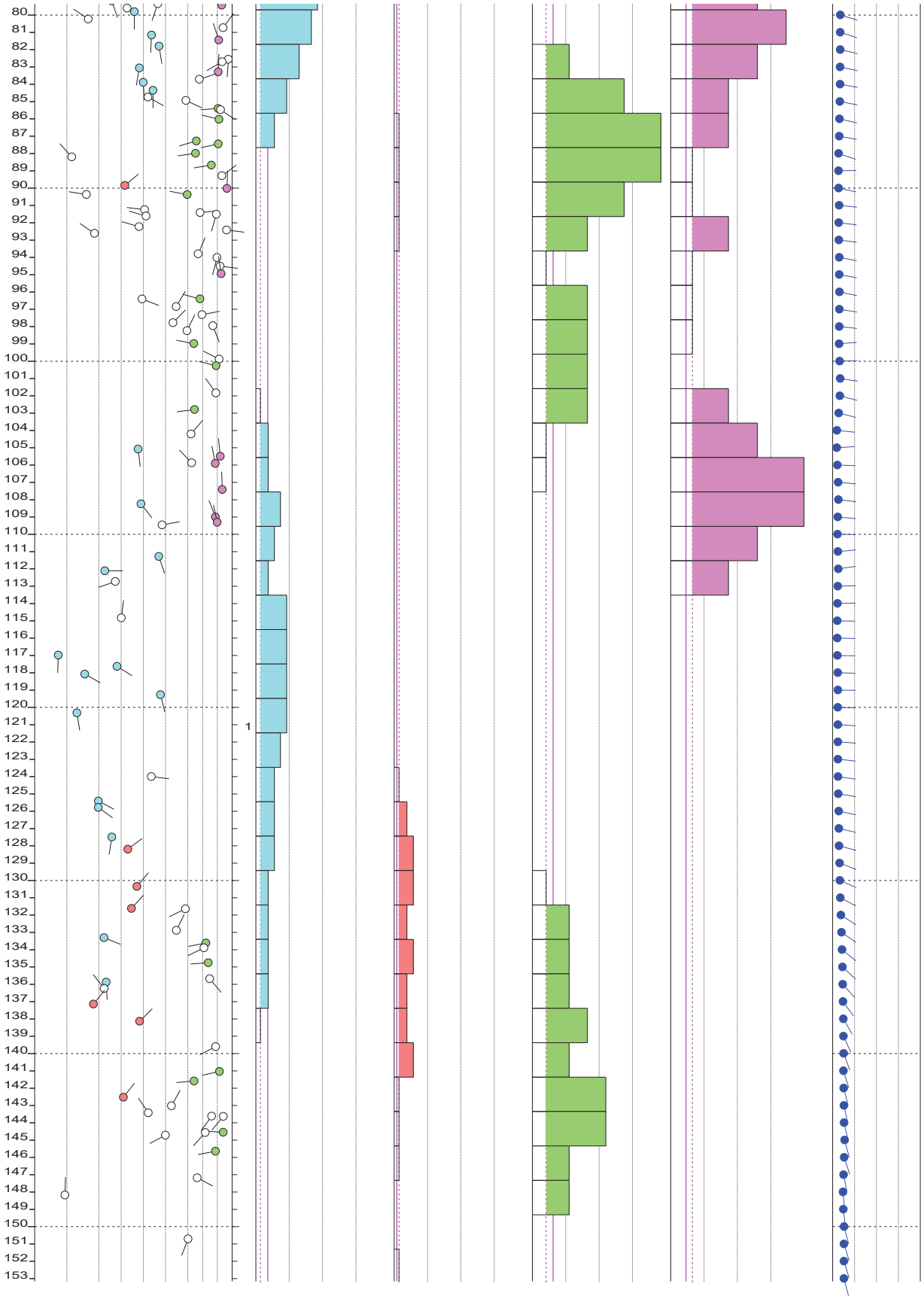
measurement distance 0.000ft
step distance 0.000ft

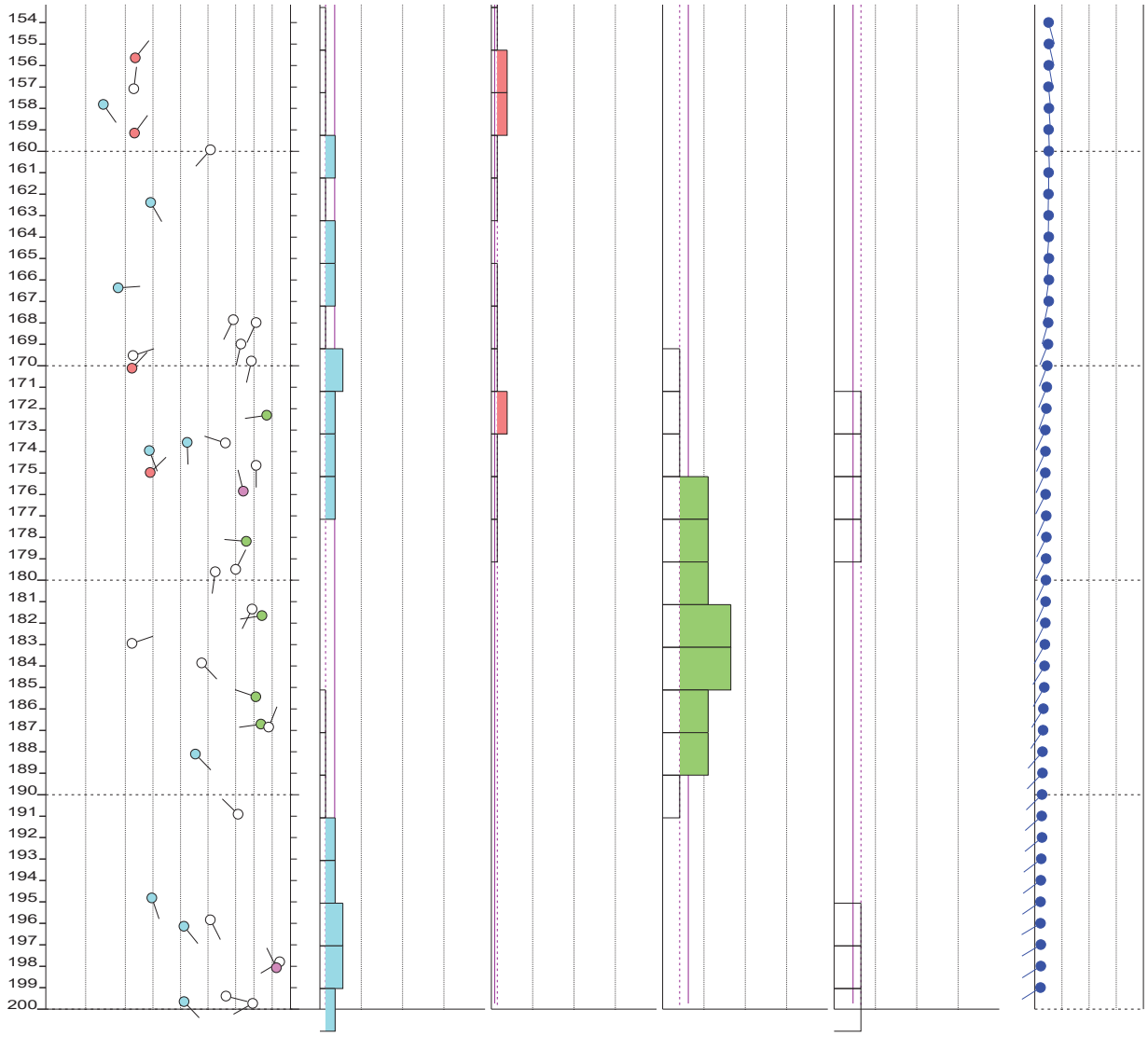
Interpretation 1

Dip data sets .....
BHTV dips

open symbols not used in mean-dip/zone-axis calculation




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DIP DATA INTERPRETATION
RGLDIP vsn 6.2
FRACTURE ANALYSIS LOG

AECOM

Borehole: B-104

VAIL DAM

top of borehole.....
East:_
North:_
Elev:_

North ref: true
Depth units are feet
Vertical scale: 1/100

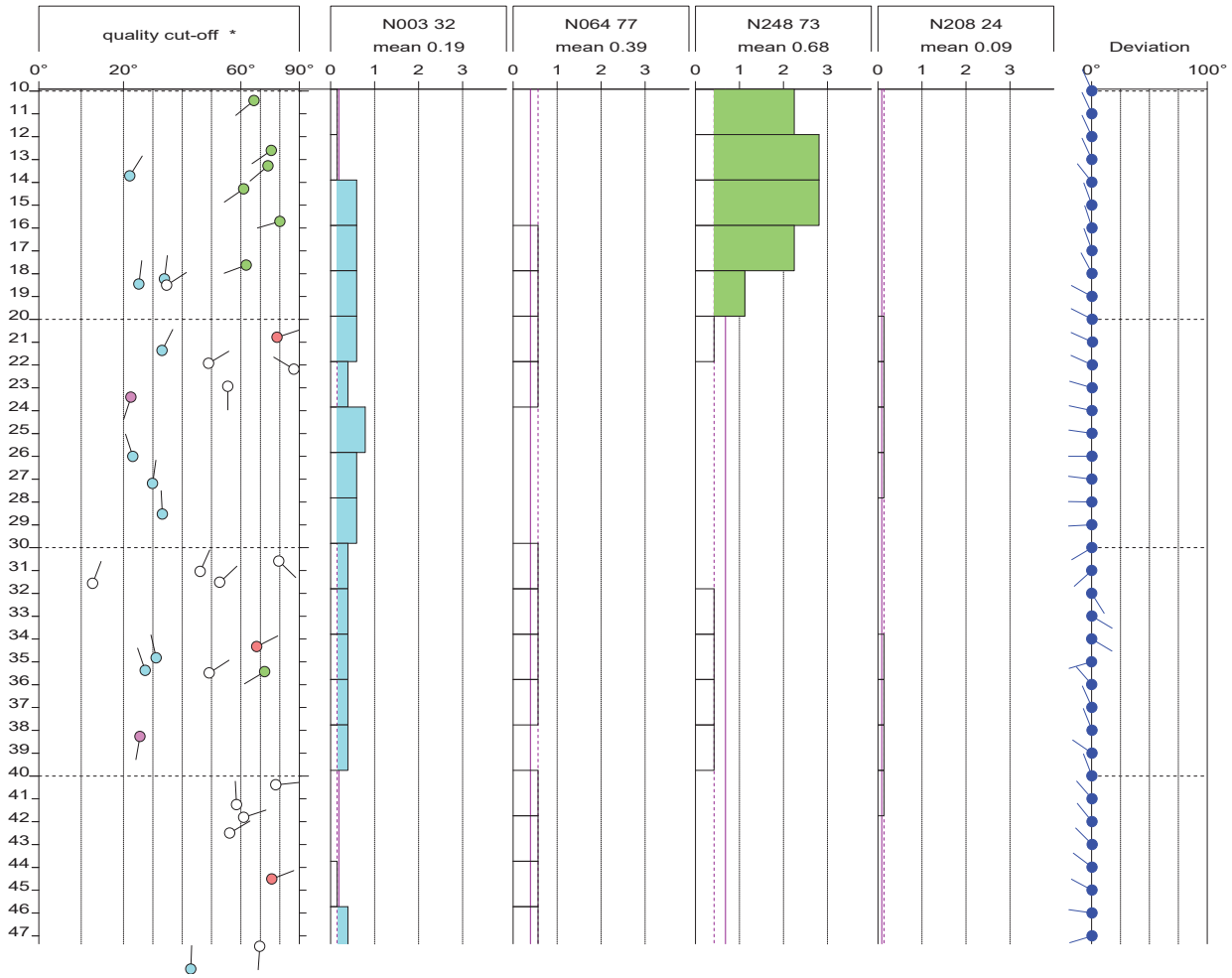
Zone from 147.508 to 9.919ft
Mean dip format: dip-azimuth and dip
Frequency histogram parameters:

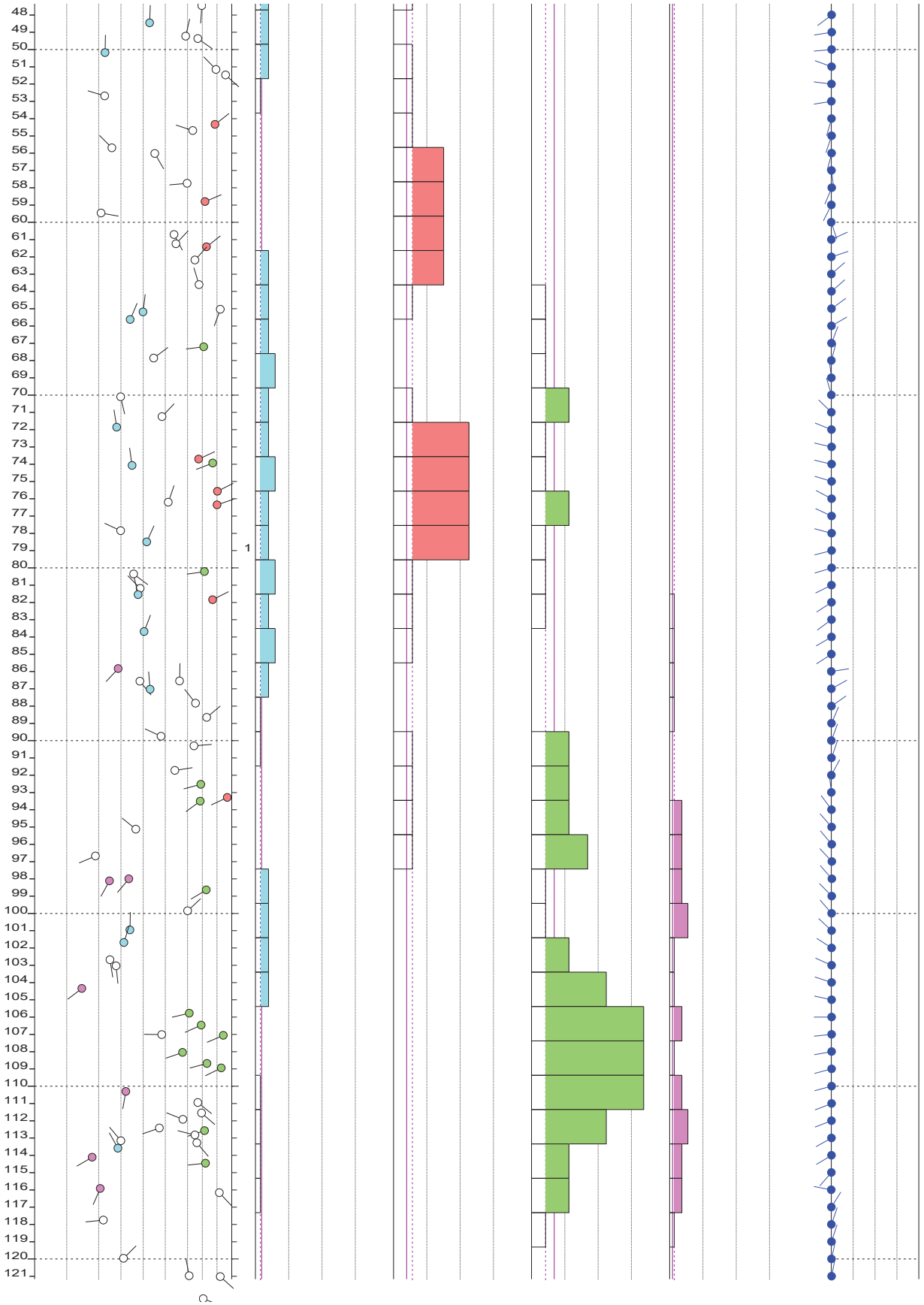
measurement distance 0.000ft
step distance 0.000ft

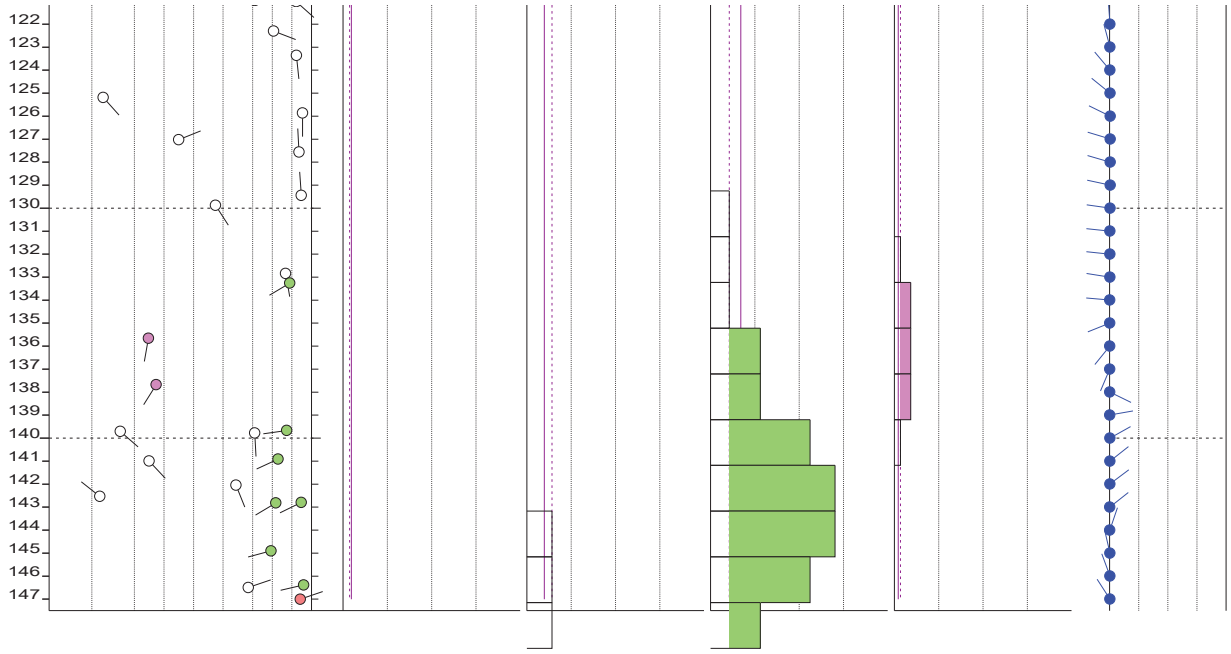
Interpretation 1

Dip data sets .....
BHTV dips

open symbols not used in mean-dip/zone-axis calculation




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DIP DATA INTERPRETATION
RGLDIP vsn 6.2
FRACTURE ANALYSIS LOG

AECOM

Borehole: B-104

VAIL DAM

top of borehole.....
East:_
North:_
Elev:_

North ref: true
Depth units are feet
Vertical scale: 1/100

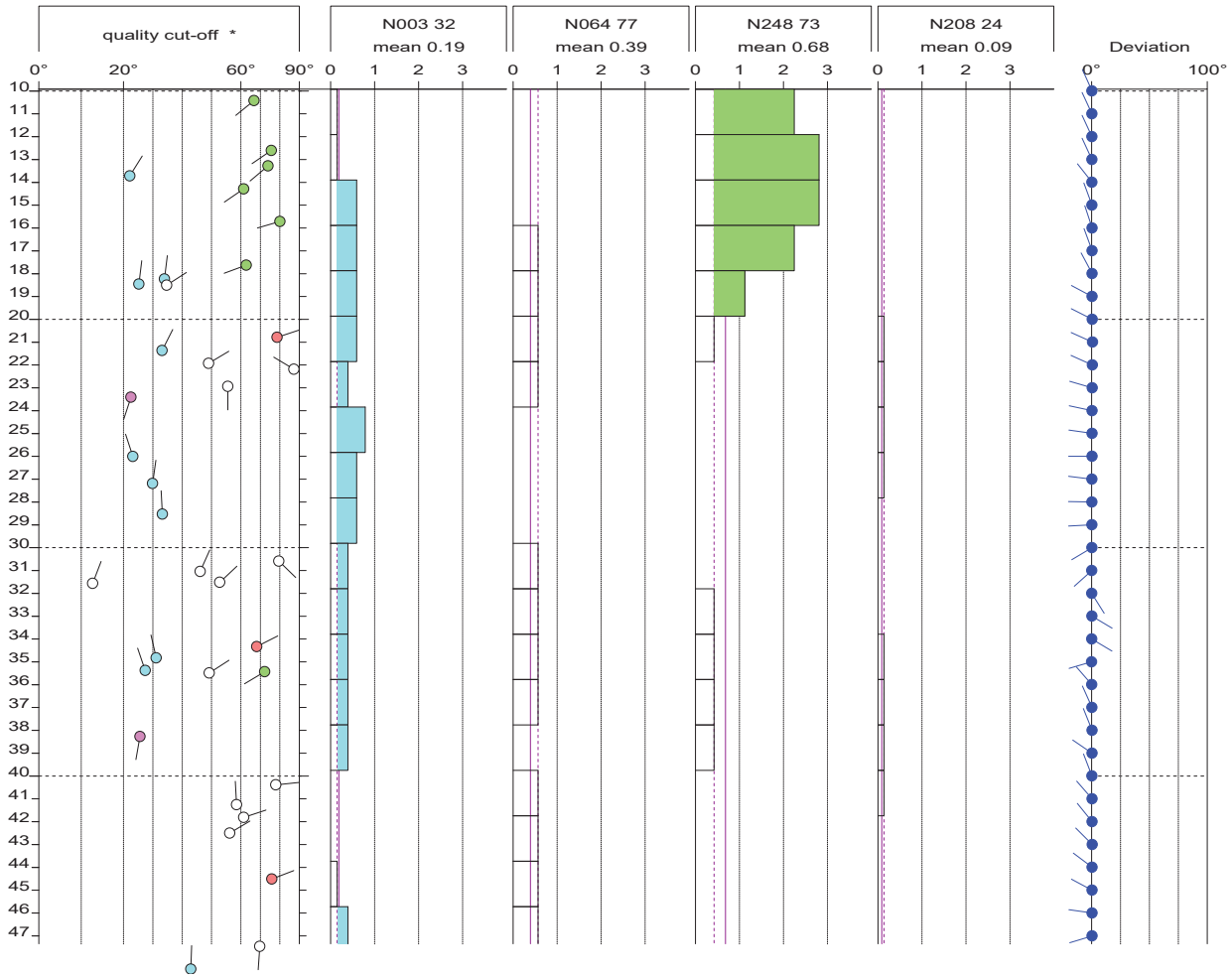
Zone from 147.508 to 9.919ft
Mean dip format: dip-azimuth and dip
Frequency histogram parameters:

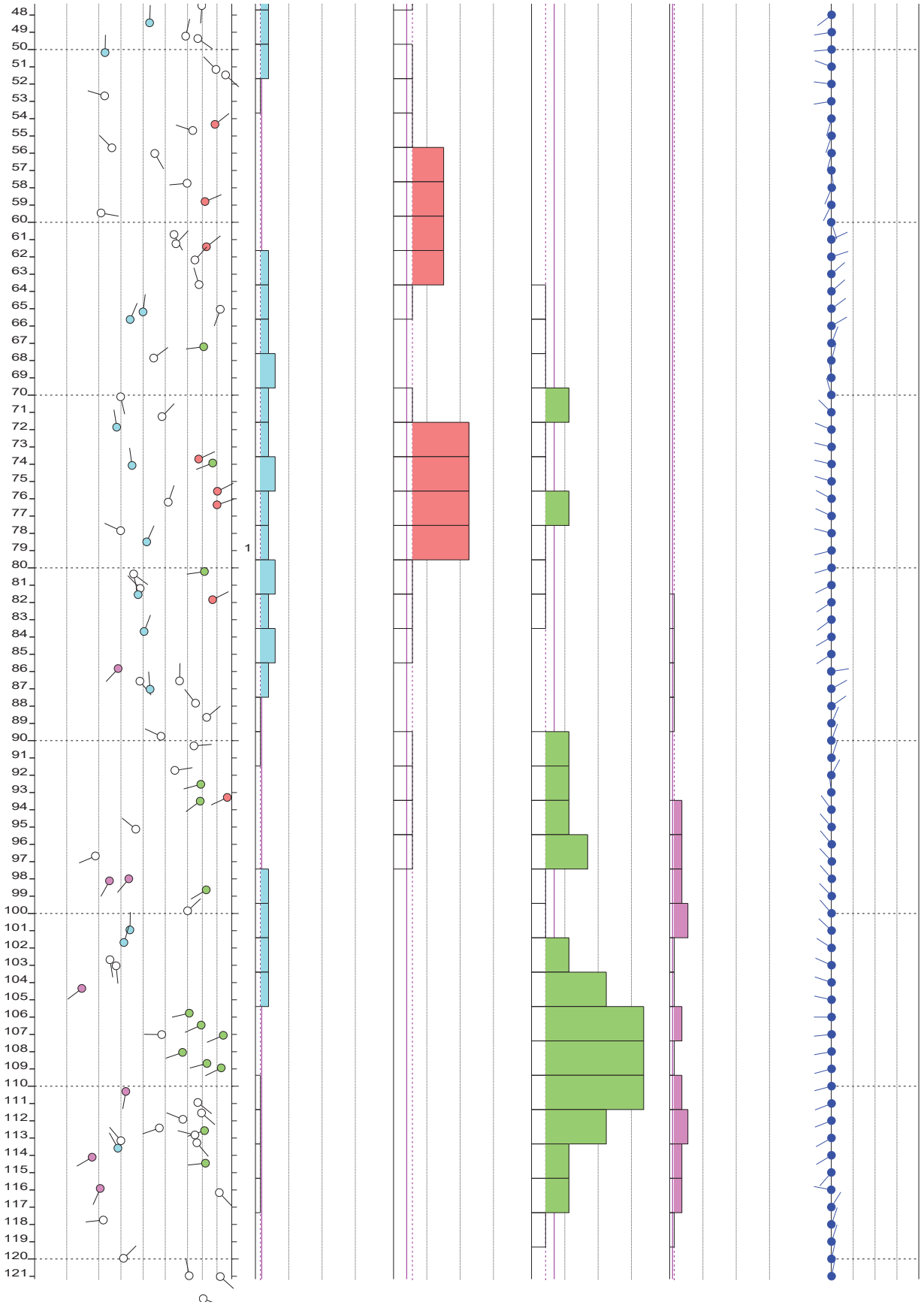
measurement distance 0.000ft
step distance 0.000ft

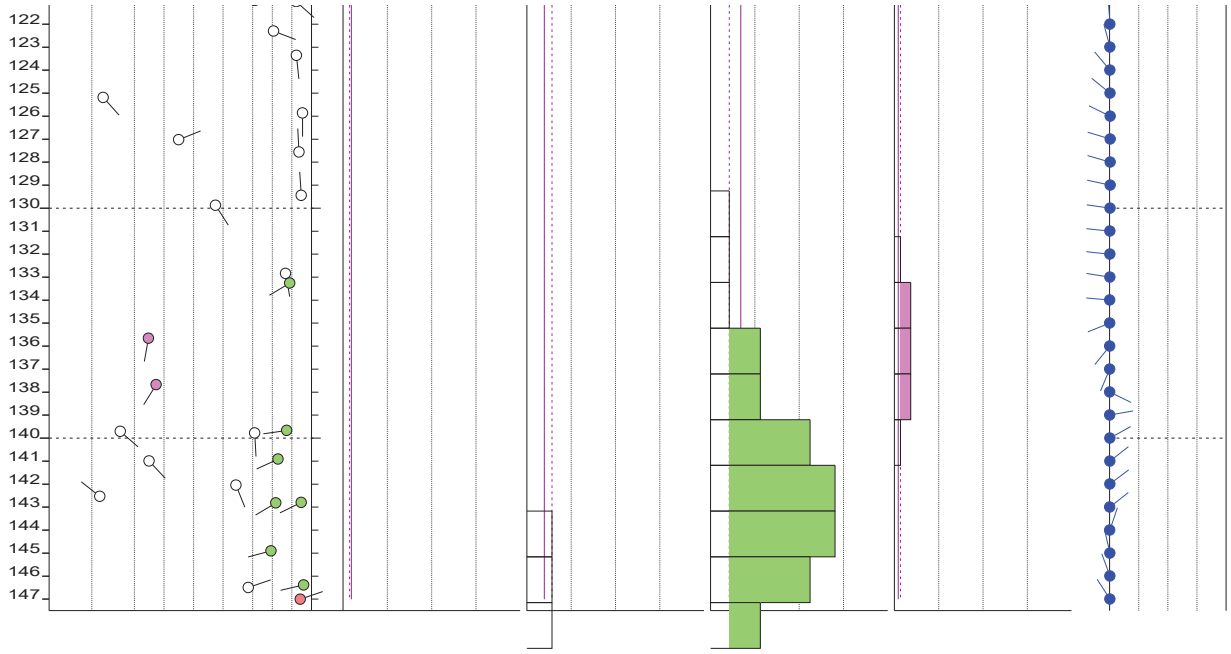
Interpretation 1

Dip data sets .....
BHTV dips

open symbols not used in mean-dip/zone-axis calculation




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DIP DATA INTERPRETATION
RGLDIP vsn 6.2
FRACTURE ANALYSIS LOG

AECOM

Borehole: B-105

VAIL DAM

top of borehole.....
East:_
North:_
Elev:_

North ref: true
Depth units are feet
Vertical scale: 1/100

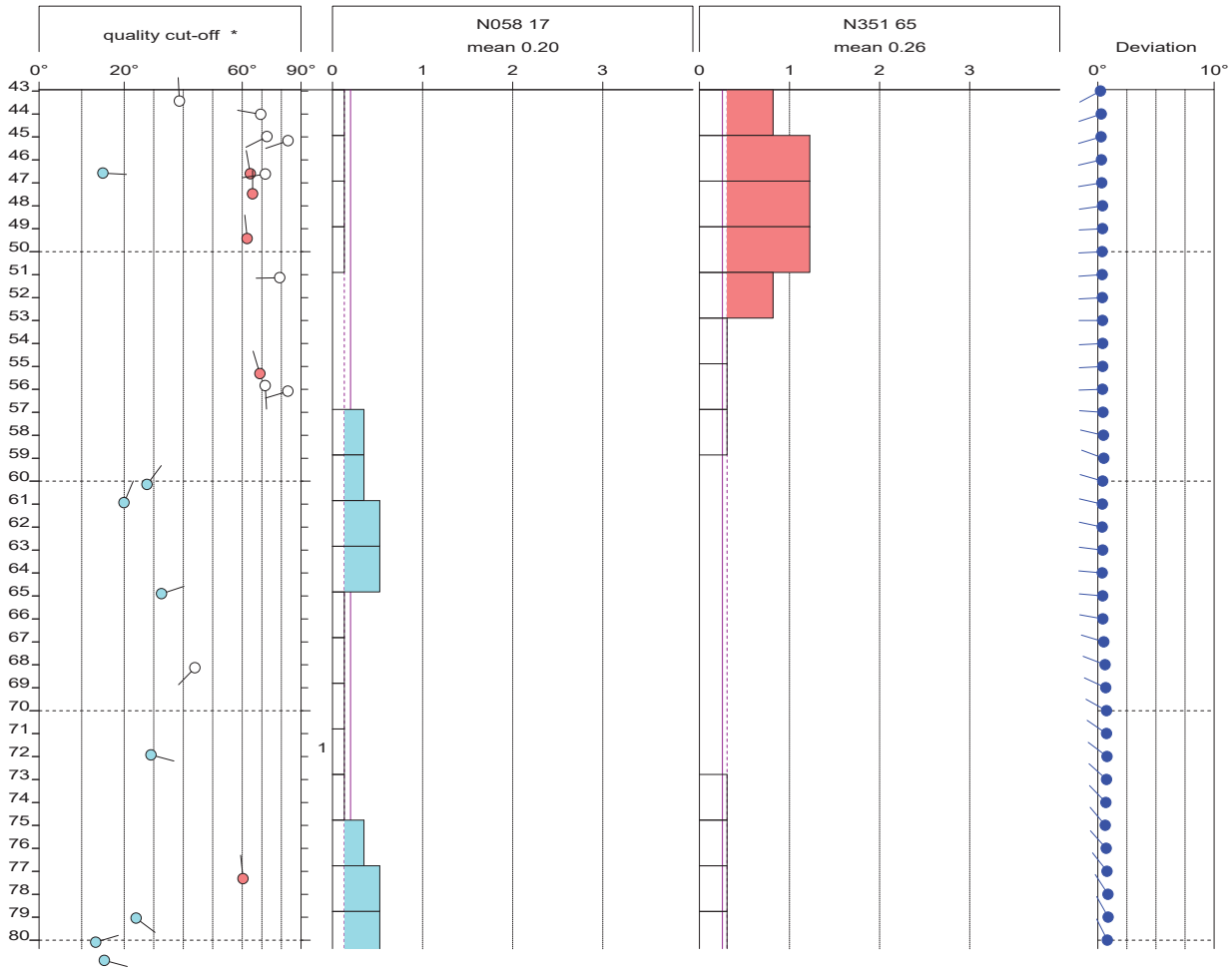
Zone from 100.060 to 42.938ft
Mean dip format: dip-azimuth and dip
Frequency histogram parameters:

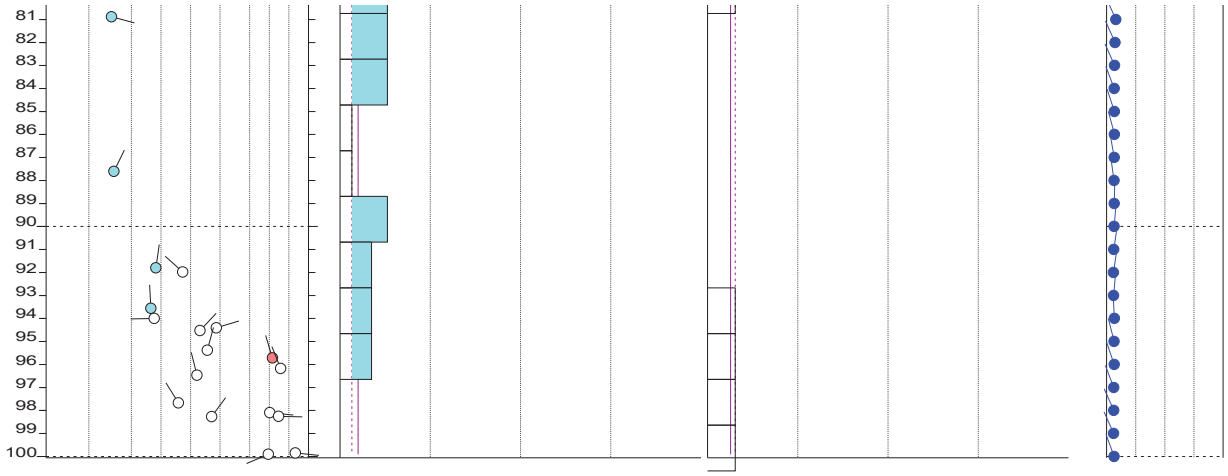
measurement distance 0.000ft
step distance 0.000ft

Interpretation 1

Dip data sets .....
BHTV dips

open symbols not used in mean-dip/zone-axis calculation




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DIP DATA INTERPRETATION
RGLDIP vsn 6.2
FRACTURE ANALYSIS LOG

AECOM

Borehole: B-105

VAIL DAM

top of borehole.....
East:
North:
Elev:

North ref: true
Depth units are feet
Vertical scale: 1/100

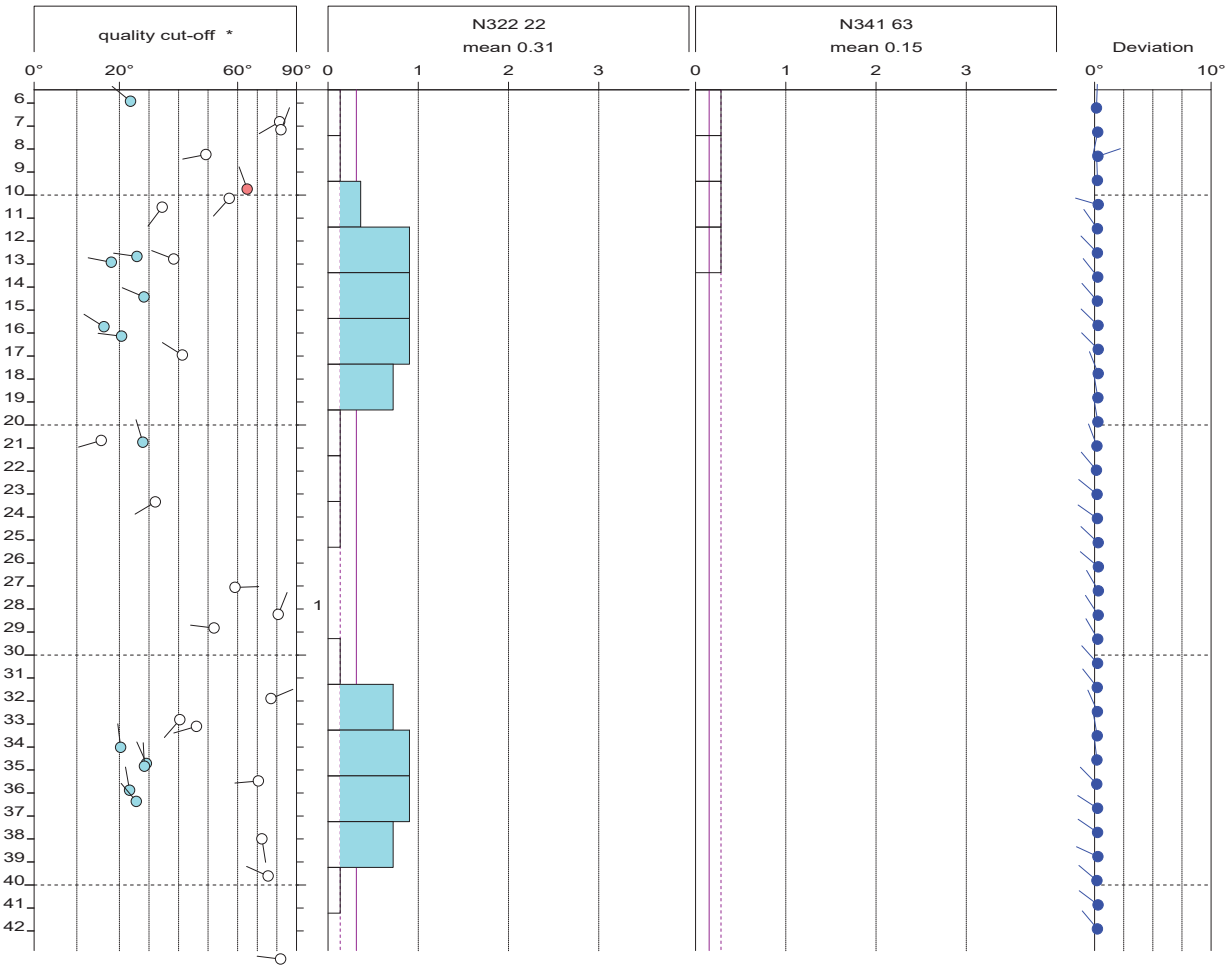
Zone from 49.973 to 5.423ft
Mean dip format: dip-azimuth and dip
Frequency histogram parameters:

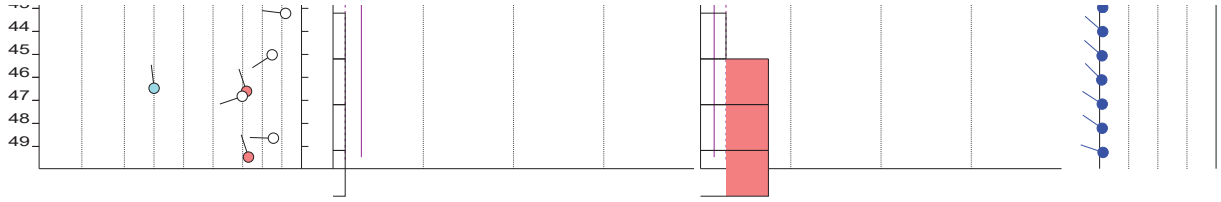
measurement distance 0.000ft
step distance 0.000ft

Interpretation 1

Dip data sets .....
OPTV dips

open symbols not used in mean-dip/zone-axis calculation




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DIP DATA INTERPRETATION
RGLDIP vsn 6.2
FRACTURE ANALYSIS LOG

AECOM

Borehole: B-106 UPPER SECTION

VAIL DAM

top of borehole.....
East:_
North:_
Elev:_

North ref: true
Depth units are feet
Vertical scale: 1/100

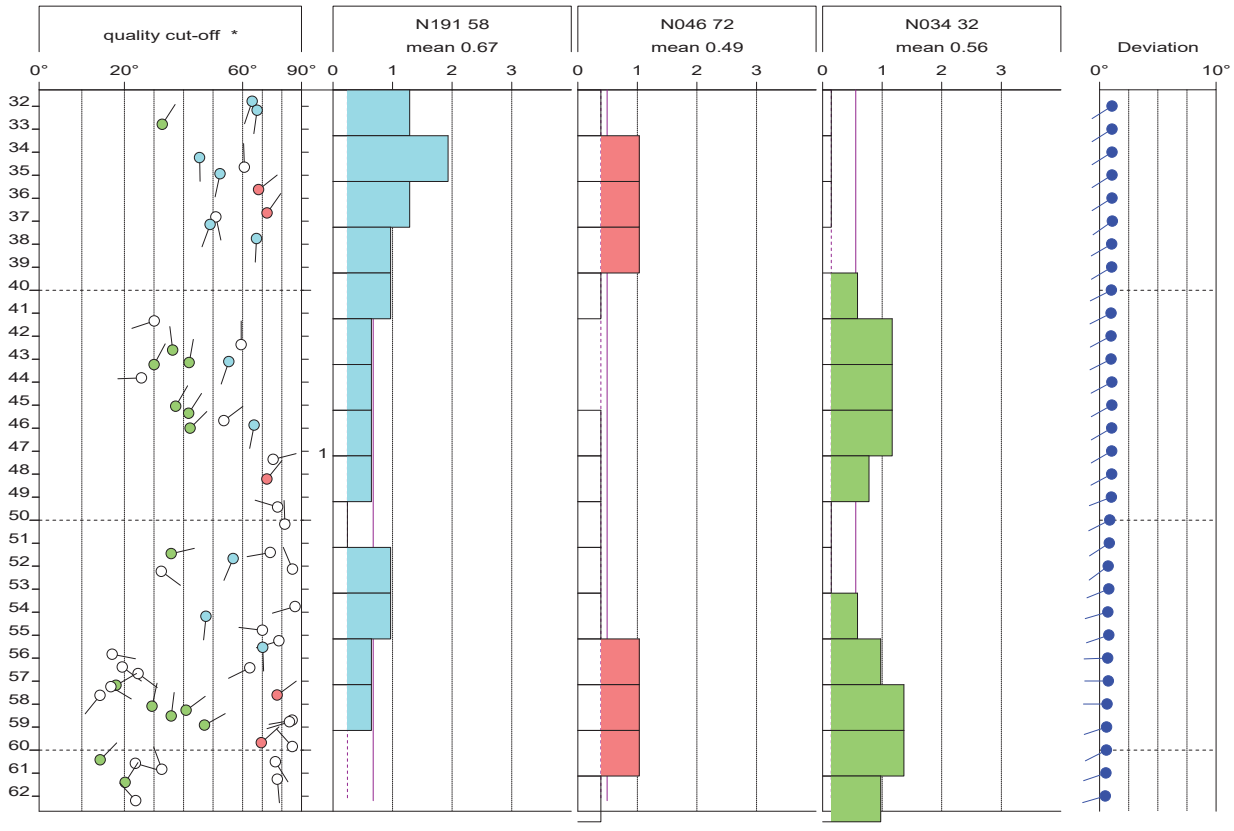
Zone from 62.656 to 31.286ft
Mean dip format: dip-azimuth and dip
Frequency histogram parameters:

measurement distance 0.000ft
step distance 0.000ft

Interpretation 1

Dip data sets .....
BHTV dips

open symbols not used in mean-dip/zone-axis calculation



DIP DATA INTERPRETATION
RGLDIP vsn 6.2
FRACTURE ANALYSIS LOG

AECOM

Borehole: B-106 MIDDLE SECTION

VAIL DAM

top of borehole.....
East:_
North:_
Elev:_

North ref: true
Depth units are feet
Vertical scale: 1/100

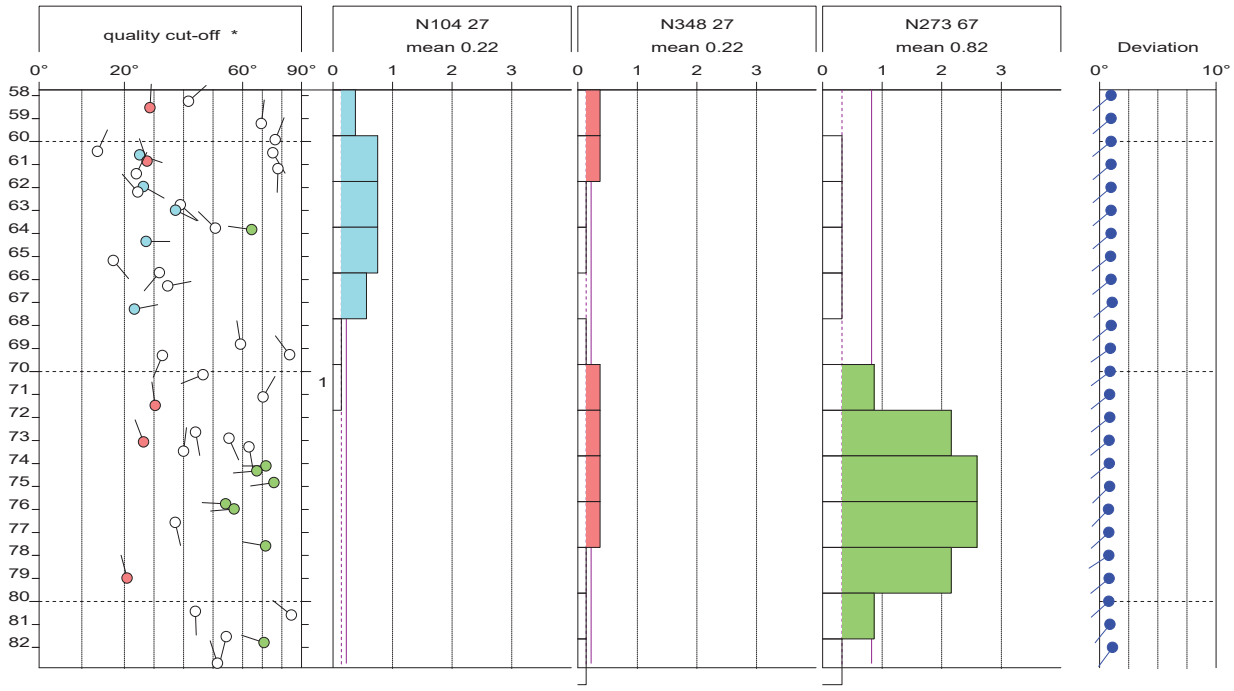
Zone from 82.880 to 57.751ft
Mean dip format: dip-azimuth and dip
Frequency histogram parameters:

measurement distance 0.000ft
step distance 0.000ft

Interpretation 1

Dip data sets .....
BHTV dips

open symbols not used in mean-dip/zone-axis calculation



DIP DATA INTERPRETATION
RGLDIP vsn 6.2
FRACTURE ANALYSIS LOG

AECOM

Borehole: B-106 LOWER SECTION

VAIL DAM

top of borehole.....
East:_
North:_
Elev:_

North ref: true
Depth units are feet
Vertical scale: 1/100

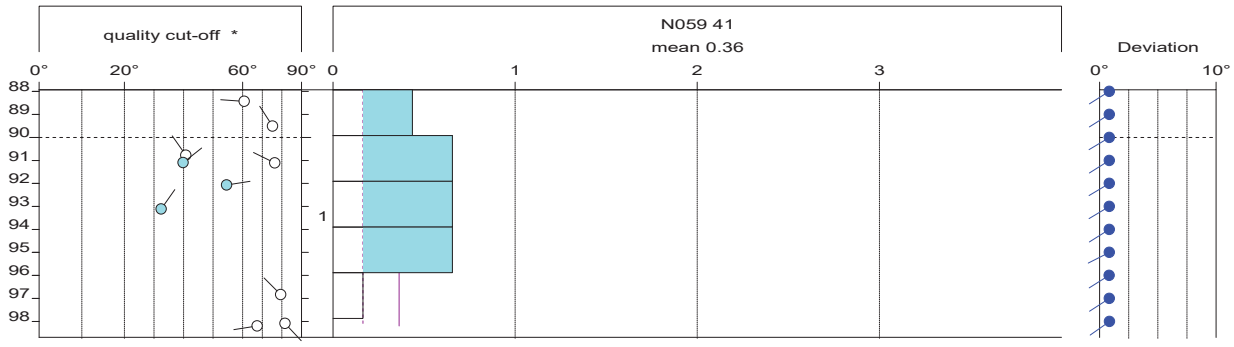
Zone from 98.698 to 87.928ft
Mean dip format: dip-azimuth and dip
Frequency histogram parameters:

measurement distance 0.000ft
step distance 0.000ft

Interpretation 1

Dip data sets .....
BHTV dips

open symbols not used in mean-dip/zone-axis calculation



APPENDIX E

BOREHOLE GEOPHYSICAL LOGGING SYSTEMS - NIST TRACEABLE CALIBRATION RECORDS

MICRO PRECISION CALIBRATION, INC
2165 N. Glassell St.,
Orange, CA 92865
714-901-5659

Calibration CERT # AC-1969

Certificate of Calibration

Date: Jan 6, 2017 **Cert No. 512200812659896**

Customer:

GEOVISION

1124 OLYMPIC DRIVE
CORONA CA 92881

Work Order #: N/A

MPC Control #:	AM6767	Serial Number:	160023
Asset ID:	160023	Department:	N/A
Gage Type:	LOGGER	Performed By:	TYLER MCKEEN
Manufacturer:	OYO	Received Condition:	IN TOLERANCE
Model Number:	3403	Returned Condition:	IN TOLERANCE
Size:	N/A	Cal. Date:	December 16, 2016
Temp/RH:	72.0°F / 54.0%	Cal. Interval:	12 MONTHS
Location:	Calibration performed at MPC facility	Cal. Due Date:	December 16, 2017

Calibration Notes:

THIS CERTIFICATE SUPERSEDES 512200812635836. REVISED PO SCP-0045 REVISION 1 JAN 04, 2017.

See attached data sheet for calculations. (1 Page)

Calibrated IAW customer supplied data form Rev 2.1
Frequency measurement uncertainty = 0.0005 Hz
Unit calibrated with Laptop Panasonic Model CF-29,s/n: 4FKSA41798
Calibrated To 4:1 Accuracy Ratio

This Calibration has been performed in conformance with, and complies to all requirements as set forth in S&ME purchase order SCP-0045 Revision 1, Dated January 04, 2017

Standards Used to Calibrate Equipment

I.D.	Description.	Model	Serial	Manufacturer	Cal. Due Date	Traceability #
T1100	UNIVERSAL COUNTER	53131A	3546A09912	HEWLETT PACKARD	Feb 2, 2017	222008122827657
DB8748	GPS TIME AND FREQUENCY RECEIVER	58503A	3625A01225	HEWLETT PACKARD	Jun 17, 2017	222008122553843
LAS0018	ARB / FUNC GENERATOR	33250A	US40001522	AGILENT	Dec 7, 2017	512200812632023

Calibrating Technician: 

TYLER MCKEEN

QC Approval: 

Jim Williams

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with EA's Publication and NIST Technical Note 1297, 1994 Edition. Services rendered comply with ISO 17025:2005, ANSI/NCSL Z540-1, MPC Quality Manual, MPC CSD and with customer purchase order instructions.

Calibration cycles and resulting due dates were submitted/approved by the customer. Any number of factors may cause an instrument to drift out of tolerance before the next scheduled calibration. Recalibration cycles should be based on frequency of use, environmental conditions and customer's established systematic accuracy. The information on this report, pertains only to the instrument identified.

All standards are traceable to SI through the National Institute of Standards and Technology (NIST) and/or recognized national or international standards laboratories. Services rendered include proper manufacturer's service instruction and are warranted for no less than thirty (30) days. This report may not be reproduced in part or in a whole without the prior written approval of the issuing MPC lab.

MICRO PRECISION CALIBRATION, INC
2165 N. Glassell St.,
Orange, CA 92865
714-901-5659

Calibration CERT # AC-1969

Certificate of Calibration

Date: Jan 6, 2017 **Cert No. 512200812659896**

Procedures Used in this Event

Procedure Name	Description
GEOVISION SEISMIC	Suspension PS Seismic Logger/Recorder Calibration Procedure

Calibrating Technician: TYLER MCKEEN

QC Approval: Jim Williams

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with EA's Publication and NIST Technical Note 1297, 1994 Edition. Services rendered comply with ISO 17025:2005, ANSI/NCSL Z540-1, MPC Quality Manual, MPC CSD and with customer purchase order instructions.

Calibration cycles and resulting due dates were submitted/approved by the customer. Any number of factors may cause an instrument to drift out of tolerance before the next scheduled calibration. Recalibration cycles should be based on frequency of use, environmental conditions and customer's established systematic accuracy. The information on this report, pertains only to the instrument identified.

All standards are traceable to SI through the National Institute of Standards and Technology (NIST) and/or recognized national or international standards laboratories. Services rendered include proper manufacturer's service instruction and are warranted for no less than thirty (30) days. This report may not be reproduced in part or in a whole without the prior written approval of the issuing MPC lab.

GEOVision geophysical services

SUSPENSION PS SEISMIC LOGGER/RECORDER CALIBRATION DATA FORM

INSTRUMENT DATA

System mfg.:	OYO	Model no.:	3403
Serial no.:	160023	Calibration date:	12/16/16
By:	Micro Precision	Due date:	12/16/17
Counter mfg.:	Hewlett Packard	Model no.:	53131A
Serial no.:	3546A09912	Calibration date:	2/02/16
By:	Micro Precision	Due date:	2/02/17
Signal generator mfg.:	Agilent	Model no.:	33250A
Serial no.:	US40001522	Calibration date:	12/07/16
By:	Micro Precision	Due date:	12/07/17
Laptop controller mfg.:	Panasonic	Model no.:	CF-29
Serial no.:	4FKSA41798	Calibration date:	N/A

SYSTEM SETTINGS:

Gain:	2-32
Filter	10k / off
Range:	5-200 microseconds
Delay:	0
Stack (1 std)	1
System date = correct date and time	Yes, 12/16/16, 11:37 AM

PROCEDURE:

Set sine wave frequency to target frequency with amplitude of approximately 0.25 volt peak
Note actual frequency on data form.
Set sample period and record data file to disk. Note file name on data form.
Pick duration of 9 cycles using PSLOG.EXE program, note duration on data form, and save as .sps file. Calculate average frequency for each channel pair and note on data form.

Average frequency must be within +/- 1% of actual frequency at all data points.

Maximum error ((AVG-ACT)/ACT*100)% As found 0.40% As left 0.40%

Target Frequency (Hz)	Actual Frequency (Hz)	Sample Period (microS)	File Name COOl	Time for 9 cycles Hn (msec)	Average Frequency Hn (Hz)	Time for 9 cycles Hr (msec)	Average Frequency Hr (Hz) EFF 12/16/16	Time for 9 cycles V (msec)	Average Frequency V (Hz)
50.00	50.0	200	001	179.4	50.1	179.6	~~77~~ 50.1	180.0	50.0
100.0	100.0	100	002	90.1	100.2	89.9	100.2	90.0	100.0
200.0	200.0	50	003	45.05	199.8	45.05	199.8	45.1	199.6
500.0	500.0	20	004	17.94	501.8	18.00	500.0	17.98	500.8
1000	1000.0	10	005	8.98	1003.0	9.01	999.0	9.01	999.0
2000	2000.0	5	006	4.49	2008.0	4.505	1998.0	4.5	2000.0

Calibrated by: Tyler McKeen — Name; 12/16/16 — Date; Signature

Witnessed by: Emily Feldman — Name; 12/16/16 — Date; Signature

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Appendix H

Laboratory Testing

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Appendix H
Laboratory Testing

Laboratory testing was performed on rock cores that were obtained at the site of the proposed replacement dam and in the proposed borrow area. The testing was performed by Twining, Inc.; the petrographic analyses were performed by Spectrum Petrographics Inc. Reports from both Twining and Spectrum Petrographics are included in this appendix.

H.1 Strength Testing

Unconfined compression and elastic modulus testing were performed in accordance with ASTM D7012 on specimens selected from the rock core obtained at the replacement dam and borrow area. The samples were prepared for testing by trimming and grinding the ends of the samples flat and parallel to each other. A loading frame was used to load the specimens and axial load, axial displacement and diametral displacement were monitored during the test. The results of the unconfined compression and elastic modulus testing are summarized in Table H-1 and graphical results are provided in Twining's report.

Table H-1. Summary of Unconfined Compressive Strength Testing on Rock

Boring Number	Sample Depth (feet)	Rock Type	Sample Diameter (inches)	Sample Length (inches)	Compressive Strength (psi)	Young's Modulus ($x10^3$ psi)
B-101	27.0	Gneiss	2.38	6.06	6,800	350
B-101	120.0	Gneiss	2.36	6.09	11,500	600
B-102	25.0	Gneiss	2.38	6.12	6,800	750
B-102	199.0	Gneiss	2.39	5.49	6,500	850
B-103	119.0	Gneiss	2.39	6.15	13,900	1,850
B-104	7.0	Gneiss	2.37	6.09	2,500	100
B-104	64.5	Gneiss	2.38	6.09	12,000	1,050
B-105	10.5	Gneiss	2.38	6.00	4,500	2,200
B-105	71.0	Gneiss	2.4	6.05	12,900	1,850
B-106	40.0	Gneiss	2.37	6.03	5,200	400
B-106	92.0	Gneiss	2.38	6.06	13,500	1,700
B-107	43.5	Gneiss	2.39	5.64	3,400	500
B-107	79.0	Gneiss	2.38	6.05	4,500	2,200
B-201	67.0	Gneiss	2.39	6.15	10,200	1,250
B-202	43.0	Tonalite	2.40	6.13	16,400	1,850

H.2 Aggregate Quality Testing

Rock core from the borings in the proposed borrow area were composited and then crushed to provide samples for aggregate quality testing. The composited cores were crushed such that there were no particles larger than 1½ inches. The core was composited in intervals of similar rock type as shown in Table 3. The results of the aggregate tests are summarized in Table H-2. Where multiple tests were performed on the aggregate samples, the value shown in Table H-2 is the average value of the test results. Details of the results of the testing on the crushed rock core are provided in Twining's report.

Table H-2. Summary of Aggregate Quality Testing

			Test Results		
			Gneiss	Granite	Gneiss + Granite
Test	Test Standard	Property	Gniess	Tonalite	Gniess + Tonalite
Sieve Analysis	ASTM C136	Smaller than 1 ½ inch (%)	100	100	100
		Smaller than 1 inch (%)	97	98	96
		Smaller than 3/4 inch (%)	77	84	75
		Smaller than 1/2 inch (%)	46	52	45
		Smaller than 3/8 inch (%)	37	42	36
		Smaller than No. 4 sieve (%)	25	27	24
		Smaller than No. 8 sieve (%)	19	20	18
		Smaller than No. 16 sieve (%)	14	15	15
		Smaller than No. 30 sieve (%)	11	11	12
		Smaller than No. 50 sieve (%)	9	8	10
		Smaller than No. 100 sieve (%)	6	4	7
		Smaller than No. 200 sieve (%)	4	2	4
Specific Gravity and Absorption	ASTM C127	Absorption (%)	1.16	1.04	1.17
		Bulk Specific Gravity (Dry)	2.64	2.66	2.64
		Apparent Specific Gravity	2.73	2.73	2.73
		Bulk Specific Gravity (Saturated Surface Dry)	2.67	2.68	2.68
Los Angeles Abrasion Test	ASTM C131	Loss after 100 Rev. (%)	11.5	15.0	11.6
		Loss after 500 Rev. (%)	42.8	49.1	40.0
Flat or Elongated Particles	ASTM D4791	Weighted % Flat and Elongated	3.2	2.1	2.3
Sulfate Soundness	ASTM C88	Weighted % Loss (Coarse Aggregate)	11.4	13.0	8.7
		Weighted % Loss (Fine Aggregate)	1.1	1.8	1.5
Potential Alkali Reactivity	ASTM C1260	Average % Expansion after 5 days	0.037	0.041	0.032
		Average % Expansion after 7 days	0.052	0.061	0.054
		Average % Expansion after 9 days	0.072	0.087	0.081

Test	Test Standard	Property	Test Results: Gneiss / Gniess	Test Results: Granite / Tonalite	Test Results: Gneiss + Granite / Gniess + Tonalite
		Average % Expansion after 12 days	0.094	0.108	0.113
		Average % Expansion after 16 days	0.116	0.129	0.143
		Potential Reactivity	Innocuous	Innocuous	Innocuous
Alkali-Silica Reactivity	ASTM C289	Average Silica Concentration (Sc, mmol SiO2/L)	28.3	29.9	23.3
		Average Reduction in Alkalinity (R_c, mmol/L)	73.3	80.8	67.5
		Potential Reactivity	Innocuous	Innocuous	Innocuous
Ethylene Glycol Soak	CRD C148	Percent Loss after 15 days	0.15	0.01	0.15

H.3 Petrographic Analyses

Petrographic analyses were performed on two specimens from the rock core obtained at the proposed borrow area. One specimen (designated B-201-67) was taken from the Gneiss (Kjm_1) in Boring B-201 at a depth of 71 feet and the other specimen (designated B-202-43) was taken from the Tonalite (Kt) in Boring B-202 at a depth of 43 feet. The petrographic analyses were performed by Spectrum Petrographics Inc. The results of the petrographic analyses are summarized in Table H-3; further details are in the Spectrum Petrographics report.

Table H-3. Summary of Petrographic Analyses

Test	Test Standard	Mineral	B-201-67	B-202-43
Petrographic Analysis	ASTM C295	Quartz (%)	42	20
		Biotite (%)	20	10
		Plagioclase (%)	20	65
		Muscovite (%)	10	-
		Opaques (%)	7	-
		Tourmaline (%)	1	<1
		Actinolite (%)	-	3
		Accessory Minerals (%)	-	2
		Rock Type	Granofels	Tonalite

2883 East Spring Street
Suite 300
Long Beach CA 90806

Tel 562.426.3355
Fax 562.426.6424

November 8, 2017
Project #: 170907.1

Mr. Christopher Goetz
AECOM
999 Town and Country Road
Orange, CA 92868

TWINING

Subject: Results of Rock Core Testing
AECOM - Vail Dam Project

Dear Mr. Goetz,

Twining, Inc., is pleased to present the results of our laboratory testing for the Vail Dam Project rock cores. The testing was performed on the rock core samples cored and delivered by AECOM. Samples were selected for testing based upon the provided testing schedule attached at the end of this document.

The rock core samples were delivered to our lab in Long Beach by AECOM on September 6, 2017. Prior to testing, the core samples were crushed down to sizes smaller than the 1.5-inch sieve to an arbitrary gradation at the discretion of our laboratory technicians, per AECOM's request. Our test results reflect the gradation achieved during the crushing of the samples.

All testing was performed in accordance with the latest versions of the applicable ASTM and CRD standards by certified laboratory technicians. The following tests and quantities were performed:

(3) Sieve Analysis of Fine and Coarse Aggregate (ASTM C136);
(6) Specific Gravity and Absorption of Coarse Aggregate (ASTM C127);
(6) Resistance to Degradation of Large-Size Aggregate by Abrasion and Impact in the Los Angeles Machine (ASTM C131);
(6) Flat and Elongated Particles in Coarse Aggregate (ASTM D4791)
(6) Soundness of Aggregates by Use of Sodium Sulfate (ASTM C88);
(6) Potential Alkali Reactivity of Aggregate (ASTM C1260);
(6) Potential Alakli-Silica Reactivity of Aggreagtes (ASTM C289);
(6) Ethylene Glycol Soak (ASTM CRD-C148); and
(15) Compressive Strength and Elastic Moduli of intact Rock Core Specimens (ASTM D7012)

The results of the above-mentioned testing are presented in the following pages of this document. We appreciate the opportunity to be of service on this project. If you have any questions regarding the results presented in this report, or if we can be of further service, please do not hesitate to contact the undersigned at 562.426.3355.

Respectfully submitted,
TWINING, INC.

Adrian Moreno, PE 87057
Senior Staff Engineer

AECOM LABORATORY TEST ASSIGNMENT AND TRACKING SHEET

Project Number: 60539527 Task Number: 3.4 Project Name: Vail Dam Geotechnical Investigation

Report to: Leo Handfelt Office: SDO Assigned by: LDH Due Date: 10/6/2017

See Back page for details and Notes (#). Date: 08/31/17

SAMPLE IDENTIFICATION				Field Info.	IDENTIFICATION, INDEX PROPERTY TESTS												ENGINEERING PROPERTY TESTS											
Boring Number (1)	Sample Number	Sample Depth (ft) (2)	Sample Type (see back page)	Field Classification	Water Content	Total Unit Weight w/ WC	Sieve	Specific Gravity & Absorption	LA Abrasion	Flat & Elongated Particles	Sulfate Soundness	Potential Alkali Reactivity	Alkali-Silica Reactivity	Ethylene Glycol Soak	Petrographic Analysis		Permeability (5)	Consolidation (6)	Swell (7)	Expansion Index	Direct Shear (8)	Ring Shear - fully softened	Ring Shear - residual	UC - Soil	UU Triaxial (5)	CU Triaxial (5)	UC - Rock	
					D2216	D7263	C136	C127	C535	D4791	C88	C1260	C289	CRD-C148	C295		D5084	D2435	D4546	D4829	D3080	D7608	D6467	D2166	D2850	D4767	D7012	
					WC	UW	MA	Gs	LAA	FE	SS	PAR	ASR	EGS	PG		HC	CON	SW	EI	DS	RSfs	RSr	UC s	UU	ICU	UC r	
					0	0	3	6	6	6	6	6	6	6	0	0	0	0	0	0	0	0	0	0	0	0	16	
B-201		Boxes 3, 4, 7, 8	C	gneiss			1	2	2	2	2	2	2	2														
B-201		71 ft (in Box 6)	C	gneiss																							1	
B-202		Boxes 1, 2, 3, 4	C	granite			1	2	2	2	2	2	2	2														
B-202		43 ft (in Box 2)	C	granite																							1	
B-202		Boxes 5, 6, 7, 8	C	gneiss+granite			1	2	2	2	2	2	2	2														
B-101		27 ft (in Box 2)	C	gneiss																							1	
B-101		120 ft (in Box 8)	C	gneiss																							1	
B-102		25 ft (in Box 1)	C	gneiss																							1	
B-102		199 ft (in Box 14)	C	gneiss																							1	
B-103		52 ft (in Box 2)	C	gneiss																							1	
B-103		119 ft (in Box 7)	C	gneiss																							1	
B-104		7 ft (in Box 1)	C	gneiss																							1	

AECOM LABORATORY TEST ASSIGNMENT AND TRACKING SHEET

Project Number: 60539527 Task Number: 3.4 Project Name: Vail Dam Geotechnical Investigation

Report to: Leo Handfelt Office: SDO Assigned by: LDH Due Date: 10/6/2017

See Back page for details and Notes (#). Date: 08/31/17

SAMPLE IDENTIFICATION				Field Info.	IDENTIFICATION, INDEX PROPERTY TESTS												ENGINEERING PROPERTY TESTS											
Boring Number (1)	Sample Number	Sample Depth (ft) (2)	Sample Type (see back page)	Field Classification	Water Content	Total Unit Weight w/ WC	Sieve	Specific Gravity & Absorption	LA Abrasion	Flat & Elongated Particles	Sulfate Soundness	Potential Alkali Reactivity	Alkali-Silica Reactivity	Ethylene Glycol Soak	Petrographic Analysis		Permeability (5)	Consolidation (6)	Swell (7)	Expansion Index	Direct Shear (8)	Ring Shear - fully softened	Ring Shear - residual	UC - Soil	UU Triaxial (5)	CU Triaxial (5)	UC - Rock	
					D2216	D7263	C136	C127	C535	D4791	C88	C1260	C289	CRD-C148	C295		D5084	D2435	D4546	D4829	D3080	D7608	D6467	D2166	D2850	D4767	D7012	
					WC	UW	MA	Gs	LAA	FE	SS	PAR	ASR	EGS	PG		HC	CON	SW	EI	DS	RSfs	RSr	UC s	UU	ICU	UC r	
					0	0	3	6	6	6	6	6	6	6	0	0	0	0	0	0	0	0	0	0	0	0	16	
B-104		64.5 ft (in Box 5)	C	gneiss																							1	
B-105		10.5 ft (in Box 1)	C	gneiss																							1	
B-105		71 ft (in Box 5)	C	gneiss																							1	
B-106		40 ft (in Box 2)	C	gneiss																							1	
B-106		92 ft (in Box 5)	C	gneiss																							1	
B-107		43.5 ft (in Box 2)	C	gneiss																							1	
B-107		79 ft (in Box 4)	C	gneiss																							1	

Twining, Inc.- Long Beach Lab
3310 Airport Way, Long Beach, CA 90806
Ph: 562.426.3355
Fax: 562.426.6424
www.twininginc.com

Material Test Report

Report No: MAT:W01-17-21291-S3
Date of Issue: 10/17/2017 **Issue No: 1**

Customer: Aecom
P.O. Box 5604
Glen Allen, VA, 23058-5604
Project: AECOM Rock Core Testing
Twining Labs
, ,

Project No.: 170907.1
Permit No.:
OSHPD:
DSA File #:
DSA AP #:

Jurisdiction:
Distribution:

Approved Signatory: Adrian Moreno (Project Manager)

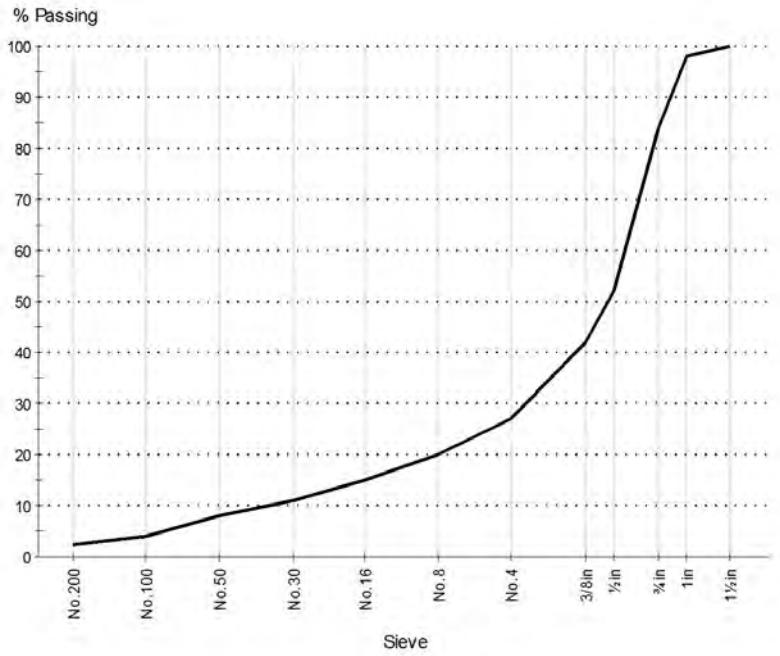
Sample Details

Sample ID: W01-17-21291-S3
Field Sample: 170907.1-3
Date Sampled:
Source:
Material:
Specification: Standard Full
Sampling Method:
Sample Location: B-202, Boxes 1, 2, 3, 4
Sample Depth:
Sampled By: Client
Material Description: Granite

Sample Description:

Granite

Particle Size Distribution



Grading: ASTM C 136

Date Tested: 9/20/2017
Tested By: Brian Vollnogle

Sieve Size	% Passing	Limits
1½in	100	
1in	98	
¾in	84	
½in	52	
3/8in	42	
No.4	27	
No.8	20	
No.16	15	
No.30	11	
No.50	8	
No.100	4	
No.200	2.2	

FINES (2.2%)		SAND			GRAVEL		COBBLES
Clay	Silt	Fine (7.3%)	Medium (9.3%)	Coarse (8.2%)	Fine (57.0%)	Coarse (16.0%)	(0.0%)

D85: 19.3761 **D60:** 13.8794 **D50:** 11.8324
D30: 5.4563 **D15:** 1.1800 **D10:** 0.4762
Cu: 29.14 **Cc:** 4.50

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Twining, Inc.- Long Beach Lab
3310 Airport Way, Long Beach, CA 90806
Ph: 562.426.3355
Fax: 562.426.6424
www.twininginc.com

Material Test Report

Report No: MAT:W01-17-21291-S5
Date of Issue: 10/17/2017 **Issue No: 1**

Customer: Aecom
P.O. Box 5604
Glen Allen, VA, 23058-5604
Project: AECOM Rock Core Testing
Twining Labs
, ,

Project No.: 170907.1
Permit No.:
OSHPD:
DSA File #:
DSA AP #:

Jurisdiction:
Distribution:

Approved Signatory: Adrian Moreno (Project Manager)

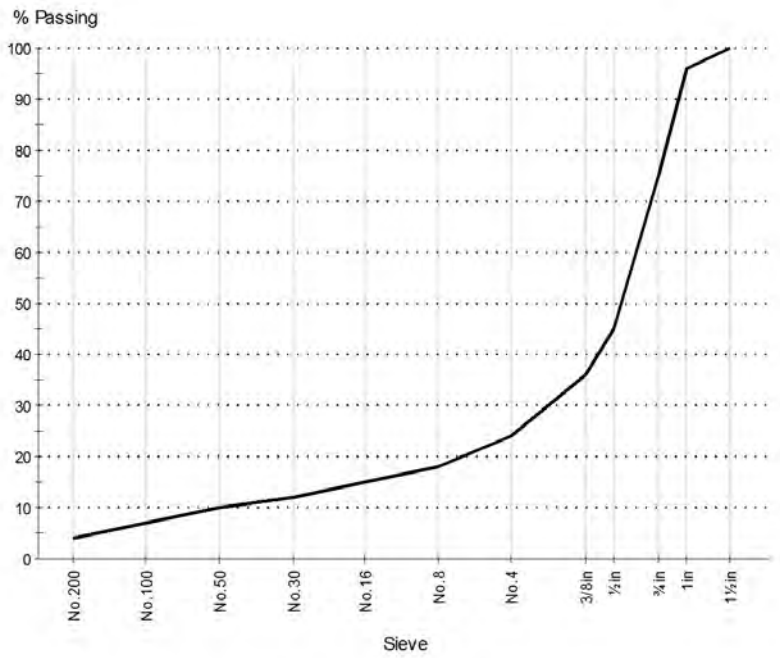
Sample Details

Sample ID: W01-17-21291-S5
Field Sample: 170907.1-5
Date Sampled:
Source:
Material:
Specification: Standard Full
Sampling Method:
Sample Location: B-202, Boxes 5, 6, 7, 8
Sample Depth:
Sampled By: Client
Material Description: Gneiss + Granite

Sample Description:

Gneiss + Granite

Particle Size Distribution



FINES (4.0%)		SAND			GRAVEL		COBBLES
Clay	Silt	Fine (7.0%)	Medium (6.3%)	Coarse (6.7%)	Fine (51.0%)	Coarse (25.0%)	(0.0%)

Grading: ASTM C 136

Date Tested: 9/20/2017
Tested By: Brian Vollnogle

Sieve Size	% Passing	Limits
1½in	100	
1in	96	
¾in	75	
½in	45	
3/8in	36	
No.4	24	
No.8	18	
No.16	15	
No.30	12	
No.50	10	
No.100	7	
No.200	4.0	

D85: 21.6525 **D60:** 15.4110 **D50:** 13.4035
D30: 6.7175 **D15:** 1.1800 **D10:** 0.3000
Cu: 51.37 **Cc:** 9.76

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Twining, Inc.- Long Beach Lab
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Ph: 562.426.3355
Fax: 562.426.6424
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Material Test Report

Report No: MAT:W01-17-21291-S1
Date of Issue: 10/17/2017 **Issue No: 1**

Customer: Aecom
P.O. Box 5604
Glen Allen, VA, 23058-5604
Project: AECOM Rock Core Testing
Twining Labs
, ,

Project No.: 170907.1
Permit No.:
OSHPD:
DSA File #:
DSA AP #:

Jurisdiction:
Distribution:

Approved Signatory: Adrian Moreno (Project Manager)

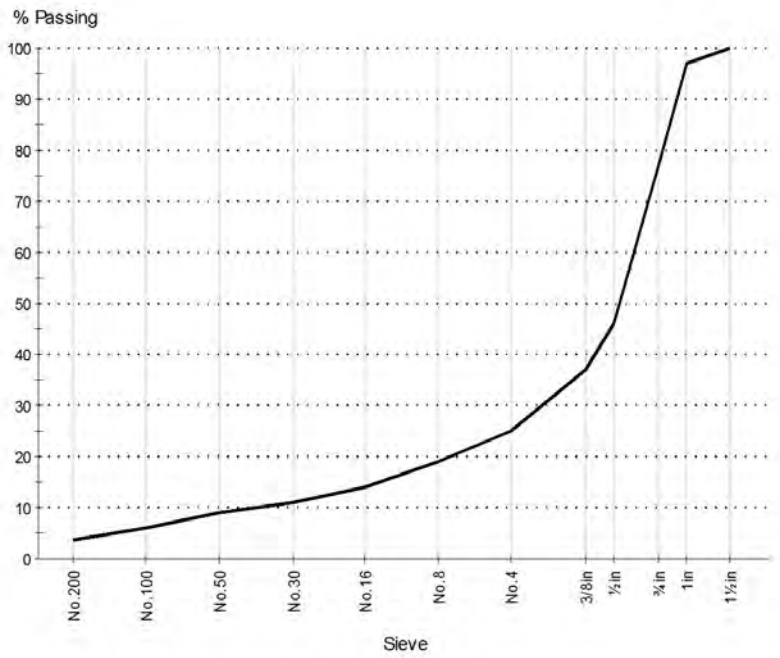
Sample Details

Sample ID: W01-17-21291-S1
Field Sample: 170907.1-1
Date Sampled: 10/06/2017
Source:
Material:
Specification: Standard Full
Sampling Method:
Sample Location: B-201, Boxes 3, 4, 7, 8
Sample Depth:
Sampled By: Client
Material Description: Gneiss

Sample Description:

Gneiss

Particle Size Distribution



FINES (3.6%)		SAND			GRAVEL		COBBLES
Clay	Silt	Fine (6.4%)	Medium (7.8%)	Coarse (7.2%)	Fine (52.0%)	Coarse (23.0%)	(0.0%)

Grading: ASTM C 136

Date Tested: 9/20/2017
Tested By: Brian Vollnogle

Sieve Size	% Passing	Limits
1½in	100	
1in	97	
¾in	77	
½in	46	
3/8in	37	
No.4	25	
No.8	19	
No.16	14	
No.30	11	
No.50	9	
No.100	6	
No.200	3.6	

D85: 21.2045 **D60:** 15.1019 **D50:** 13.1939
D30: 6.3405 **D15:** 1.3555 **D10:** 0.4243
Cu: 35.60 **Cc:** 6.27

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TWINING

SPECIFIC GRAVITY AND ABSORPTION
ASTM C 127

Project Name:	AECOM Rock Core Testing	Tested By :	B.V
Project No.:	170907.1	Date Tested:	10/14/2017
Client:	AECOM	Input By:	A.M.
Sampled By:	Client	Checked By:	A.M.
Sample Source:	**B-201, Boxes 3, 4, 7, 8**	Lab No.:	W01-17-21291
Sample Description:	**Gneiss - Sample 1**	Sample No.:	

Coarse Aggregate Specific Gravity and Absorption

Bulk Specific Gravity:	**2.647**
Bulk Specific Gravity (SSD):	**2.677**
Apparent Specific Gravity:	**2.728**
Absorption (Percent):	**1.12%**

COMMENTS:

REVIEWED BY:

Adrian Moreno, Project Manager

TWINING

SPECIFIC GRAVITY AND ABSORPTION
ASTM C 127

Project Name:	AECOM Rock Core Testing	Tested By :	B.V
Project No.:	170907.1	Date Tested:	10/14/2017
Client:	AECOM	Input By:	A.M.
Sampled By:	Client	Checked By:	A.M.
Sample Source:	**B-201, Boxes 3, 4, 7, 8**	Lab No.:	W01-17-21291
Sample Description:	**Gneiss - Sample 2**	Sample No.:	

Coarse Aggregate Specific Gravity and Absorption

Bulk Specific Gravity:	**2.641**
Bulk Specific Gravity (SSD):	**2.672**
Apparent Specific Gravity:	**2.727**
Absorption (Percent):	**1.21%**

COMMENTS:

REVIEWED BY:

Adrian Moreno, Project Manager

TWINING

SPECIFIC GRAVITY AND ABSORPTION
ASTM C 127

Project Name:	AECOM Rock Core Testing	Tested By :	B.V
Project No.:	170907.1	Date Tested:	10/14/2017
Client:	AECOM	Input By:	A.M.
Sampled By:	Client	Checked By:	A.M.
Sample Source:	**B-202, Boxes 1, 2, 3, 4**	Lab No.:	W01-17-21291
Sample Description:	**Granite - Sample 1**	Sample No.:	

Coarse Aggregate Specific Gravity and Absorption

Bulk Specific Gravity:	**2.659**
Bulk Specific Gravity (SSD):	**2.686**
Apparent Specific Gravity:	**2.731**
Absorption (Percent):	**0.98%**

COMMENTS:

REVIEWED BY:

Adrian Moreno, Project Manager

TWINING

SPECIFIC GRAVITY AND ABSORPTION
ASTM C 127

Project Name:	AECOM Rock Core Testing	Tested By :	B.V
Project No.:	170907.1	Date Tested:	10/14/2017
Client:	AECOM	Input By:	A.M.
Sampled By:	Client	Checked By:	A.M.
Sample Source:	**B-202, Boxes 1, 2, 3, 4**	Lab No.:	W01-17-21291
Sample Description:	**Granite - Sample 2**	Sample No.:	

Coarse Aggregate Specific Gravity and Absorption

Bulk Specific Gravity:	**2.652**
Bulk Specific Gravity (SSD):	**2.681**
Apparent Specific Gravity:	**2.732**
Absorption (Percent):	**1.10%**

COMMENTS:

REVIEWED BY:

Adrian Moreno, Project Manager

TWINING

SPECIFIC GRAVITY AND ABSORPTION
ASTM C 127

Project Name:	AECOM Rock Core Testing	Tested By :	B.V
Project No.:	170907.1	Date Tested:	10/14/2017
Client:	AECOM	Input By:	A.M.
Sampled By:	Client	Checked By:	A.M.
Sample Source:	**B-202, Boxes 5, 6, 7, 8**	Lab No.:	W01-17-21291
Sample Description:	**Gneiss+Granite - Sample 1**	Sample No.:	

Coarse Aggregate Specific Gravity and Absorption

Bulk Specific Gravity:	**2.653**
Bulk Specific Gravity (SSD):	**2.679**
Apparent Specific Gravity:	**2.725**
Absorption (Percent):	**1.00%**

COMMENTS:

REVIEWED BY:

Adrian Moreno, Project Manager

TWINING

SPECIFIC GRAVITY AND ABSORPTION
ASTM C 127

Project Name:	AECOM Rock Core Testing	Tested By :	B.V
Project No.:	170907.1	Date Tested:	10/14/2017
Client:	AECOM	Input By:	A.M.
Sampled By:	Client	Checked By:	A.M.
Sample Source:	**B-202, Boxes 5, 6, 7, 8**	Lab No.:	W01-17-21291
Sample Description:	**Gneiss+Granite - Sample 2**	Sample No.:	

Coarse Aggregate Specific Gravity and Absorption

Bulk Specific Gravity:	**2.638**
Bulk Specific Gravity (SSD):	**2.673**
Apparent Specific Gravity:	**2.734**
Absorption (Percent):	**1.34%**

COMMENTS:

REVIEWED BY:

Adrian Moreno, Project Manager

TWINING

LA ABRASION

ASTM C 131

Project Name:	AECOM Rock Core Testing	Tested By :	B.V.
Project No.:	170907.1	Date Tested:	10/17/2017
Client:	AECOM	Input By:	A.M.
Sampled By:	Client	Checked By:	A.M.
Sample Source:	**B-201, Boxes 3, 4, 7, 8**	Lab No.:	W01-17-21291
Sample Description:	**Gneiss - Sample 1**	Sample No.:	

Grading/Charge of Test Sample

Sieve Sizes		*A*	***B***	*C*	*D*	*Used*
Passing	*Retained*	1250 ± 25				
1 1/2"	*1"*	1250 ± 25				
1"	*3/4"*	1250 ± 10				
3/4"	*1/2"*	1250 ± 10	**2500 ± 10**			
1/2"	*3/8"*		**2500 ± 10**			
3/8"	*1/4"*			2500 ± 10		
1/4"	*No. 4*			2500 ± 10		
No. 4	*No. 8*				5000 ± 10	
Total		5000 ± 10	**5000 ± 10**	5000 ± 10	5000 ± 10	**5000.8**
No. Charges		12	**11**	8	6	**11**
Mass Charge		5000 ± 25	**4584 ± 25**	3330 ± 20	2500 ± 15	**4583.1**

Type of Grading:	B
Initial Sample Mass (g):	5000.8
Sample Mass @ **100** Revolutions (g):	4467.2
Percent Wear (%)	**10.7**
Sample Mass @ **500** Revolutions (g):	2882.2
Percent Wear (%)	**42.4**

COMMENTS:

REVIEWED BY:

Adrian Moreno, Project Manager

TWINING

LA ABRASION

ASTM C 131

Project Name:	AECOM Rock Core Testing	Tested By :	B.V.
Project No.:	170907.1	Date Tested:	10/17/2017
Client:	AECOM	Input By:	A.M.
Sampled By:	Client	Checked By:	A.M.
Sample Source:	**B-201, Boxes 3, 4, 7, 8**	Lab No.:	W01-17-21291
Sample Description:	**Gneiss - Sample 2**	Sample No.:	

Grading/Charge of Test Sample

Sieve Sizes		*A*	***B***	*C*	*D*	*Used*
Passing	*Retained*	1250 ± 25				
1 1/2"	*1"*	1250 ± 25				
1"	*3/4"*	1250 ± 10				
3/4"	*1/2"*	1250 ± 10	**2500 ± 10**			
1/2"	*3/8"*		**2500 ± 10**			
3/8"	*1/4"*			2500 ± 10		
1/4"	*No. 4*			2500 ± 10		
No. 4	*No. 8*				5000 ± 10	
Total		5000 ± 10	**5000 ± 10**	5000 ± 10	5000 ± 10	**5000.6**
No. Charges		12	**11**	8	6	**11**
Mass Charge		5000 ± 25	**4584 ± 25**	3330 ± 20	2500 ± 15	**4583.1**

Type of Grading:	B
Initial Sample Mass (g):	5000.6
Sample Mass @ **100** Revolutions (g):	4378.8
Percent Wear (%)	**12.4**
Sample Mass @ **500** Revolutions (g):	2841.9
Percent Wear (%)	**43.2**

COMMENTS:

REVIEWED BY:

Adrian Moreno, Project Manager

LA ABRASION
ASTM C 131

Project Name:	AECOM Rock Core Testing	Tested By :	B.V.
Project No.:	170907.1	Date Tested:	10/17/2017
Client:	AECOM	Input By:	A.M.
Sampled By:	Client	Checked By:	A.M.
Sample Source:	**B-202, Boxes 1, 2, 3, 4**	Lab No.:	W01-17-21291
Sample Description:	**Granite - Sample 1**	Sample No.:	

Grading/Charge of Test Sample

Sieve Sizes		*A*	***B***	*C*	*D*	*Used*
Passing	*Retained*	1250 ± 25				
1 1/2"	*1"*	1250 ± 25				
1"	*3/4"*	1250 ± 10				
3/4"	*1/2"*	1250 ± 10	**2500 ± 10**			
1/2"	*3/8"*		**2500 ± 10**			
3/8"	*1/4"*			2500 ± 10		
1/4"	*No. 4*			2500 ± 10		
No. 4	*No. 8*				5000 ± 10	
Total		5000 ± 10	**5000 ± 10**	5000 ± 10	5000 ± 10	**5000.4**
No. Charges		12	**11**	8	6	**11**
Mass Charge		5000 ± 25	**4584 ± 25**	3330 ± 20	2500 ± 15	**4583.1**

Type of Grading:	B
Initial Sample Mass (g):	5000.4
Sample Mass @ **100** Revolutions (g):	4247.9
Percent Wear (%)	**15.0**
Sample Mass @ **500** Revolutions (g):	2561.8
Percent Wear (%)	**48.8**

COMMENTS:

REVIEWED BY:

Adrian Moreno, Project Manager

LA ABRASION
ASTM C 131

Project Name:	AECOM Rock Core Testing	Tested By :	B.V.
Project No.:	170907.1	Date Tested:	10/17/2017
Client:	AECOM	Input By:	A.M.
Sampled By:	Client	Checked By:	A.M.
Sample Source:	**B-202, Boxes 1, 2, 3, 4**	Lab No.:	W01-17-21291
Sample Description:	**Granite - Sample 2**	Sample No.:	

Grading/Charge of Test Sample

Sieve Sizes		*A*	***B***	*C*	*D*	*Used*
Passing	*Retained*	1250 ± 25				
1 1/2"	*1"*	1250 ± 25				
1"	*3/4"*	1250 ± 10				
3/4"	*1/2"*	1250 ± 10	**2500 ± 10**			
1/2"	*3/8"*		**2500 ± 10**			
3/8"	*1/4"*			2500 ± 10		
1/4"	*No. 4*			2500 ± 10		
No. 4	*No. 8*				5000 ± 10	
Total		5000 ± 10	**5000 ± 10**	5000 ± 10	5000 ± 10	**5000.6**
No. Charges		12	**11**	8	6	**11**
Mass Charge		5000 ± 25	**4584 ± 25**	3330 ± 20	2500 ± 15	**4583.1**

Type of Grading:	B
Initial Sample Mass (g):	5000.6
Sample Mass @ **100** Revolutions (g):	4254.7
Percent Wear (%)	**14.9**
Sample Mass @ **500** Revolutions (g):	2532.8
Percent Wear (%)	**49.4**

COMMENTS:

REVIEWED BY:

Adrian Moreno, Project Manager

TWINING

LA ABRASION

ASTM C 131

Project Name:	AECOM Rock Core Testing	Tested By :	B.V.
Project No.:	170907.1	Date Tested:	10/17/2017
Client:	AECOM	Input By:	A.M.
Sampled By:	Client	Checked By:	A.M.
Sample Source:	**B-202, Boxes 5, 6, 7, 8**	Lab No.:	W01-17-21291
Sample Description:	**Gneiss+Granite - Sample 1**	Sample No.:	

Grading/Charge of Test Sample

Sieve Sizes		*A*	***B***	*C*	*D*	*Used*
Passing	*Retained*	1250 ± 25				
1 1/2"	*1"*	1250 ± 25				
1"	*3/4"*	1250 ± 10				
3/4"	*1/2"*	1250 ± 10	**2500 ± 10**			
1/2"	*3/8"*		**2500 ± 10**			
3/8"	*1/4"*			2500 ± 10		
1/4"	*No. 4*			2500 ± 10		
No. 4	*No. 8*				5000 ± 10	
Total		5000 ± 10	**5000 ± 10**	5000 ± 10	5000 ± 10	**5000.6**
No. Charges		12	**11**	8	6	**11**
Mass Charge		5000 ± 25	**4584 ± 25**	3330 ± 20	2500 ± 15	**4583.1**

Type of Grading:	B
Initial Sample Mass (g):	5000.6
Sample Mass @ **100** Revolutions (g):	4430.9
Percent Wear (%)	**11.4**
Sample Mass @ **500** Revolutions (g):	3019.5
Percent Wear (%)	**39.6**

COMMENTS:

REVIEWED BY:

Adrian Moreno, Project Manager

LA ABRASION
ASTM C 131

Project Name:	AECOM Rock Core Testing	Tested By :	B.V.
Project No.:	170907.1	Date Tested:	10/17/2017
Client:	AECOM	Input By:	A.M.
Sampled By:	Client	Checked By:	A.M.
Sample Source:	**B-202, Boxes 5, 6, 7, 8**	Lab No.:	W01-17-21291
Sample Description:	**Gneiss+Granite - Sample 2**	Sample No.:	

Grading/Charge of Test Sample

Sieve Sizes		*A*	***B***	*C*	*D*	*Used*
Passing	*Retained*	1250 ± 25				
1 1/2"	*1"*	1250 ± 25				
1"	*3/4"*	1250 ± 10				
3/4"	*1/2"*	1250 ± 10	**2500 ± 10**			
1/2"	*3/8"*		**2500 ± 10**			
3/8"	*1/4"*			2500 ± 10		
1/4"	*No. 4*			2500 ± 10		
No. 4	*No. 8*				5000 ± 10	
Total		5000 ± 10	**5000 ± 10**	5000 ± 10	5000 ± 10	**5002.4**
No. Charges		12	**11**	8	6	**11**
Mass Charge		5000 ± 25	**4584 ± 25**	3330 ± 20	2500 ± 15	**4583.1**

Type of Grading:	B
Initial Sample Mass (g):	5002.4
Sample Mass @ **100** Revolutions (g):	4409.0
Percent Wear (%)	**11.9**
Sample Mass @ **500** Revolutions (g):	2935.1
Percent Wear (%)	**41.3**

COMMENTS:

REVIEWED BY:

Adrian Moreno, Project Manager

TWINING

FLAT AND ELONGATED PARTICLES

ASTM D 4791

Project Name:	AECOM Rock Core Testing	Tested By :	BV
Project No.:	170907.1	Date Tested:	10/16/2017
Client:	AECOM	Input By:	AM
Sampled By:	Client	Checked By:	AM
Sample Source:	**B-201, Boxes 3, 4, 7, 8**	Lab No.:	W01-17-21291
Sample Description:	**Gneiss - Sample 1**	Sample No.:	

Dimensional Ratio: **5:1**

Sieve Size	% Original Grading	Weight of Particles	Results of Test		Weighted Avg. %
			Weigh of Flat and Elong. Particles	Proportion Flat and Elong., %	Flat and Elongated
2" (50mm)					
1 1/2" (37.5mm)					
1" (25mm)					
3/4" (19mm)	20	1840.9	50.2	2.7	0.5
1/2" (12.5mm)	31	697.2	39.8	5.7	1.8
3/8" (9.5mm)					
No. 4 (4.75mm)					
Minus No. 4					
Total	51			**Total**	**2.3**

Dimensional Ratio:

Sieve Size	% Original Grading	Weight of Particles	Results of Test		Weighted Avg. %
			Weigh of Flat and Elong. Particles	Proportion Flat and Elong., %	Flat and Elongated
2" (50mm)					
1 1/2" (37.5mm)					
1" (25mm)					
3/4" (19mm)					
1/2" (12.5mm)					
3/8" (9.5mm)					
No. 4 (4.75mm)					
Minus No. 4					
Total					

COMMENTS: Results based on sieve analyses performed for sample.
Size fractions containing less than 10% by mass of original grading were not included in the weighted total.

REVIEWED BY:

Adrian Moreno, Project Manager

TWINING

FLAT AND ELONGATED PARTICLES

ASTM D 4791

Project Name:	AECOM Rock Core Testing	Tested By :	BV
Project No.:	170907.1	Date Tested:	10/16/2017
Client:	AECOM	Input By:	AM
Sampled By:	Client	Checked By:	AM
Sample Source:	**B-201, Boxes 3, 4, 7, 8**	Lab No.:	W01-17-21291
Sample Description:	**Gneiss - Sample 2**	Sample No.:	

Dimensional Ratio: **5:1**

Sieve Size	% Original Grading	Weight of Particles	Results of Test		Weighted Avg. %
			Weigh of Flat and Elong. Particles	Proportion Flat and Elong., %	Flat and Elongated
2" (50mm)					
1 1/2" (37.5mm)					
1" (25mm)					
3/4" (19mm)	20	1827.4	74.1	4.1	0.8
1/2" (12.5mm)	31	762.7	78.1	10.2	3.2
3/8" (9.5mm)					
No. 4 (4.75mm)					
Minus No. 4					
Total	51			**Total**	**4.0**

Dimensional Ratio:

Sieve Size	% Original Grading	Weight of Particles	Results of Test		Weighted Avg. %
			Weigh of Flat and Elong. Particles	Proportion Flat and Elong., %	Flat and Elongated
2" (50mm)					
1 1/2" (37.5mm)					
1" (25mm)					
3/4" (19mm)					
1/2" (12.5mm)					
3/8" (9.5mm)					
No. 4 (4.75mm)					
Minus No. 4					
Total					

COMMENTS: Results based on sieve analyses performed for sample.
Size fractions containing less than 10% by mass of original grading were not included in the weighted total.

REVIEWED BY:

Adrian Moreno, Project Manager

TWINING

FLAT AND ELONGATED PARTICLES

ASTM D 4791

Project Name:	AECOM Rock Core Testing	Tested By :	BV
Project No.:	170907.1	Date Tested:	10/16/2017
Client:	AECOM	Input By:	AM
Sampled By:	Client	Checked By:	AM
Sample Source:	**B-202, Boxes 1, 2, 3, 4**	Lab No.:	W01-17-21291
Sample Description:	**Granite - Sample 2**	Sample No.:	

Dimensional Ratio: **5:1**

Sieve Size	% Original Grading	Weight of Particles	Results of Test		Weighted Avg. %
			Weigh of Flat and Elong. Particles	Proportion Flat and Elong., %	Flat and Elongated
2" (50mm)					
1 1/2" (37.5mm)					
1" (25mm)					
3/4" (19mm)	14	1723.0	84.3	4.9	0.7
1/2" (12.5mm)	32	601.2	20.7	3.4	1.1
3/8" (9.5mm)	10	167.2	4.9	2.9	0.3
No. 4 (4.75mm)					
Minus No. 4					
Total	56			**Total**	**2.1**

Dimensional Ratio:

Sieve Size	% Original Grading	Weight of Particles	Results of Test		Weighted Avg. %
			Weigh of Flat and Elong. Particles	Proportion Flat and Elong., %	Flat and Elongated
2" (50mm)					
1 1/2" (37.5mm)					
1" (25mm)					
3/4" (19mm)					
1/2" (12.5mm)					
3/8" (9.5mm)					
No. 4 (4.75mm)					
Minus No. 4					
Total					

COMMENTS: Results based on sieve analyses performed for sample.
Size fractions containing less than 10% by mass of original grading were not included in the weighted total.

REVIEWED BY:

Adrian Moreno, Project Manager

TWINING

FLAT AND ELONGATED PARTICLES

ASTM D 4791

Project Name:	AECOM Rock Core Testing	Tested By :	BV
Project No.:	170907.1	Date Tested:	10/16/2017
Client:	AECOM	Input By:	AM
Sampled By:	Client	Checked By:	AM
Sample Source:	**B-202, Boxes 1, 2, 3, 4**	Lab No.:	W01-17-21291
Sample Description:	**Granite - Sample 1**	Sample No.:	

Dimensional Ratio: **5:1**

Sieve Size	% Original Grading	Weight of Particles	Results of Test		Weighted Avg. %
			Weigh of Flat and Elong. Particles	Proportion Flat and Elong., %	Flat and Elongated
2" (50mm)					
1 1/2" (37.5mm)					
1" (25mm)					
3/4" (19mm)	14	1769.7	40.0	2.3	0.3
1/2" (12.5mm)	32	580.5	21.3	3.7	1.2
3/8" (9.5mm)	10	159.8	8.7	5.4	0.5
No. 4 (4.75mm)					
Minus No. 4					
Total	56			**Total**	**2.0**

Dimensional Ratio:

Sieve Size	% Original Grading	Weight of Particles	Results of Test		Weighted Avg. %
			Weigh of Flat and Elong. Particles	Proportion Flat and Elong., %	Flat and Elongated
2" (50mm)					
1 1/2" (37.5mm)					
1" (25mm)					
3/4" (19mm)					
1/2" (12.5mm)					
3/8" (9.5mm)					
No. 4 (4.75mm)					
Minus No. 4					
Total					

COMMENTS: Results based on sieve analyses performed for sample.
Size fractions containing less than 10% by mass of original grading were not included in the weighted total.

REVIEWED BY:

Adrian Moreno, Project Manager

TWINING

FLAT AND ELONGATED PARTICLES

ASTM D 4791

Project Name:	AECOM Rock Core Testing	Tested By :	BV
Project No.:	170907.1	Date Tested:	10/16/2017
Client:	AECOM	Input By:	AM
Sampled By:	Client	Checked By:	AM
Sample Source:	**B-202, Boxes 5, 6, 7, 8**	Lab No.:	W01-17-21291
Sample Description:	**Gneiss+Granite - Sample 1**	Sample No.:	

Dimensional Ratio: **5:1**

Sieve Size	% Original Grading	Weight of Particles	Results of Test		Weighted Avg. %
			Weigh of Flat and Elong. Particles	Proportion Flat and Elong., %	Flat and Elongated
2" (50mm)					
1 1/2" (37.5mm)					
1" (25mm)					
3/4" (19mm)	21	1716.2	87.8	5.1	1.1
1/2" (12.5mm)	30	700.8	32.4	4.6	1.4
3/8" (9.5mm)					
No. 4 (4.75mm)					
Minus No. 4					
Total	51			**Total**	**2.5**

Dimensional Ratio:

Sieve Size	% Original Grading	Weight of Particles	Results of Test		Weighted Avg. %
			Weigh of Flat and Elong. Particles	Proportion Flat and Elong., %	Flat and Elongated
2" (50mm)					
1 1/2" (37.5mm)					
1" (25mm)					
3/4" (19mm)					
1/2" (12.5mm)					
3/8" (9.5mm)					
No. 4 (4.75mm)					
Minus No. 4					
Total					

COMMENTS: Results based on sieve analyses performed for sample.
Size fractions containing less than 10% by mass of original grading were not included in the weighted total.

REVIEWED BY:

Adrian Moreno, Project Manager

TWINING

FLAT AND ELONGATED PARTICLES

ASTM D 4791

Project Name:	AECOM Rock Core Testing	Tested By :	BV
Project No.:	170907.1	Date Tested:	10/16/2017
Client:	AECOM	Input By:	AM
Sampled By:	Client	Checked By:	AM
Sample Source:	**B-202, Boxes 5, 6, 7, 8**	Lab No.:	W01-17-21291
Sample Description:	**Gneiss+Granite - Sample 2**	Sample No.:	

Dimensional Ratio: **5:1**

Sieve Size	% Original Grading	Weight of Particles	Results of Test		Weighted Avg. %
			Weigh of Flat and Elong. Particles	Proportion Flat and Elong., %	Flat and Elongated
2" (50mm)					
1 1/2" (37.5mm)					
1" (25mm)					
3/4" (19mm)	21	1731.2	123.7	7.1	1.5
1/2" (12.5mm)	30	697.2	45.3	6.5	1.9
3/8" (9.5mm)					
No. 4 (4.75mm)					
Minus No. 4					
Total	51			**Total**	**3.4**

Dimensional Ratio:

Sieve Size	% Original Grading	Weight of Particles	Results of Test		Weighted Avg. %
			Weigh of Flat and Elong. Particles	Proportion Flat and Elong., %	Flat and Elongated
2" (50mm)					
1 1/2" (37.5mm)					
1" (25mm)					
3/4" (19mm)					
1/2" (12.5mm)					
3/8" (9.5mm)					
No. 4 (4.75mm)					
Minus No. 4					
Total					

COMMENTS: Results based on sieve analyses performed for sample.
Size fractions containing less than 10% by mass of original grading were not included in the weighted total.

REVIEWED BY:

Adrian Moreno, Project Manager

TWINING

SOUNDNESS

ASTM C88-99a

Project Name:	AECOM Rock Core Testing	Tested By :	B.V.
Project No.:	170907.1	Date Tested:	9/24/2017
Client:	AECOM Rock Core Testing	Input By:	A.M.
Sampled By:	Client	Checked By:	A.M.
Sample Source:	**B-201, Boxes 3, 4, 7, 8**	Lab No.:	W01-17-21291
Sample Description:	**Gneiss - Sample 1**	Sample No.:	
Solution Type:	**Sodium Sulfate**		

SOUNDNESS OF COARSE AGGREGATE

Sieve Size	Required Mass (gm)	% Original Grading	Wt. Before Test (gm)	Wt. After Test (gm)	Wt. Loss (gm)	% Loss Designated Sieve After Test	Weighted% Loss
2 1/2" - 2" (63mm - 50mm)	3000 ± 300						
2" - 1 1/2" (50mm - 37.5mm)	2000 ± 200						
1 1/2" - 1" (37.5mm - 25mm)	1000 ± 50						
1" - 3/4" (25mm - 19mm)	500 ± 30	20	495.9	447.1	48.8	9.8	2.0
3/4" - 1/2" (19mm - 12.5mm)	670 ± 10	31	667.0	562	105.0	15.7	4.9
1/2" - 3/8" (12.5mm - 9.5mm)	330 ± 5	9	331.4	252.3	79.1	23.9	2.1
3/8" - #4 (9.5mm - 4.75mm)	300 ± 5	12	301.2	256.8	44.4	14.7	1.8
						Total Weighted Loss (%)	**10.8**

SOUNDNESS OF FINE AGGREGATE

Sieve Size	Required Mass (gm)	% Original Grading	Wt. Before Test (gm)	Wt. After Test (gm)	Wt. Loss (gm)	% Loss Designated Sieve After Test	Weighted% Loss
3/8" - #4 (9.5mm - 4.75mm)	100 ± 0.1						
#4 - #8 (4.75mm - 2.36mm)	100 ± 0.1	6	100	91.5	8.5	8.5	0.5
#8 - #16(2.36mm - 1.18mm)	100 ± 0.1	5	100	93.4	6.6	6.6	0.3
#16 - #30 (1.18mm - 600um)	100 ± 0.1	3	100	94.4	5.6	5.6	0.2
#30 - #50 (600um - 300um)	100 ± 0.1	2	100	96.7	3.3	3.3	0.1
#50 - #100 (300um - 150um)	100 ± 0.1						
						Total Weighted Loss (%)	**1.1**

COMMENTS: Results based on sieve analyses performed for sample.

REVIEWED BY:

Adrian Moreno, Project Manager

TWINING

SOUNDNESS

ASTM C88-99a

Project Name:	AECOM Rock Core Testing	Tested By :	B.V.
Project No.:	170907.1	Date Tested:	9/24/2017
Client:	AECOM Rock Core Testing	Input By:	A.M.
Sampled By:	Client	Checked By:	A.M.
Sample Source:	**B-201, Boxes 3, 4, 7, 8**	Lab No.:	W01-17-21291
Sample Description:	**Gneiss - Sample 2**	Sample No.:	
Solution Type:	**Sodium Sulfate**		

SOUNDNESS OF COARSE AGGREGATE

Sieve Size	Required Mass (gm)	% Original Grading	Wt. Before Test (gm)	Wt. After Test (gm)	Wt. Loss (gm)	% Loss Designated Sieve After Test	Weighted% Loss
2 1/2" - 2" (63mm - 50mm)	3000 ± 300						
2" - 1 1/2" (50mm - 37.5mm)	2000 ± 200						
1 1/2" - 1" (37.5mm - 25mm)	1000 ± 50						
1" - 3/4" (25mm - 19mm)	500 ± 30	20	501.6	400.9	100.7	20.1	4.0
3/4" - 1/2" (19mm - 12.5mm)	670 ± 10	31	671.4	588.9	82.5	12.3	3.8
1/2" - 3/8" (12.5mm - 9.5mm)	330 ± 5	9	331.3	247.3	84.0	25.4	2.3
3/8" - #4 (9.5mm - 4.75mm)	300 ± 5	12	300.4	253.2	47.2	15.7	1.9
						Total Weighted Loss (%)	**12.0**

SOUNDNESS OF FINE AGGREGATE

Sieve Size	Required Mass (gm)	% Original Grading	Wt. Before Test (gm)	Wt. After Test (gm)	Wt. Loss (gm)	% Loss Designated Sieve After Test	Weighted% Loss
3/8" - #4 (9.5mm - 4.75mm)	100 ± 0.1						
#4 - #8 (4.75mm - 2.36mm)	100 ± 0.1	6	100.0	92.9	7.1	7.1	0.4
#8 - #16(2.36mm - 1.18mm)	100 ± 0.1	5	100.0	90.3	9.7	9.7	0.5
#16 - #30 (1.18mm - 600um)	100 ± 0.1	3	100.0	94.1	5.9	5.9	0.2
#30 - #50 (600um - 300um)	100 ± 0.1	2	100.0	96.5	3.5	3.5	0.1
#50 - #100 (300um - 150um)	100 ± 0.1						
						Total Weighted Loss (%)	**1.2**

COMMENTS: Results based on sieve analyses performed for sample.

REVIEWED BY:

Adrian Moreno, Project Manager

TWINING

SOUNDNESS

ASTM C88-99a

Project Name:	AECOM Rock Core Testing	Tested By :	B.V.
Project No.:	170907.1	Date Tested:	9/24/2017
Client:	AECOM Rock Core Testing	Input By:	A.M.
Sampled By:	Client	Checked By:	A.M.
Sample Source:	**B-202, Boxes 1, 2, 3, 4**	Lab No.:	W01-17-21291
Sample Description:	**Granite - Sample 1**	Sample No.:	
Solution Type:	**Sodium Sulfate**		

SOUNDNESS OF COARSE AGGREGATE

Sieve Size	Required Mass (gm)	% Original Grading	Wt. Before Test (gm)	Wt. After Test (gm)	Wt. Loss (gm)	% Loss Designated Sieve After Test	Weighted% Loss
2 1/2" - 2" (63mm - 50mm)	3000 ± 300						
2" - 1 1/2" (50mm - 37.5mm)	2000 ± 200						
1 1/2" - 1" (37.5mm - 25mm)	1000 ± 50						
1" - 3/4" (25mm - 19mm)	500 ± 30	14	506.5	398.4	108.1	21.3	3.0
3/4" - 1/2" (19mm - 12.5mm)	670 ± 10	32	674.9	549.7	125.2	18.6	5.9
1/2" - 3/8" (12.5mm - 9.5mm)	330 ± 5	10	332.3	212.5	119.8	36.1	3.6
3/8" - #4 (9.5mm - 4.75mm)	300 ± 5	15	301.0	263.6	37.4	12.4	1.9
						Total Weighted Loss (%)	**14.4**

SOUNDNESS OF FINE AGGREGATE

Sieve Size	Required Mass (gm)	% Original Grading	Wt. Before Test (gm)	Wt. After Test (gm)	Wt. Loss (gm)	% Loss Designated Sieve After Test	Weighted% Loss
3/8" - #4 (9.5mm - 4.75mm)	100 ± 0.1						
#4 - #8 (4.75mm - 2.36mm)	100 ± 0.1	7	100.0	88.2	11.8	11.8	0.8
#8 - #16(2.36mm - 1.18mm)	100 ± 0.1	5	100.0	87.8	12.2	12.2	0.6
#16 - #30 (1.18mm - 600um)	100 ± 0.1	4	100.0	93.9	6.1	6.1	0.2
#30 - #50 (600um - 300um)	100 ± 0.1	3	100.0	95.6	4.4	4.4	0.1
#50 - #100 (300um - 150um)	100 ± 0.1						
						Total Weighted Loss (%)	**1.8**

COMMENTS: Results based on sieve analyses performed for sample.

REVIEWED BY:

Adrian Moreno, Project Manager

TWINING

SOUNDNESS

ASTM C88-99a

Project Name:	AECOM Rock Core Testing	Tested By :	B.V.
Project No.:	170907.1	Date Tested:	9/24/2017
Client:	AECOM Rock Core Testing	Input By:	A.M.
Sampled By:	Client	Checked By:	A.M.
Sample Source:	**B-202, Boxes 1, 2, 3, 4**	Lab No.:	W01-17-21291
Sample Description:	**Granite - Sample 2**	Sample No.:	
Solution Type:	**Sodium Sulfate**		

SOUNDNESS OF COARSE AGGREGATE

Sieve Size	Required Mass (gm)	% Original Grading	Wt. Before Test (gm)	Wt. After Test (gm)	Wt. Loss (gm)	% Loss Designated Sieve After Test	Weighted% Loss
2 1/2" - 2" (63mm - 50mm)	3000 ± 300						
2" - 1 1/2" (50mm - 37.5mm)	2000 ± 200						
1 1/2" - 1" (37.5mm - 25mm)	1000 ± 50						
1" - 3/4" (25mm - 19mm)	500 ± 30	14	505.3	420.3	85.0	16.8	2.4
3/4" - 1/2" (19mm - 12.5mm)	670 ± 10	32	676.7	577.7	99.0	14.6	4.7
1/2" - 3/8" (12.5mm - 9.5mm)	330 ± 5	10	333.5	251.3	82.2	24.6	2.5
3/8" - #4 (9.5mm - 4.75mm)	300 ± 5	15	302.6	260.7	41.9	13.8	2.1
						Total Weighted Loss (%)	**11.6**

SOUNDNESS OF FINE AGGREGATE

Sieve Size	Required Mass (gm)	% Original Grading	Wt. Before Test (gm)	Wt. After Test (gm)	Wt. Loss (gm)	% Loss Designated Sieve After Test	Weighted% Loss
3/8" - #4 (9.5mm - 4.75mm)	100 ± 0.1						
#4 - #8 (4.75mm - 2.36mm)	100 ± 0.1	7	100.0	87.8	12.2	12.2	0.9
#8 - #16(2.36mm - 1.18mm)	100 ± 0.1	5	100.0	87.9	12.1	12.1	0.6
#16 - #30 (1.18mm - 600um)	100 ± 0.1	4	100.0	92.5	7.5	7.5	0.3
#30 - #50 (600um - 300um)	100 ± 0.1	3	100.0	96.7	3.3	3.3	0.1
#50 - #100 (300um - 150um)	100 ± 0.1						
						Total Weighted Loss (%)	**1.9**

COMMENTS: Results based on sieve analyses performed for sample.

REVIEWED BY:

Adrian Moreno, Project Manager

TWINING

SOUNDNESS

ASTM C88-99a

Project Name:	AECOM Rock Core Testing	Tested By :	B.V.
Project No.:	170907.1	Date Tested:	9/24/2017
Client:	AECOM Rock Core Testing	Input By:	A.M.
Sampled By:	Client	Checked By:	A.M.
Sample Source:	**B-202, Boxes 5, 6, 7, 8**	Lab No.:	W01-17-21291
Sample Description:	**Gneiss+Granite - Sample 1**	Sample No.:	
Solution Type:	**Sodium Sulfate**		

SOUNDNESS OF COARSE AGGREGATE

Sieve Size	Required Mass (gm)	% Original Grading	Wt. Before Test (gm)	Wt. After Test (gm)	Wt. Loss (gm)	% Loss Designated Sieve After Test	Weighted% Loss
2 1/2" - 2" (63mm - 50mm)	3000 ± 300						
2" - 1 1/2" (50mm - 37.5mm)	2000 ± 200						
1 1/2" - 1" (37.5mm - 25mm)	1000 ± 50						
1" - 3/4" (25mm - 19mm)	500 ± 30	21	506.9	410.9	96.0	18.9	4.0
3/4" - 1/2" (19mm - 12.5mm)	670 ± 10	30	677.7	627.7	50.0	7.4	2.2
1/2" - 3/8" (12.5mm - 9.5mm)	330 ± 5	9	330.9	264.8	66.1	20.0	1.8
3/8" - #4 (9.5mm - 4.75mm)	300 ± 5	12	302.0	263.2	38.8	12.8	1.5
						Total Weighted Loss (%)	**9.5**

SOUNDNESS OF FINE AGGREGATE

Sieve Size	Required Mass (gm)	% Original Grading	Wt. Before Test (gm)	Wt. After Test (gm)	Wt. Loss (gm)	% Loss Designated Sieve After Test	Weighted% Loss
3/8" - #4 (9.5mm - 4.75mm)	100 ± 0.1						
#4 - #8 (4.75mm - 2.36mm)	100 ± 0.1	6	100.0	87.1	12.9	12.9	0.8
#8 - #16(2.36mm - 1.18mm)	100 ± 0.1	3	100.0	85.3	14.7	14.7	0.4
#16 - #30 (1.18mm - 600um)	100 ± 0.1	3	100.0	90.0	10.0	10.0	0.3
#30 - #50 (600um - 300um)	100 ± 0.1	2	100.0	94.1	5.9	5.9	0.1
#50 - #100 (300um - 150um)	100 ± 0.1						
						Total Weighted Loss (%)	**1.6**

COMMENTS: Results based on sieve analyses performed for sample.

REVIEWED BY:

Adrian Moreno, Project Manager

TWINING

SOUNDNESS

ASTM C88-99a

Project Name:	AECOM Rock Core Testing	Tested By :	B.V.
Project No.:	170907.1	Date Tested:	9/24/2017
Client:	AECOM Rock Core Testing	Input By:	A.M.
Sampled By:	Client	Checked By:	A.M.
Sample Source:	**B-202, Boxes 5, 6, 7, 8**	Lab No.:	W01-17-21291
Sample Description:	**Gneiss+Granite - Sample 2**	Sample No.:	
Solution Type:	**Sodium Sulfate**		

SOUNDNESS OF COARSE AGGREGATE

Sieve Size	Required Mass (gm)	% Original Grading	Wt. Before Test (gm)	Wt. After Test (gm)	Wt. Loss (gm)	% Loss Designated Sieve After Test	Weighted% Loss
2 1/2" - 2" (63mm - 50mm)	3000 ± 300						
2" - 1 1/2" (50mm - 37.5mm)	2000 ± 200						
1 1/2" - 1" (37.5mm - 25mm)	1000 ± 50						
1" - 3/4" (25mm - 19mm)	500 ± 30	21	503.2	444.3	58.9	11.7	2.5
3/4" - 1/2" (19mm - 12.5mm)	670 ± 10	30	676.8	630.1	46.7	6.9	2.1
1/2" - 3/8" (12.5mm - 9.5mm)	330 ± 5	9	334.2	271.0	63.2	18.9	1.7
3/8" - #4 (9.5mm - 4.75mm)	300 ± 5	12	302.7	258.1	44.6	14.7	1.8
						Total Weighted Loss (%)	**8.0**

SOUNDNESS OF FINE AGGREGATE

Sieve Size	Required Mass (gm)	% Original Grading	Wt. Before Test (gm)	Wt. After Test (gm)	Wt. Loss (gm)	% Loss Designated Sieve After Test	Weighted% Loss
3/8" - #4 (9.5mm - 4.75mm)	100 ± 0.1						
#4 - #8 (4.75mm - 2.36mm)	100 ± 0.1	6	100.0	88.9	11.1	11.1	0.7
#8 - #16(2.36mm - 1.18mm)	100 ± 0.1	3	100.0	90.7	9.3	9.3	0.3
#16 - #30 (1.18mm - 600um)	100 ± 0.1	3	100.0	85.9	14.1	14.1	0.4
#30 - #50 (600um - 300um)	100 ± 0.1	2	100.0	94.5	5.5	5.5	0.1
#50 - #100 (300um - 150um)	100 ± 0.1						
						Total Weighted Loss (%)	**1.5**

COMMENTS: Results based on sieve analyses performed for sample.

REVIEWED BY:

Adrian Moreno, Project Manager

Twining, Inc.- Long Beach Lab
3310 Airport Way, Long Beach, CA 90806
Ph: 562.426.3355
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www.twininginc.com

Potential Alkali Reactivity Report

Report No: 2
Prir 11/3/2017 **Issue No:**

Customer: AECOM
999 Town and Country Road, Orange, CA 92868

Project: Vail Dam Rock Core Testing

Project No: 170907.1
Permit No:
OSHPD:
DSA File #:
DSA AP #:

Jurisdiction:
Distribution List:

Approved by: Adrian Moreno
Project Manager

Sample Details

Date Sampled: N/I
Sampled By: Client
Sample Source Vail Dam Rock Cores
Sample Location B-201, Boxes 3, 4, 7, 8

Sample Method: N/I
Material Type: Gneiss
Test Method: ASTM C 1260

Test Results

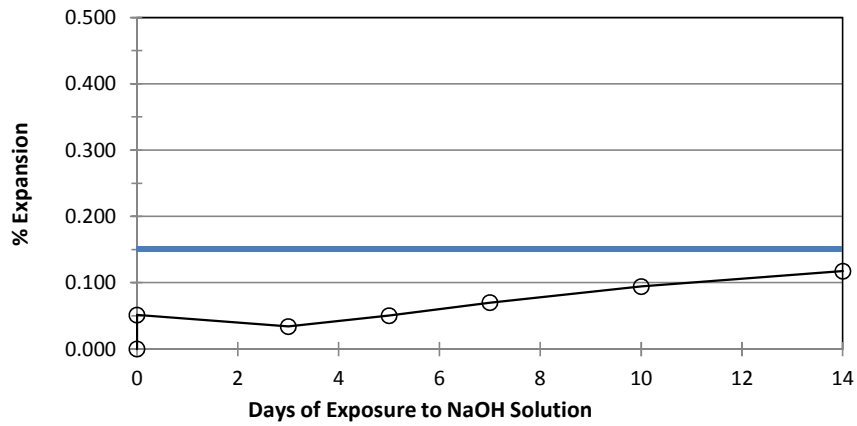
Test ID: CH17-366
Date Fabricated: 10/4/2017
Time Fabricated: 11:36 AM
Tested By: R. Davenport

Cement Type: Mitsubishi II/V
Total Alkalies: 0.49%
Water Cement Ratio: 0.47%
Autoclave: 0.03%

Expansion of Bars (%)

Date	Total Age	Age in NaOH	A	B	C	D	Average
10/5/2017	1 Day	0 Day	0.000	0.000	0.000	0.000	0.000
Store in H2O at 80 ± 2.0°C							
10/6/2017	2 Day	0 Day	0.053	0.055	0.047	0.051	0.052
Store in 1N NaOH at 80 ± 2.0°C							
10/9/2017	5 Day	3 Day	0.035	0.034	0.033	0.034	0.034
10/11/2017	7 Day	5 Day	0.056	0.049	0.050	0.047	0.051
10/13/2017	9 Day	7 Day	0.070	0.067	0.073	0.070	0.070
10/16/2017	12 Day	10 Day	0.092	0.090	0.098	0.097	0.094
10/20/2017	16 Day	14 Day	0.115	0.115	0.120	0.120	0.118

Chart



Results: Innocuous

Comments

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Potential Alkali Reactivity Report

Report No: 1
Prir 11/3/2017 **Issue No:**

Customer:	AECOM 999 Town and Country Road, Orange, CA 92868	**Project No:**	170907.1
		Permit No:	
		OSHPD:	
Project:	Vail Dam Rock Core Testing	**DSA File #:**	
		DSA AP #:	

Jurisdiction:
Distribution List:

Approved by: Adrian Moreno
Project Manager

Sample Details

Date Sampled:	N/I	**Sample Method:**	N/I
Sampled By:	Client	**Material Type:**	Gneiss
Sample Source	Vail Dam Rock Cores	**Test Method:**	ASTM C 1260
Sample Location	B-201, Boxes 3, 4, 7, 8		

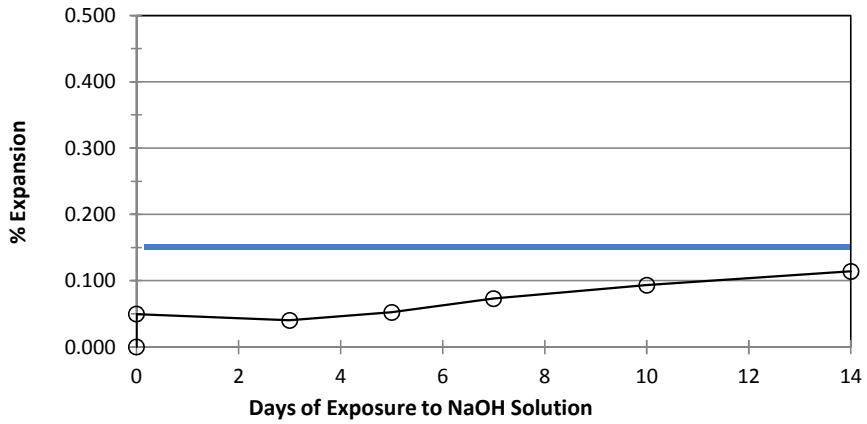
Test Results

Test ID:	CH17-365	**Cement Type:**	Mitsubishi II/V
Date Fabricated:	10/4/2017	**Total Alkalies:**	0.49%
Time Fabricated:	10:49 AM	**Water Cement Ratio:**	0.47%
Tested By:	R. Davenport	**Autoclave:**	0.03%

Expansion of Bars (%)

Date	Total Age	Age in NaOH	A	B	C	D	Average
10/5/2017	1 Day	0 Day	0.000	0.000	0.000	0.000	0.000
Store in H2O at 80 ± 2.0°C							
10/6/2017	2 Day	0 Day	0.050	0.049	0.050	0.050	0.050
Store in 1N NaOH at 80 ± 2.0°C							
10/9/2017	5 Day	3 Day	0.040	0.041	0.040	0.040	0.040
10/11/2017	7 Day	5 Day	0.054	0.050	0.052	0.054	0.053
10/13/2017	9 Day	7 Day	0.074	0.071	0.073	0.075	0.073
10/16/2017	12 Day	10 Day	0.095	0.090	0.095	0.094	0.094
10/20/2017	16 Day	14 Day	0.107	0.114	0.120	0.116	0.114

Chart



Results: Innocuous

Comments

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Potential Alkali Reactivity Report

Report No: 2
Prir 11/3/2017 **Issue No:**

Customer:	AECOM 999 Town and Country Road, Orange, CA 92868	**Project No:**	170907.1
		Permit No:	
		OSHPD:	
Project:	Vail Dam Rock Core Testing	**DSA File #:**	
		DSA AP #:	

Jurisdiction:
Distribution List:

Approved by: Adrian Moreno
Project Manager

Sample Details

Date Sampled:	N/I	**Sample Method:**	N/I
Sampled By:	Client	**Material Type:**	Granite
Sample Source	Vail Dam Rock Cores	**Test Method:**	ASTM C 1260
Sample Location	B-202, Boxes 1, 2, 3, 4		

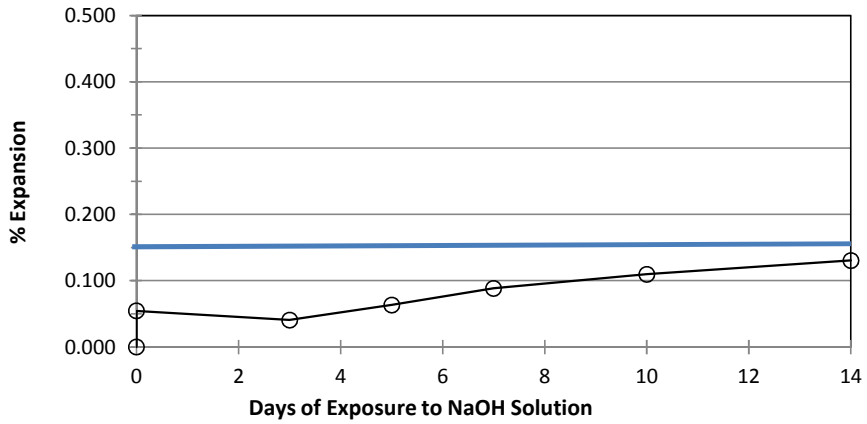
Test Results

Test ID:	CH17-368	**Cement Type:**	Mitsubishi II/V
Date Fabricated:	10/6/2017	**Total Alkalies:**	0.49%
Time Fabricated:	10:00 AM	**Water Cement Ratio:**	0.47%
Tested By:	R. Davenport	**Autoclave:**	0.03%

Expansion of Bars (%)

Date	Total Age	Age in NaOH	A	B	C	D	Average
10/7/2017	1 Day	0 Day	0.000	0.000	0.000	0.000	0.000
		Store in H2O at 80 ± 2.0°C					
10/8/2017	2 Day	0 Day	0.056	0.055	0.055	0.052	0.055
		Store in 1N NaOH at 80 ± 2.0°C					
10/11/2017	5 Day	3 Day	0.041	0.037	0.044	0.042	0.041
10/13/2017	7 Day	5 Day	0.063	0.060	0.066	0.065	0.063
10/15/2017	9 Day	7 Day	0.088	0.084	0.095	0.087	0.088
10/18/2017	12 Day	10 Day	0.111	0.102	0.117	0.109	0.110
10/22/2017	16 Day	14 Day	0.134	0.123	0.140	0.126	0.131

Chart



Results: Innocuous

Comments

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Potential Alkali Reactivity Report

Report No: 1
Prir 11/3/2017 **Issue No:**

Customer:	AECOM 999 Town and Country Road, Orange, CA 92868	**Project No:**	170907.1
		Permit No:	
		OSHPD:	
Project:	Vail Dam Rock Core Testing	**DSA File #:**	
		DSA AP #:	

Jurisdiction:
Distribution List:

Approved by: Adrian Moreno
Project Manager

Sample Details

Date Sampled:	N/I	**Sample Method:**	N/I
Sampled By:	Client	**Material Type:**	Granite
Sample Source	Vail Dam Rock Cores	**Test Method:**	ASTM C 1260
Sample Location	B-202, Boxes 1, 2, 3, 4		

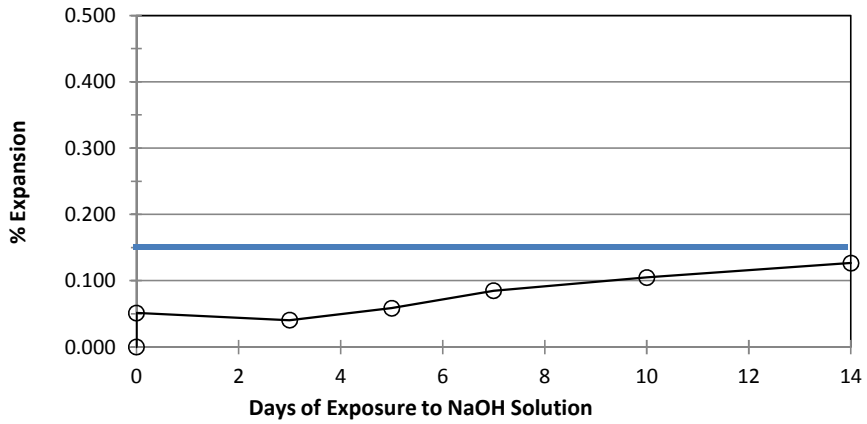
Test Results

Test ID:	CH17-367	**Cement Type:**	Mitsubishi II/V
Date Fabricated:	10/6/2017	**Total Alkalies:**	0.49%
Time Fabricated:	8:41 AM	**Water Cement Ratio:**	0.47%
Tested By:	R. Davenport	**Autoclave:**	0.03%

Expansion of Bars (%)

Date	Total Age	Age in NaOH	A	B	C	D	Average
10/7/2017	1 Day	0 Day	0.000	0.000	0.000	0.000	0.000
Store in H2O at 80 ± 2.0°C							
10/8/2017	2 Day	0 Day	0.048	0.053	0.052	0.052	0.051
Store in 1N NaOH at 80 ± 2.0°C							
10/11/2017	5 Day	3 Day	0.044	0.037	0.036	0.045	0.040
10/13/2017	7 Day	5 Day	0.063	0.055	0.056	0.061	0.059
10/15/2017	9 Day	7 Day	0.086	0.080	0.084	0.090	0.085
10/18/2017	12 Day	10 Day	0.103	0.100	0.106	0.111	0.105
10/22/2017	16 Day	14 Day	0.126	0.120	0.128	0.133	0.127

Chart



Results: Innocuous

Comments

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Potential Alkali Reactivity Report

Report No: 1
Prir 11/3/2017 **Issue No:**

Customer:	AECOM 999 Town and Country Road, Orange, CA 92868	**Project No:**	170907.1
		Permit No:	
		OSHPD:	
Project:	Vail Dam Rock Core Testing	**DSA File #:**	
		DSA AP #:	
Jurisdiction:			
Distribution List:			

Approved by: Adrian Moreno
Project Manager

Sample Details

Date Sampled:	N/I	**Sample Method:**	N/I
Sampled By:	Client	**Material Type:**	Gneiss+Granite
Sample Source	Vail Dam Rock Cores	**Test Method:**	ASTM C 1260
Sample Location	B-202, Boxes 5, 6, 7, 8		

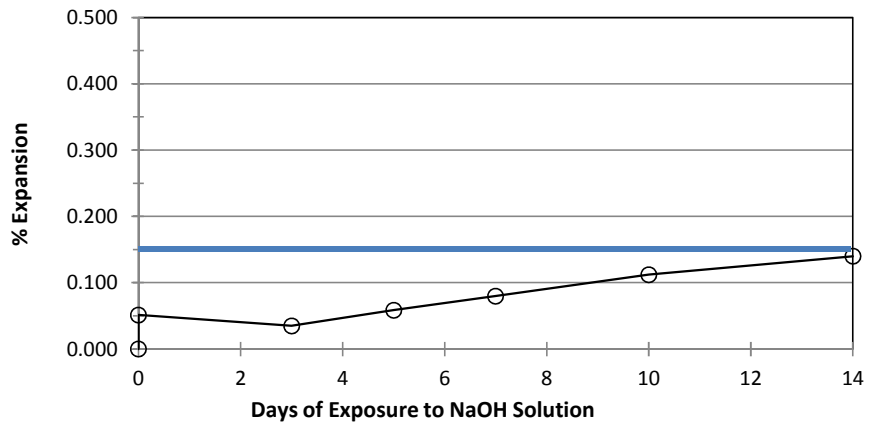
Test Results

Test ID:	CH17-369	**Cement Type:**	Mitsubishi II/V
Date Fabricated:	10/11/2017	**Total Alkalies:**	0.49%
Time Fabricated:	7:14 AM	**Water Cement Ratio:**	0.47%
Tested By:	R. Davenport	**Autoclave:**	0.03%

Expansion of Bars (%)

Date	Total Age	Age in NaOH	A	B	C	D	Average
10/12/2017	1 Day	0 Day	0.000	0.000	0.000	0.000	0.000
		Store in H2O at 80 ± 2.0°C					
10/13/2017	2 Day	0 Day	0.051	0.052	0.053	0.050	0.052
		Store in 1N NaOH at 80 ± 2.0°C					
10/16/2017	5 Day	3 Day	0.034	0.038	0.037	0.031	0.035
10/18/2017	7 Day	5 Day	0.056	0.064	0.059	0.055	0.058
10/20/2017	9 Day	7 Day	0.075	0.087	0.080	0.078	0.080
10/23/2017	12 Day	10 Day	0.108	0.120	0.112	0.109	0.112
10/27/2017	16 Day	14 Day	0.133	0.152	0.144	0.131	0.140

Chart



Results: Innocuous

Comments

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Potential Alkali Reactivity Report

Report No: 2
Prir 11/3/2017 **Issue No:**

Customer:	AECOM 999 Town and Country Road, Orange, CA 92868	**Project No:**	170907.1
		Permit No:	
		OSHPD:	
Project:	Vail Dam Rock Core Testing	**DSA File #:**	
		DSA AP #:	

Jurisdiction:
Distribution List:

Approved by: Adrian Moreno
Project Manager

Sample Details

Date Sampled:	N/I	**Sample Method:**	N/I
Sampled By:	Client	**Material Type:**	Gneiss+Granite
Sample Source	Vail Dam Rock Cores	**Test Method:**	ASTM C 1260
Sample Location	B-202, Boxes 5, 6, 7, 8		

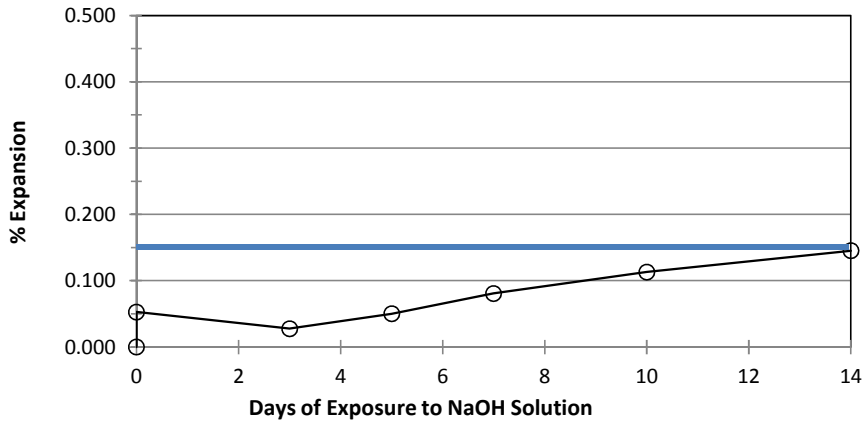
Test Results

Test ID:	CH17-370	**Cement Type:**	Mitsubishi II/V
Date Fabricated:	10/11/2017	**Total Alkalies:**	0.49%
Time Fabricated:	8:12 AM	**Water Cement Ratio:**	0.47%
Tested By:	R. Davenport	**Autoclave:**	0.03%

Expansion of Bars (%)

Date	Total Age	Age in NaOH	A	B	C	D	Average
10/12/2017	1 Day	0 Day	0.000	0.000	0.000	0.000	0.000
		Store in H2O at 80 ± 2.0°C					
10/13/2017	2 Day	0 Day	0.051	0.055	0.053	0.052	0.053
		Store in 1N NaOH at 80 ± 2.0°C					
10/16/2017	5 Day	3 Day	0.027	0.033	0.027	0.024	0.028
10/18/2017	7 Day	5 Day	0.048	0.057	0.050	0.046	0.050
10/20/2017	9 Day	7 Day	0.082	0.084	0.082	0.075	0.081
10/23/2017	12 Day	10 Day	0.113	0.117	0.115	0.108	0.113
10/27/2017	16 Day	14 Day	0.141	0.153	0.146	0.141	0.145

Chart



Results: Innocuous

Comments

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Material Test Report

Report No: 2
Printed date: 10/17/2017 **Issue No:**

Customer:	AECOM 999 Town and Country Road, Orange, CA 92868	**Project No:**	170907.1
		Permit No:	
		OSHPD:	
Project:	Vail Dam Rock Core Tetsing	**DSA File #:**	
		DSA AP #:	
Jurisdiction:			
Distribution List:			

Approved by: Adrian Moreno
Projoect Manager

Sample Details

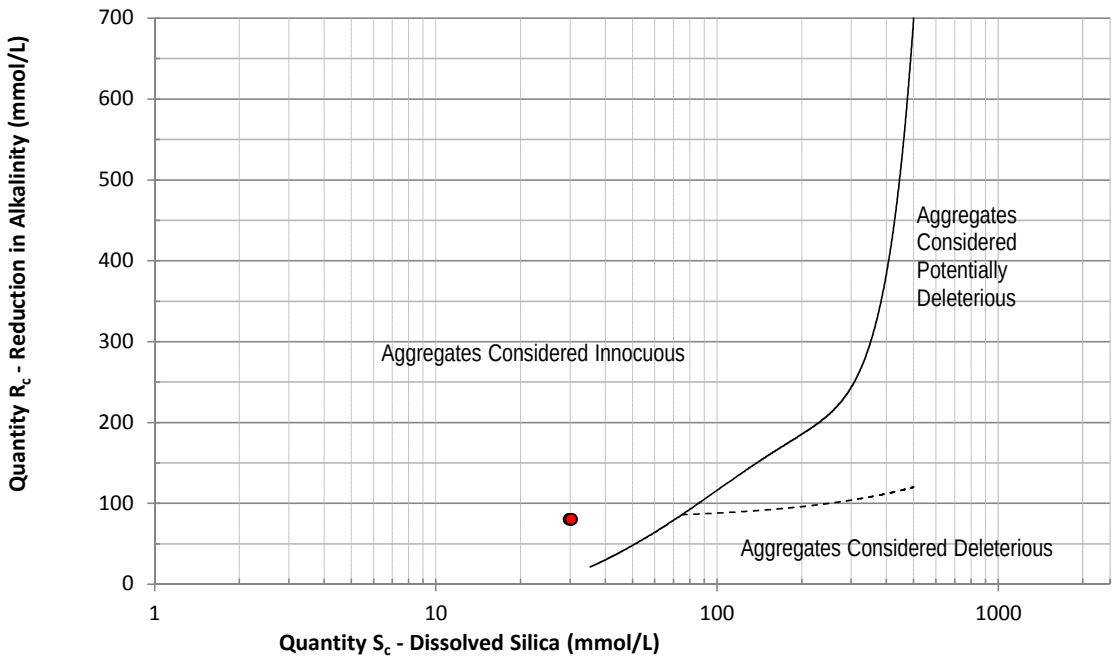
Date Sampled:	N/I	**Sample Method:**	N/I
Sampled By:	Client	**Material Type:**	Granite
Source:	Vail Dam Rock Cores	**Test Method:**	ASTM C 289
Quarry:	B-202, Boxes 1, 2, 3, 4		

Test Results

Silica Standard:	Lot No. TR0418	**Calibration:**	10/13/2017
Cat. No.:	S-135	**Concentration:**	1 ml = 1.000 mg
Date Tested:	10/13/2017	**Tested By:**	R.Davenport

Dissolved Silica, S_c	Set 2-1	30.4	**mmol/L**	**Reduction in Alkalinity, R_c**	Set 2-1	80.0	**mmol/L**
	Set 2-2	29.8	**mmol/L**		Set 2-2	80.0	**mmol/L**
	Set 2-3	30.3	**mmol/L**		Set 2-3	80.0	**mmol/L**

Chart



Results: Innocuous

Compliance:

Comments

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Material Test Report

Report No: 1
Printed date: 10/17/2017 **Issue No:**

Customer:	AECOM 999 Town and Country Road, Orange, CA 92868	**Project No:**	170907.1
		Permit No:	
		OSHPD:	
Project:	Vail Dam Rock Core Tetsing	**DSA File #:**	
		DSA AP #:	
Jurisdiction:			
Distribution List:			

Approved by: Adrian Moreno
Projoect Manager

Sample Details

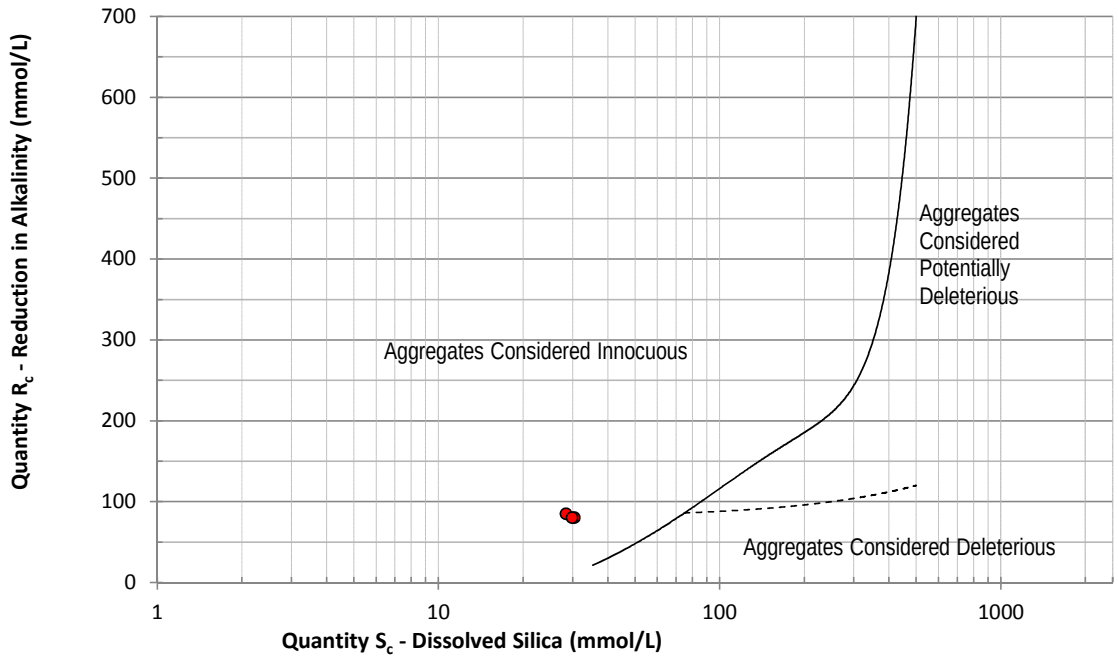
Date Sampled:	N/I	**Sample Method:**	N/I
Sampled By:	Client	**Material Type:**	Granite
Source:	Vail Dam Rock Cores	**Test Method:**	ASTM C 289
Quarry:	B-202, Boxes 1, 2, 3, 4		

Test Results

Silica Standard:	Lot No. TR0418	**Calibration:**	10/13/2017
Cat. No.:	S-135	**Concentration:**	1 ml = 1.000 mg
Date Tested:	10/13/2017	**Tested By:**	R.Davenport

Dissolved Silica, S_c	Set 2-1	28.5	**mmol/L**	**Reduction in Alkalinity, R_c**	Set 2-1	85.0	**mmol/L**
	Set 2-2	30.5	**mmol/L**		Set 2-2	80.0	**mmol/L**
	Set 2-3	29.9	**mmol/L**		Set 2-3	80.0	**mmol/L**

Chart



Results: Innocuous

Compliance:

Comments

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Material Test Report

Report No: 2
Printed date: 10/17/2017 **Issue No:**

Customer:	AECOM 999 Town and Country Road, Orange, CA 92868	**Project No:**	170907.1
		Permit No:	
		OSHPD:	
Project:	Vail Dam Rock Core Tetsing	**DSA File #:**	
		DSA AP #:	
Jurisdiction:			
Distribution List:			

Approved by: Adrian Moreno
Projoect Manager

Sample Details

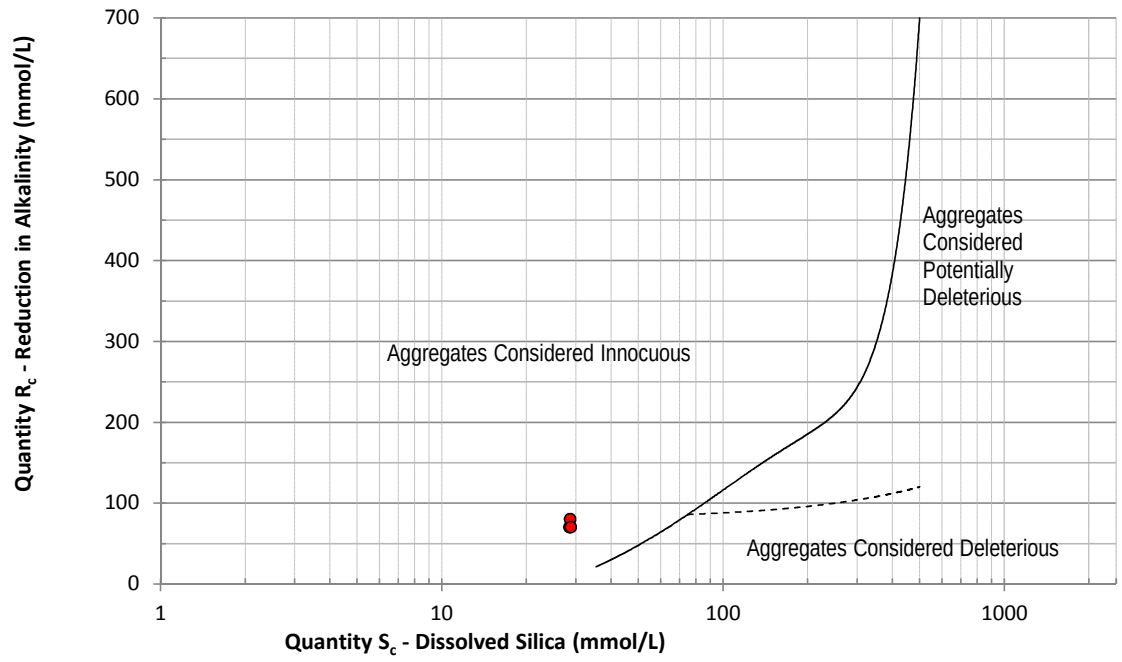
Date Sampled:	N/I	**Sample Method:**	N/I
Sampled By:	Client	**Material Type:**	Gneiss
Source:	Vail Dam Rock Cores	**Test Method:**	ASTM C 289
Quarry:	B-201, Boxes 3, 4, 7, 8		

Test Results

Silica Standard:	Lot No. TR0418	**Calibration:**	10/11/2017
Cat. No.:	S-135	**Concentration:**	1 ml = 1.000 mg
Date Tested:	10/11/2017	**Tested By:**	R.Davenport

Dissolved Silica, S_c	Set 1-2-1	28.5	**mmol/L**	**Reduction in Alkalinity, R_c**	Set 1-2-1	70.0	**mmol/L**
	Set 1-2-2	28.6	**mmol/L**		Set 1-2-2	80.0	**mmol/L**
	Set 1-2-3	28.8	**mmol/L**		Set 1-2-3	70.0	**mmol/L**

Chart



Results: Innocuous

Compliance:

Comments

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Ph: 562.426.3355
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www.twininginc.com

Material Test Report

Report No: 1
Printed date: 10/17/2017 **Issue No:**

Customer:	AECOM 999 Town and Country Road, Orange, CA 92868	**Project No:**	170907.1
Project:	Vail Dam Rock Core Tetsing	**Permit No:**	
		OSHPD:	
		DSA File #:	
		DSA AP #:	
Jurisdiction:			
Distribution List:			

Approved by: Adrian Moreno
Project Manager

Sample Details

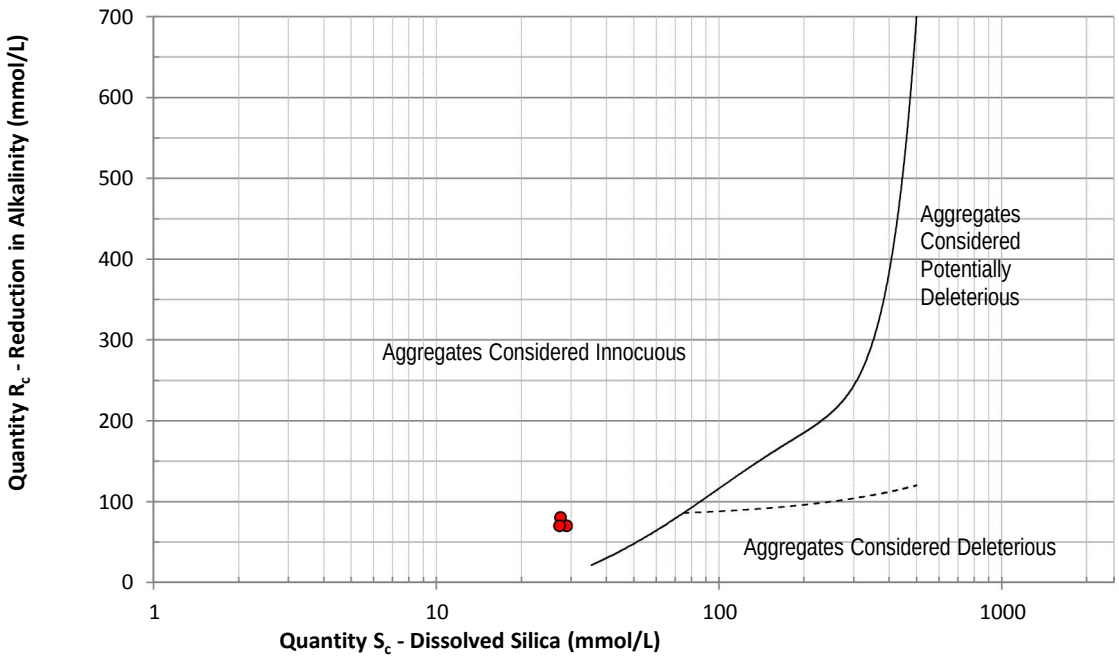
Date Sampled:	N/I	**Sample Method:**	N/I
Sampled By:	Client	**Material Type:**	Gneiss
Sample Source	Vail Dam Rock Cores	**Test Method:**	ASTM C 289
Sample Location	B-201, Boxes 3, 4, 7, 8		

Test Results

Silica Standard:	Lot No. TR0418	**Calibration:**	10/11/2017
Cat. No.:	S-135	**Concentration:**	1 ml = 1.000 mg
Date Tested:	10/11/2017	**Tested By:**	R.Davenport

Dissolved Silica, S_c				**Reduction in Alkalinity, R_c**			
	Set 1-1	29.0	**mmol/L**		Set 1-1	70.0	**mmol/L**
	Set 1-2	27.5	**mmol/L**		Set 1-2	80.0	**mmol/L**
	Set 1-3	27.4	**mmol/L**		Set 1-3	70.0	**mmol/L**

Chart



Results: Innocuous

Compliance:

Comments

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Material Test Report

Report No: 1
Printed date: 10/17/2017 **Issue No:**

Customer:	AECOM 999 Town and Country Road, Orange, CA 92868	**Project No:**	170907.1
		Permit No:	
		OSHPD:	
Project:	Vail Dam Rock Core Tetsing	**DSA File #:**	
		DSA AP #:	
Jurisdiction:			
Distribution List:			

Approved by: Adrian Moreno
Projoect Manager

Sample Details

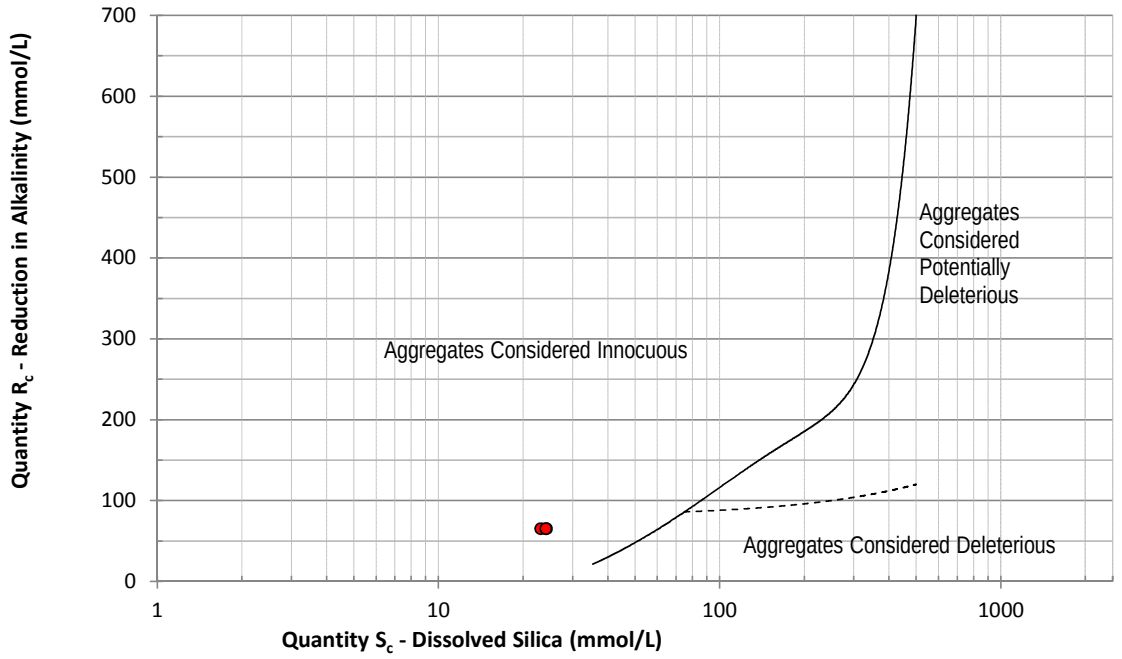
Date Sampled:	N/I	**Sample Method:**	N/I
Sampled By:	Client	**Material Type:**	Gneiss + Granite
Source:	Vail Dam Rock Cores	**Test Method:**	ASTM C 289
Quarry:	B-202, Boxes 5, 6, 7, 8		

Test Results

Silica Standard:	Lot No. TR0418	**Calibration:**	10/16/2017
Cat. No.:	S-135	**Concentration:**	1 ml = 1.000 mg
Date Tested:	10/16/2017	**Tested By:**	R.Davenport

Dissolved Silica, S_c	Set 3-1	23.2	**mmol/L**	**Reduction in Alkalinity, R_c**	Set 3-1	65.0	**mmol/L**
	Set 3-2	24.2	**mmol/L**		Set 3-2	65.0	**mmol/L**
	Set 3-3	24.1	**mmol/L**		Set 3-3	65.0	**mmol/L**

Chart



Results: Innocuous

Compliance:

Comments

Twining, Inc.- Long Beach Lab
3310 Airport Way, Long Beach, CA 90806
Ph: 562.426.3355
Fax: 562.426.6424
www.twininginc.com

Material Test Report

Report No: 2
Printed date: 10/17/2017 **Issue No:**

Customer:	AECOM 999 Town and Country Road, Orange, CA 92868	**Project No:**	170907.1
		Permit No:	
		OSHPD:	
Project:	Vail Dam Rock Core Tetsing	**DSA File #:**	
		DSA AP #:	
Jurisdiction:			
Distribution List:			

Approved by: Adrian Moreno
Projoect Manager

Sample Details

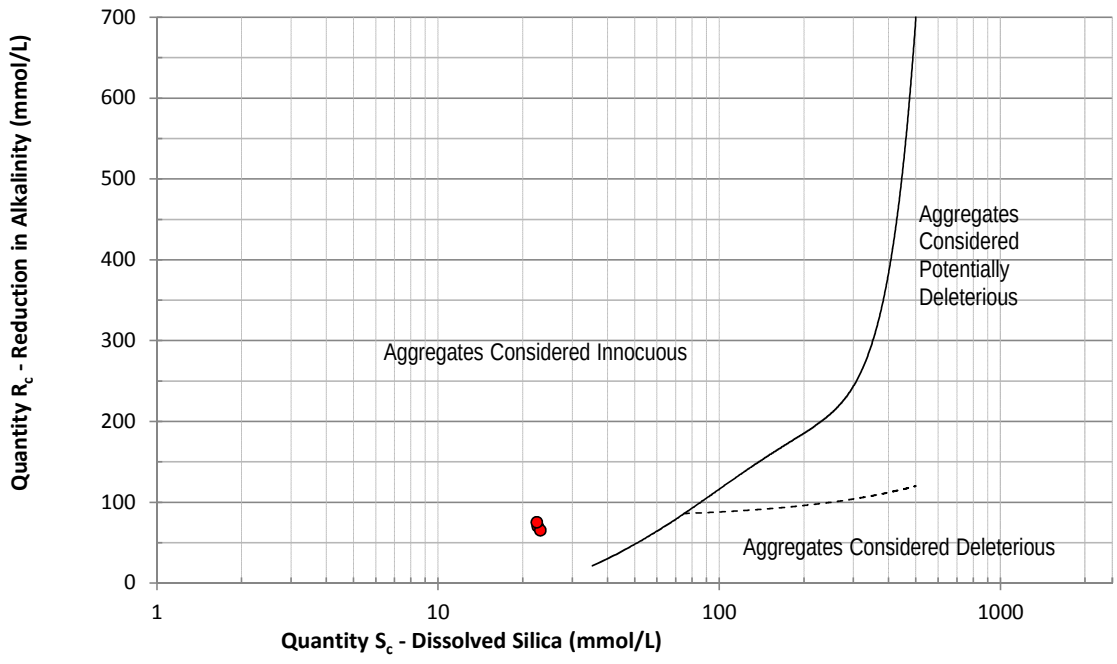
Date Sampled:	N/I	**Sample Method:**	N/I
Sampled By:	Client	**Material Type:**	Gneiss + Granite
Source:	Vail Dam Rock Cores	**Test Method:**	ASTM C 289
Quarry:	B-202, Boxes 5, 6, 7, 8		

Test Results

Silica Standard:	Lot No. TR0418	**Calibration:**	10/16/2017
Cat. No.:	S-135	**Concentration:**	1 ml = 1.000 mg
Date Tested:	10/16/2017	**Tested By:**	R.Davenport

Dissolved Silica, S_c	Set 3-1	22.6	**mmol/L**	**Reduction in Alkalinity, R_c**	Set 3-1	70.0	**mmol/L**
	Set 3-2	23.1	**mmol/L**		Set 3-2	65.0	**mmol/L**
	Set 3-3	22.5	**mmol/L**		Set 3-3	75.0	**mmol/L**

Chart



Results: Innocuous

Compliance:

Comments

TWINING

Ethylene Glycol Soak
CRD-C 148-69

Project Name:	AECOM Rock Core Testing	Tested By :	S.C.
Project No.:	170907.1	Date Tested:	10/14/2017
Client:	AECOM	Input By:	A.M.
Sampled By:	Client	Checked By:	A.M.
Sample Source:	**B-201, Boxes 3, 4, 7, 8**	Lab No.:	W01-17-21291
Sample Description:	**Gneiss**	Sample No.:	

Dry Weight Before Soak (g):	**10398.4**
Dry Weight After 15-day Soak (g):	**10382.3**
Material Loss (g):	**16.1**
Percent Loss (%):	**0.15%**

BEFORE SOAK



AFTER 15-DAY SOAK



COMMENTS: Material did not experience a significant reduction in weight or quality.
Test performed on material retained on the 3/4-inch sieve.

REVIEWED BY:

Adrian Moreno, Project Manager

TWINING

Ethylene Glycol Soak
CRD-C 148-69

Project Name:	AECOM Rock Core Testing	Tested By :	S.C.
Project No.:	170907.1	Date Tested:	10/14/2017
Client:	AECOM	Input By:	A.M.
Sampled By:	Client	Checked By:	A.M.
Sample Source:	**B-202, Boxes 1, 2, 3, 4**	Lab No.:	W01-17-21291
Sample Description:	**Granite**	Sample No.:	

Dry Weight Before Soak (g):	**10187.0**
Dry Weight After 15-day Soak (g):	**10186.0**
Material Loss (g):	**1.0**
Percent Loss (%):	**0.01%**

BEFORE SOAK



AFTER 15-DAY SOAK



COMMENTS: Material did not experience a significant reduction in weight or appearance.
Test performed on material retained on the 3/4-inch sieve.

REVIEWED BY:

Adrian Moreno, Project Manager

TWINING

Ethylene Glycol Soak
CRD-C 148-69

Project Name:	AECOM Rock Core Testing	Tested By :	S.C.
Project No.:	170907.1	Date Tested:	10/14/2017
Client:	AECOM	Input By:	A.M.
Sampled By:	Client	Checked By:	A.M.
Sample Source:	**B-202, Boxes 5, 6, 7, 8**	Lab No.:	W01-17-21291
Sample Description:	**Gneiss + Granite**	Sample No.:	

Dry Weight Before Soak (g):	**10631.0**
Dry Weight After 15-day Soak (g):	**10615.0**
Material Loss (g):	**16.0**
Percent Loss (%):	**0.15%**

BEFORE SOAK



AFTER 15-DAY SOAK



COMMENTS: Material did not experience a significant reduction in weight or appearance.
Test performed on material retained on the 3/4-inch sieve.

REVIEWED BY:

Adrian Moreno, Project Manager

Twining, Inc.- Long Beach Lab
3310 Airport Way, Long Beach, CA 90806
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Compressive Strength and Elastic Modulus of Rock Cores

Report No: 1
Printed date: 11/8/2017 **Issue No:**

Customer:	AECOM 999 Town and Country Road, Orange, CA 92868	**Project No:**	170907.1
Project:	Vail Dam Rock Core Testing	**Permit No:** **OSHPD:** **DSA File #:** **DSA AP #:**	
Jurisdiction: **Distribution List:**		**Approved by:** Adrian Moreno Project Manager	

Sample Details

Date Sampled:	N/I	**Core Material:**	Gneiss
Sampled By:	Client	**Diameter (in.)**	2.39
Sample Source	Vail Dam Rock Cores	**Height (in.)**	6.15
Sample Location:	B-201 at 67 ft.	**Area (sq. in.)**	4.49

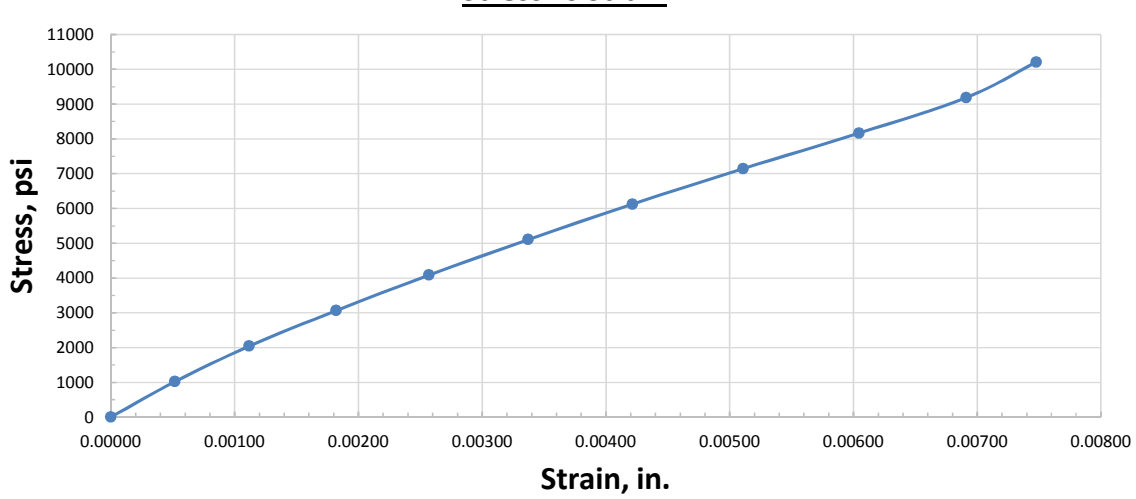
Test Results

Date Tested:	10/14/2017	**Gauge Length (in.):**	2.00
Tested By:	S. Chang	**Ultimate Load (lbs.):**	45800
Test Method:	ASTM D 7012	**Unconfined Compressive Strength (psi.)**	**10200**

Test Data

Percent Load (%)	Load (lbs.)	Stress (psi.)	Strain Gauge 1 (in.)	Strain Gauge 2 (in.)	Average Deflection (in.)	Incremental Deflection (in.)	Strain (in./in.)
0	0	0	0.00000	0.00000	0.00000	0.00000	0.00000
10	4580	1021	0.00202	0.00005	0.00104	0.00104	0.00052
20	9160	2042	0.00359	0.00088	0.00224	0.00120	0.00112
30	13740	3063	0.00518	0.00210	0.00364	0.00141	0.00182
40	18320	4084	0.00683	0.00345	0.00514	0.00150	0.00257
50	22900	5104	0.00854	0.00495	0.00675	0.00161	0.00337
60	27480	6125	0.01029	0.00657	0.00843	0.00169	0.00422
70	32060	7146	0.01208	0.00836	0.01022	0.00179	0.00511
80	36640	8167	0.01383	0.01035	0.01209	0.00187	0.00605
90	41220	9188	0.01486	0.01279	0.01383	0.00174	0.00691
100	45800	10209	0.01253	0.01738	0.01496	0.00113	0.00748

Chart



Modulus of Elasticity (psi): 1,250,000

Comments

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Compressive Strength and Elastic Modulus of Rock Cores

Report No: 1
Printed date: 11/8/2017 **Issue No:**

Customer:	AECOM 999 Town and Country Road, Orange, CA 92868	**Project No:**	170907.1
Project:	Vail Dam Rock Core Testing	**Permit No:**	
		OSHPD:	
		DSA File #:	
		DSA AP #:	
Jurisdiction:			
Distribution List:			

Approved by: Adrian Moreno
Project Manager

Sample Details

Date Sampled:	N/I	**Core Material:**	Granite
Sampled By:	Client	**Diameter (in.)**	2.40
Sample Source	Vail Dam Rock Cores	**Height (in.)**	6.13
Sample Location:	B-202 at 43 ft.	**Area (sq. in.)**	4.52

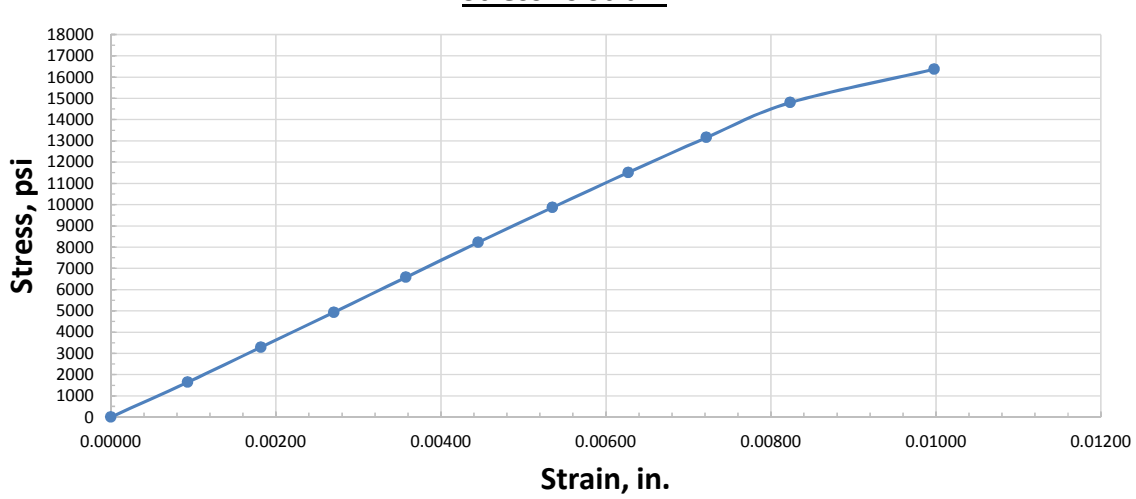
Test Results

Date Tested:	10/14/2017	**Gauge Length (in.):**	2.00
Tested By:	S. Chang	**Ultimate Load (lbs.):**	74400
Test Method:	ASTM D 7012	**Unconfined Compressive Strength (psi.)**	**16400**

Test Data

Percent Load (%)	Load (lbs.)	Stress (psi.)	Strain Gauge 1 (in.)	Strain Gauge 2 (in.)	Average Deflection (in.)	Incremental Deflection (in.)	Strain (in./in.)
0	0	0	0.00000	0.00000	0.00000	0.00000	0.00000
10	7440	1645	0.00256	0.00117	0.00187	0.00187	0.00093
20	14880	3289	0.00475	0.00252	0.00364	0.00177	0.00182
30	22320	4934	0.00674	0.00407	0.00541	0.00177	0.00270
40	29760	6578	0.00866	0.00564	0.00715	0.00175	0.00358
50	37200	8223	0.01054	0.00727	0.00891	0.00176	0.00445
60	44640	9868	0.01243	0.00898	0.01071	0.00180	0.00535
70	52080	11512	0.01430	0.01079	0.01255	0.00184	0.00627
80	59520	13157	0.01618	0.01270	0.01444	0.00190	0.00722
90	66960	14801	0.01804	0.01490	0.01647	0.00203	0.00824
100	74050	16369	0.02030	0.01962	0.01996	0.00349	0.00998

Chart



Modulus of Elasticity (psi): 1,850,000

Comments

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Compressive Strength and Elastic Modulus of Rock Cores

Report No: 1
Printed date: 11/8/2017 **Issue No:**

Customer: AECOM, 999 Town and Country Road, Orange, CA 92868	**Project No:** 170907.1
Project: Vail Dam Rock Core Testing	**Permit No:**
	OSHPD:
	DSA File #:
	DSA AP #:
Jurisdiction:	
Distribution List:	

Approved by: Adrian Moreno
Project Manager

Sample Details

Date Sampled:	N/I	**Core Material:**	Gneiss
Sampled By:	Client	**Diameter (in.)**	2.38
Sample Source	Vail Dam Rock Cores	**Height (in.)**	6.06
Sample Location:	B-101 at 27 ft.	**Area (sq. in.)**	4.45

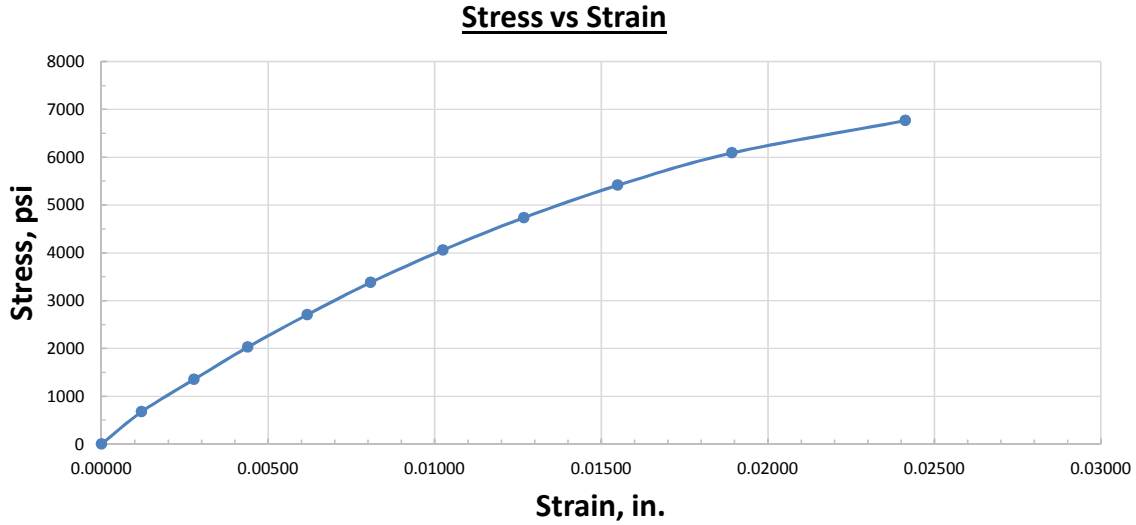
Test Results

Date Tested:	10/16/2017	**Gauge Length (in.):**	1.00
Tested By:	S. Chang	**Ultimate Load (lbs.):**	30100
Test Method:	ASTM D 7012	**Unconfined Compressive Strength (psi.)**	**6800**

Test Data

Percent Load (%)	Load (lbs.)	Stress (psi.)	Strain Gauge 1 (in.)	Strain Gauge 2 (in.)	Average Deflection (in.)	Incremental Deflection (in.)	Strain (in./in.)
0	0	0	0.00000	0.00000	0.00000	0.00000	0.00000
10	3010	677	0.00149	0.00092	0.00121	0.00121	0.00121
20	6020	1353	0.00345	0.00210	0.00278	0.00157	0.00278
30	9030	2030	0.00532	0.00347	0.00440	0.00162	0.00440
40	12040	2706	0.00738	0.00497	0.00618	0.00178	0.00618
50	15050	3383	0.00964	0.00653	0.00809	0.00191	0.00809
60	18060	4060	0.01222	0.00828	0.01025	0.00217	0.01025
70	21070	4736	0.01517	0.01019	0.01268	0.00243	0.01268
80	24080	5413	0.01867	0.01232	0.01550	0.00282	0.01550
90	27090	6089	0.02308	0.01477	0.01893	0.00343	0.01893
100	30100	6766	0.03054	0.01772	0.02413	0.00521	0.02413

Chart



Modulus of Elasticity (psi): 350,000

Comments

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Compressive Strength and Elastic Modulus of Rock Cores

Report No: 1
Printed date: 11/8/2017 **Issue No:**

Customer:	AECOM 999 Town and Country Road, Orange, CA 92868	**Project No:**	170907.1
Project:	Vail Dam Rock Core Testing	**Permit No:** **OSHPD:** **DSA File #:** **DSA AP #:**	
Jurisdiction: **Distribution List:**		**Approved by:** Adrian Moreno Project Manager	

Sample Details

Date Sampled:	N/I	**Core Material:**	Gneiss
Sampled By:	Client	**Diameter (in.)**	2.36
Sample Source	Vail Dam Rock Cores	**Height (in.)**	6.09
Sample Location:	B-101 at 120 ft.	**Area (sq. in.)**	4.37

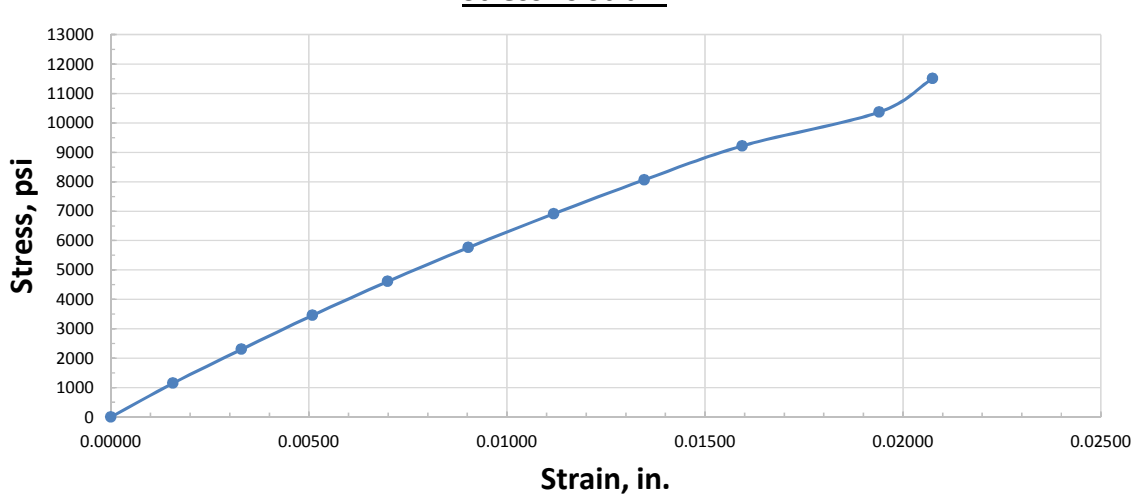
Test Results

Date Tested:	10/16/2017	**Gauge Length (in.):**	1.00
Tested By:	S. Chang	**Ultimate Load (lbs.):**	50400
Test Method:	ASTM D 7012	**Unconfined Compressive Strength (psi.)**	**11500**

Test Data

Percent Load (%)	Load (lbs.)	Stress (psi.)	Strain Gauge 1 (in.)	Strain Gauge 2 (in.)	Average Deflection (in.)	Incremental Deflection (in.)	Strain (in./in.)
0	0	0	0.00000	0.00000	0.00000	0.00000	0.00000
10	5040	1152	0.00087	0.00227	0.00157	0.00157	0.00157
20	10080	2304	0.00244	0.00416	0.00330	0.00173	0.00330
30	15120	3457	0.00413	0.00605	0.00509	0.00179	0.00509
40	20160	4609	0.00583	0.00815	0.00699	0.00190	0.00699
50	25200	5761	0.00765	0.01040	0.00903	0.00204	0.00903
60	30240	6913	0.00947	0.01290	0.01119	0.00216	0.01119
70	35280	8065	0.01135	0.01559	0.01347	0.00229	0.01347
80	40320	9217	0.01369	0.01819	0.01594	0.00247	0.01594
90	45360	10370	0.01659	0.02222	0.01941	0.00347	0.01941
100	50350	11510	0.01772	0.02378	0.02075	0.00135	0.02075

Chart



Modulus of Elasticity (psi): 600,000

Comments

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Compressive Strength and Elastic Modulus of Rock Cores

Report No: 1
Printed date: 11/8/2017 **Issue No:**

Customer:	AECOM 999 Town and Country Road, Orange, CA 92868	**Project No:**	170907.1
Project:	Vail Dam Rock Core Testing	**Permit No:** **OSHPD:** **DSA File #:** **DSA AP #:**	
Jurisdiction: **Distribution List:**		**Approved by:** Adrian Moreno Project Manager	

Sample Details

Date Sampled:	N/I	**Core Material:**	Gneiss
Sampled By:	Client	**Diameter (in.)**	2.38
Sample Source	Vail Dam Rock Cores	**Height (in.)**	6.12
Sample Location:	B-102 at 25 ft.	**Area (sq. in.)**	4.45

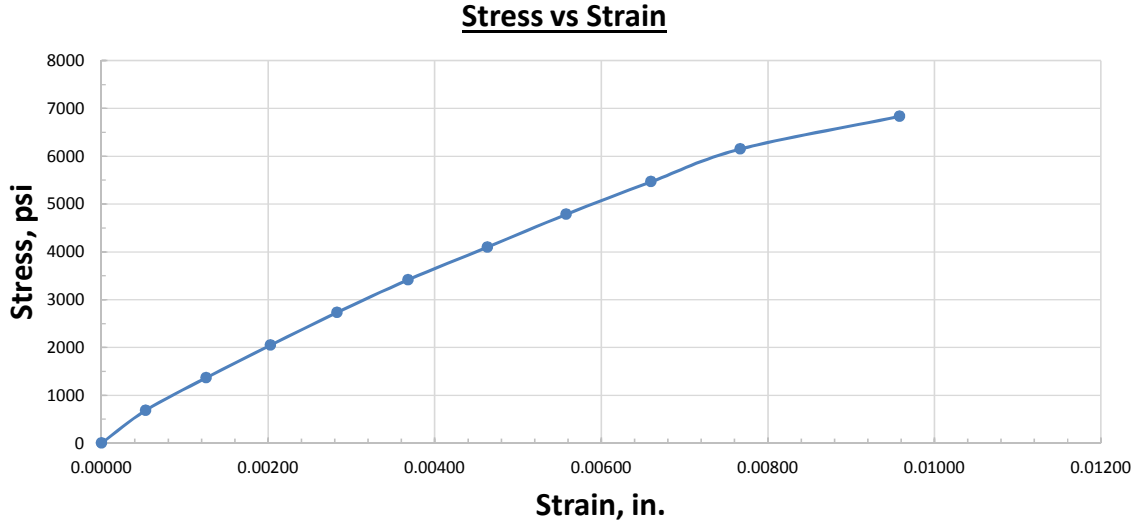
Test Results

Date Tested:	10/14/2017	**Gauge Length (in.):**	2.00
Tested By:	S. Chang	**Ultimate Load (lbs.):**	30400
Test Method:	ASTM D 7012	**Unconfined Compressive Strength (psi.)**	**6800**

Test Data

Percent Load (%)	Load (lbs.)	Stress (psi.)	Strain Gauge 1 (in.)	Strain Gauge 2 (in.)	Average Deflection (in.)	Incremental Deflection (in.)	Strain (in./in.)
0	0	0	0.00000	0.00000	0.00000	0.00000	0.00000
10	3040	683	0.00132	0.00080	0.00106	0.00106	0.00053
20	6080	1367	0.00260	0.00243	0.00252	0.00146	0.00126
30	9120	2050	0.00386	0.00426	0.00406	0.00155	0.00203
40	12160	2733	0.00513	0.00619	0.00566	0.00160	0.00283
50	15200	3417	0.00644	0.00829	0.00737	0.00171	0.00368
60	18240	4100	0.00710	0.01144	0.00927	0.00191	0.00464
70	21280	4783	0.00815	0.01417	0.01116	0.00189	0.00558
80	24320	5467	0.00914	0.01726	0.01320	0.00204	0.00660
90	27360	6150	0.01023	0.02045	0.01534	0.00214	0.00767
100	30400	6833	0.01255	0.02578	0.01917	0.00383	0.00958

Chart



Modulus of Elasticity (psi): 750,000

Comments

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Compressive Strength and Elastic Modulus of Rock Cores

Report No: 1
Printed date: 11/8/2017 **Issue No:**

Customer: AECOM, 999 Town and Country Road, Orange, CA 92868	**Project No:** 170907.1
Project: Vail Dam Rock Core Testing	**Permit No:**
	OSHPD:
	DSA File #:
	DSA AP #:
Jurisdiction:	
Distribution List:	

Approved by: Adrian Moreno
Project Manager

Sample Details

Date Sampled:	N/I	**Core Material:**	Gneiss
Sampled By:	Client	**Diameter (in.)**	2.39
Sample Source	Vail Dam Rock Cores	**Height (in.)**	5.49
Sample Location:	B-102 at 199 ft.	**Area (sq. in.)**	4.49

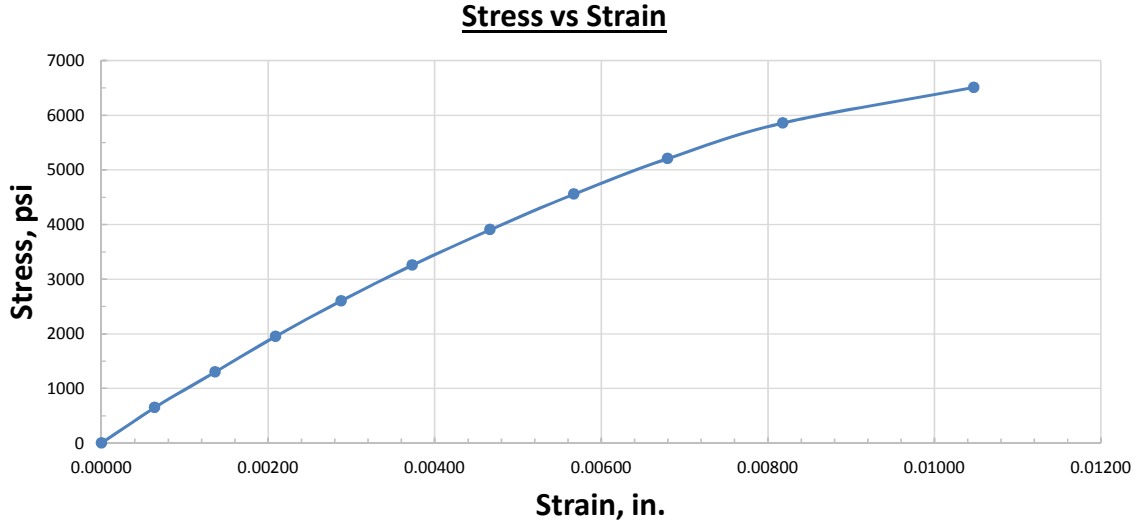
Test Results

Date Tested:	10/14/2017	**Gauge Length (in.):**	2.00
Tested By:	S. Chang	**Ultimate Load (lbs.):**	29200
Test Method:	ASTM D 7012	**Unconfined Compressive Strength (psi.)**	**6500**

Test Data

Percent Load (%)	Load (lbs.)	Stress (psi.)	Strain Gauge 1 (in.)	Strain Gauge 2 (in.)	Average Deflection (in.)	Incremental Deflection (in.)	Strain (in./in.)
0	0	0	0.00000	0.00000	0.00000	0.00000	0.00000
10	2920	651	0.00152	0.00104	0.00128	0.00128	0.00064
20	5840	1302	0.00336	0.00210	0.00273	0.00145	0.00137
30	8760	1953	0.00502	0.00334	0.00418	0.00145	0.00209
40	11680	2603	0.00669	0.00482	0.00576	0.00158	0.00288
50	14600	3254	0.00841	0.00651	0.00746	0.00171	0.00373
60	17520	3905	0.01027	0.00840	0.00934	0.00188	0.00467
70	20440	4556	0.01223	0.01046	0.01135	0.00201	0.00567
80	23360	5207	0.01436	0.01284	0.01360	0.00226	0.00680
90	26280	5858	0.01681	0.01591	0.01636	0.00276	0.00818
100	29200	6509	0.01805	0.02385	0.02095	0.00459	0.01048

Chart



Modulus of Elasticity (psi): 850,000

Comments

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Compressive Strength and Elastic Modulus of Rock Cores

Report No: 1
Printed date: 11/8/2017 **Issue No:**

Customer: AECOM, 999 Town and Country Road, Orange, CA 92868	**Project No:** 170907.1
Project: Vail Dam Rock Core Testing	**Permit No:**
	OSHPD:
	DSA File #:
	DSA AP #:
Jurisdiction:	
Distribution List:	

Approved by: Adrian Moreno
Project Manager

Sample Details

Date Sampled:	N/I	**Core Material:**	Gneiss
Sampled By:	Client	**Diameter (in.)**	2.39
Sample Source	Vail Dam Rock Cores	**Height (in.)**	6.15
Sample Location:	B-103 at 11 ft.	**Area (sq. in.)**	4.49

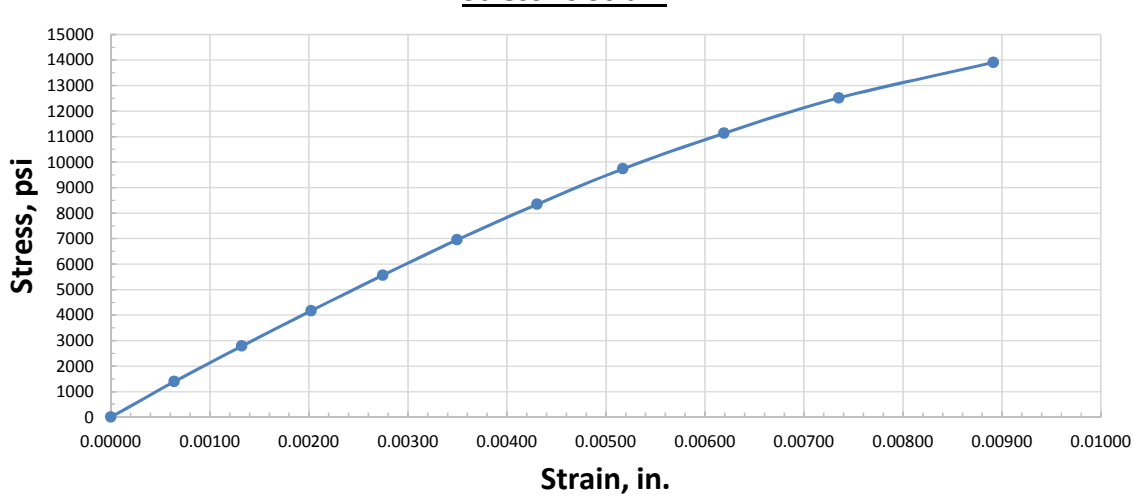
Test Results

Date Tested:	10/14/2017	**Gauge Length (in.):**	2.00
Tested By:	S. Chang	**Ultimate Load (lbs.):**	62400
Test Method:	ASTM D 7012	**Unconfined Compressive Strength (psi.)**	**13900**

Test Data

Percent Load (%)	Load (lbs.)	Stress (psi.)	Strain Gauge 1 (in.)	Strain Gauge 2 (in.)	Average Deflection (in.)	Incremental Deflection (in.)	Strain (in./in.)
0	0	0	0.00000	0.00000	0.00000	0.00000	0.00000
10	6240	1391	0.00063	0.00193	0.00128	0.00128	0.00064
20	12480	2782	0.00190	0.00339	0.00265	0.00137	0.00132
30	18720	4173	0.00330	0.00479	0.00405	0.00140	0.00202
40	24960	5564	0.00481	0.00618	0.00550	0.00145	0.00275
50	31200	6955	0.00638	0.00761	0.00700	0.00150	0.00350
60	37440	8345	0.00806	0.00916	0.00861	0.00162	0.00431
70	43680	9736	0.00986	0.01083	0.01035	0.00174	0.00517
80	49920	11127	0.01195	0.01282	0.01239	0.00204	0.00619
90	56160	12518	0.01408	0.01533	0.01471	0.00232	0.00735
100	62400	13909	0.01709	0.01857	0.01783	0.00313	0.00892

Chart



Modulus of Elasticity (psi): 1,850,000

Comments

Twining, Inc.- Long Beach Lab
3310 Airport Way, Long Beach, CA 90806
Ph: 562.426.3355
Fax: 562.426.6424
www.twininginc.com

Compressive Strength and Elastic Modulus of Rock Cores

Report No: 1
Printed date: 11/8/2017 **Issue No:**

Customer: AECOM, 999 Town and Country Road, Orange, CA 92868	**Project No:** 170907.1
Project: Vail Dam Rock Core Testing	**Permit No:**
	OSHPD:
	DSA File #:
	DSA AP #:
Jurisdiction:	
Distribution List:	

Approved by: Adrian Moreno
Project Manager

Sample Details

Date Sampled:	N/I	**Core Material:**	Gneiss
Sampled By:	Client	**Diameter (in.)**	2.37
Sample Source	Vail Dam Rock Cores	**Height (in.)**	6.09
Sample Location:	B-104 at 7 ft.	**Area (sq. in.)**	4.41

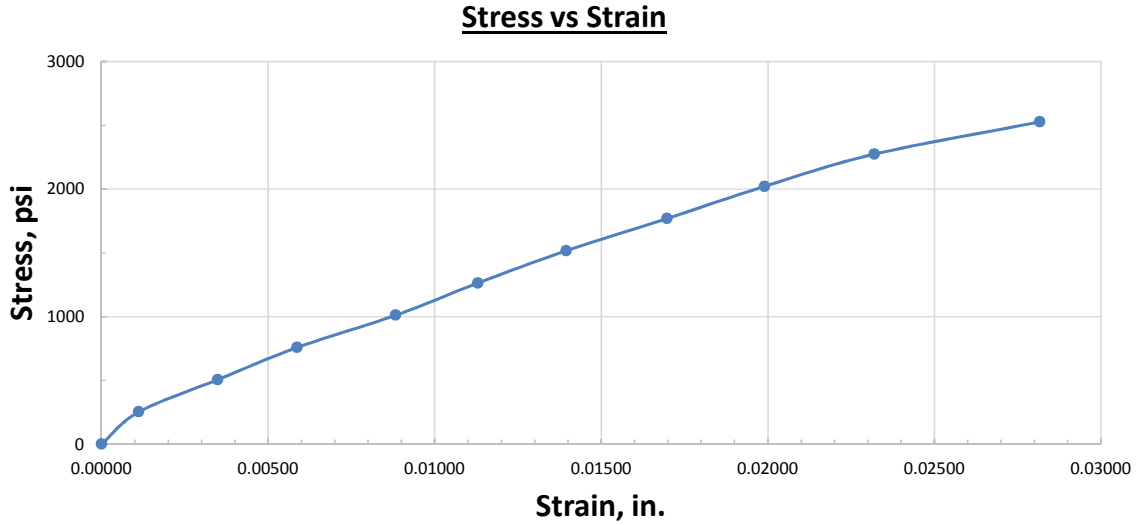
Test Results

Date Tested:	10/16/2017	**Gauge Length (in.):**	1.00
Tested By:	S. Chang	**Ultimate Load (lbs.):**	11150
Test Method:	ASTM D 7012	**Unconfined Compressive Strength (psi.)**	**2500**

Test Data

Percent Load (%)	Load (lbs.)	Stress (psi.)	Strain Gauge 1 (in.)	Strain Gauge 2 (in.)	Average Deflection (in.)	Incremental Deflection (in.)	Strain (in./in.)
0	0	0	0.00000	0.00000	0.00000	0.00000	0.00000
10	1115	253	0.00037	0.00187	0.00112	0.00112	0.00112
20	2230	505	0.00094	0.00603	0.00349	0.00237	0.00349
30	3345	758	0.00148	0.01027	0.00588	0.00239	0.00588
40	4460	1011	0.00170	0.01596	0.00883	0.00296	0.00883
50	5575	1264	0.00179	0.02081	0.01130	0.00247	0.01130
60	6690	1516	0.00195	0.02595	0.01395	0.00265	0.01395
70	7805	1769	0.00215	0.03181	0.01698	0.00303	0.01698
80	8920	2022	0.00229	0.03752	0.01991	0.00293	0.01991
90	10035	2275	0.00223	0.04418	0.02321	0.00330	0.02321
100	11150	2527	0.00173	0.05460	0.02817	0.00496	0.02817

Chart



Modulus of Elasticity (psi): 100,000

Comments

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Compressive Strength and Elastic Modulus of Rock Cores

Report No: 1
Printed date: 11/8/2017 **Issue No:**

Customer:	AECOM 999 Town and Country Road, Orange, CA 92868	**Project No:**	170907.1
Project:	Vail Dam Rock Core Testing	**Permit No:** **OSHPD:** **DSA File #:** **DSA AP #:**	
Jurisdiction: **Distribution List:**		**Approved by:** Adrian Moreno Project Manager	

Sample Details

Date Sampled:	N/I	**Core Material:**	Gneiss
Sampled By:	Client	**Diameter (in.)**	2.38
Sample Source	Vail Dam Rock Cores	**Height (in.)**	6.09
Sample Location:	B-104 at 64.5 ft.	**Area (sq. in.)**	4.45

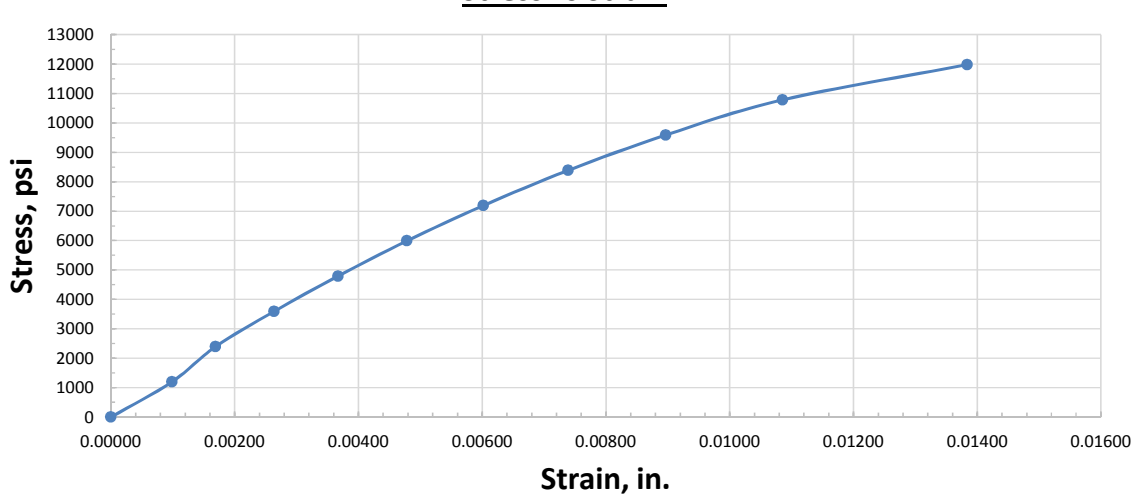
Test Results

Date Tested:	10/14/2017	**Gauge Length (in.):**	2.00
Tested By:	S. Chang	**Ultimate Load (lbs.):**	53300
Test Method:	ASTM D 7012	**Unconfined Compressive Strength (psi.)**	**12000**

Test Data

Percent Load (%)	Load (lbs.)	Stress (psi.)	Strain Gauge 1 (in.)	Strain Gauge 2 (in.)	Average Deflection (in.)	Incremental Deflection (in.)	Strain (in./in.)
0	0	0	0.00000	0.00000	0.00000	0.00000	0.00000
10	5330	1198	0.00034	0.00361	0.00198	0.00198	0.00099
20	10660	2396	0.00093	0.00584	0.00339	0.00141	0.00169
30	15990	3594	0.00260	0.00795	0.00528	0.00189	0.00264
40	21320	4792	0.00456	0.01012	0.00734	0.00207	0.00367
50	26650	5990	0.00675	0.01239	0.00957	0.00223	0.00479
60	31980	7188	0.00923	0.01484	0.01204	0.00247	0.00602
70	37310	8387	0.01202	0.01754	0.01478	0.00275	0.00739
80	42640	9585	0.01549	0.02037	0.01793	0.00315	0.00897
90	47970	10783	0.01939	0.02403	0.02171	0.00378	0.01086
100	53300	11981	0.02551	0.02984	0.02768	0.00597	0.01384

Chart



Modulus of Elasticity (psi): 1,050,000

Comments

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Compressive Strength and Elastic Modulus of Rock Cores

Report No: 1
Printed date: 11/8/2017 **Issue No:**

Customer:	AECOM 999 Town and Country Road, Orange, CA 92868	**Project No:**	170907.1
Project:	Vail Dam Rock Core Testing	**Permit No:** **OSHPD:** **DSA File #:** **DSA AP #:**	
Jurisdiction: **Distribution List:**		**Approved by:** Adrian Moreno Project Manager	

Sample Details

Date Sampled:	N/I	**Core Material:**	Gneiss
Sampled By:	Client	**Diameter (in.)**	2.38
Sample Source	Vail Dam Rock Cores	**Height (in.)**	6.00
Sample Location:	B-105 at 10.5 ft.	**Area (sq. in.)**	4.45

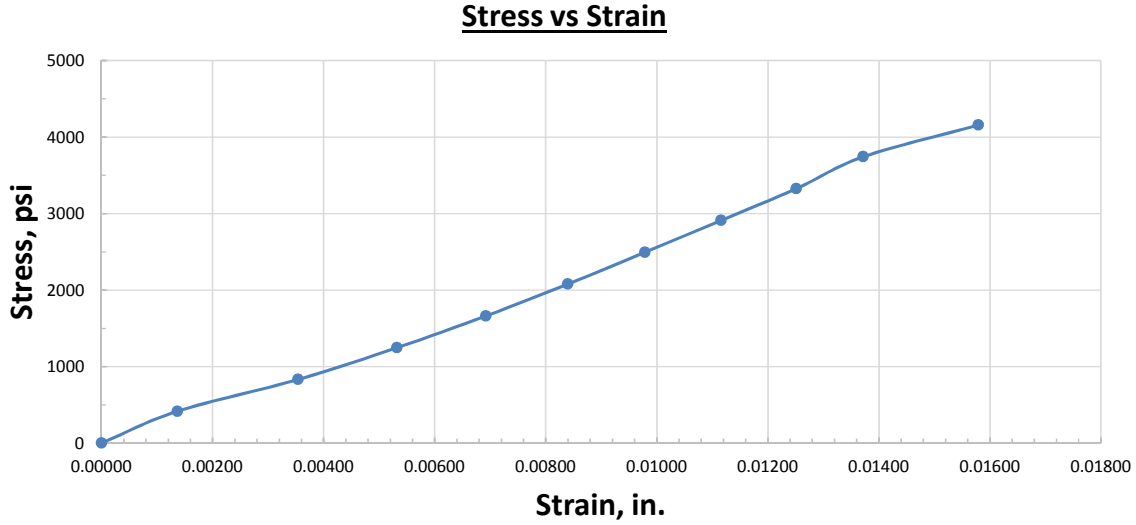
Test Results

Date Tested:	10/14/2017	**Gauge Length (in.):**	2.00
Tested By:	S. Chang	**Ultimate Load (lbs.):**	18500
Test Method:	ASTM D 7012	**Unconfined Compressive Strength (psi.)**	**4200**

Test Data

Percent Load (%)	Load (lbs.)	Stress (psi.)	Strain Gauge 1 (in.)	Strain Gauge 2 (in.)	Average Deflection (in.)	Incremental Deflection (in.)	Strain (in./in.)
0	0	0	0.00000	0.00000	0.00000	0.00000	0.00000
10	1850	416	0.00062	0.00484	0.00273	0.00273	0.00137
20	3700	832	0.00427	0.00988	0.00708	0.00435	0.00354
30	5550	1248	0.00771	0.01358	0.01065	0.00357	0.00532
40	7400	1663	0.01083	0.01687	0.01385	0.00321	0.00693
50	9250	2079	0.01375	0.01985	0.01680	0.00295	0.00840
60	11100	2495	0.01653	0.02263	0.01958	0.00278	0.00979
70	12950	2911	0.01928	0.02535	0.02232	0.00274	0.01116
80	14800	3327	0.02210	0.02796	0.02503	0.00272	0.01252
90	16650	3743	0.02504	0.02984	0.02744	0.00241	0.01372
100	18500	4158	0.02885	0.03432	0.03159	0.00415	0.01579

Chart



Modulus of Elasticity (psi): 300,000

Comments

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Compressive Strength and Elastic Modulus of Rock Cores

Report No: 1
Printed date: 11/8/2017 **Issue No:**

Customer:	AECOM 999 Town and Country Road, Orange, CA 92868	**Project No:**	170907.1
Project:	Vail Dam Rock Core Testing	**Permit No:** **OSHPD:** **DSA File #:** **DSA AP #:**	
Jurisdiction: **Distribution List:**		**Approved by:** Adrian Moreno Project Manager	

Sample Details

Date Sampled:	N/I	**Core Material:**	Gneiss
Sampled By:	Client	**Diameter (in.)**	2.40
Sample Source	Vail Dam Rock Cores	**Height (in.)**	6.05
Sample Location:	B-105 at 71 ft.	**Area (sq. in.)**	0.00

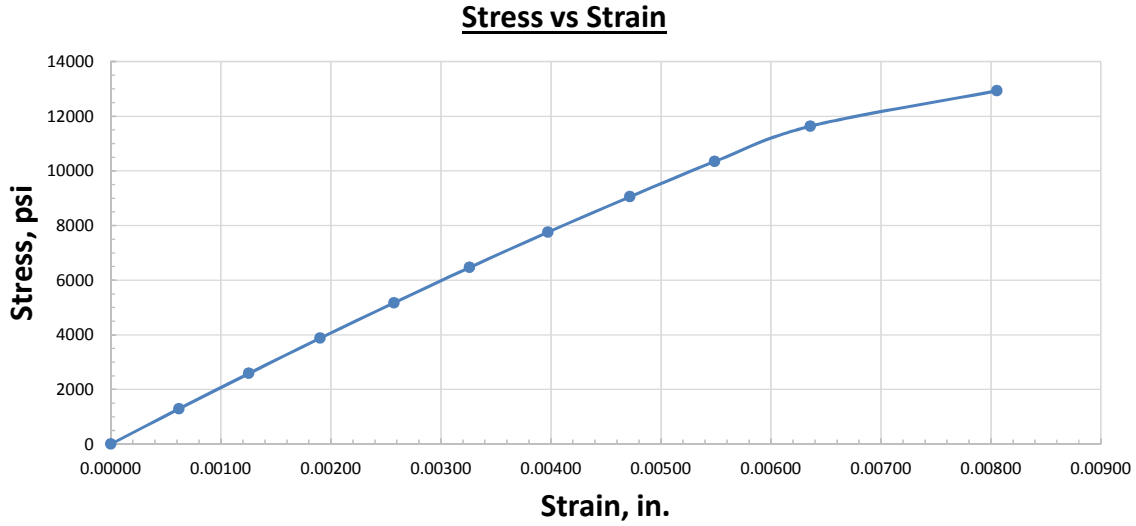
Test Results

Date Tested:	10/14/2017	**Gauge Length (in.):**	2.00
Tested By:	S. Chang	**Ultimate Load (lbs.):**	58500
Test Method:	ASTM D 7012	**Unconfined Compressive Strength (psi.)**	**9700**

Test Data

Percent Load (%)	Load (lbs.)	Stress (psi.)	Strain Gauge 1 (in.)	Strain Gauge 2 (in.)	Average Deflection (in.)	Incremental Deflection (in.)	Strain (in./in.)
0	0	0	0.00000	0.00000	0.00000	0.00000	0.00000
10	5850	1293	0.00129	0.00119	0.00124	0.00124	0.00062
20	11700	2586	0.00250	0.00252	0.00251	0.00127	0.00126
30	17550	3879	0.00371	0.00390	0.00381	0.00130	0.00190
40	23400	5173	0.00494	0.00536	0.00515	0.00135	0.00258
50	29250	6466	0.00616	0.00688	0.00652	0.00137	0.00326
60	35100	7759	0.00741	0.00849	0.00795	0.00143	0.00398
70	40950	9052	0.00870	0.01017	0.00944	0.00149	0.00472
80	46800	10345	0.01001	0.01195	0.01098	0.00155	0.00549
90	52650	11638	0.01155	0.01389	0.01272	0.00174	0.00636
100	58500	12931	0.01429	0.01793	0.01611	0.00339	0.00806

Chart



Modulus of Elasticity (psi): 1,850,000

Comments

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Compressive Strength and Elastic Modulus of Rock Cores

Report No: 1
Printed date: 11/8/2017 **Issue No:**

Customer:	AECOM 999 Town and Country Road, Orange, CA 92868	**Project No:**	170907.1
Project:	Vail Dam Rock Core Testing	**Permit No:**	
		OSHPD:	
		DSA File #:	
		DSA AP #:	
Jurisdiction:			
Distribution List:			

Approved by: Adrian Moreno
Project Manager

Sample Details

Date Sampled:	N/I	**Core Material:**	Gneiss
Sampled By:	Client	**Diameter (in.)**	2.37
Sample Source	Vail Dam Rock Cores	**Height (in.)**	6.03
Sample Location:	B-106 at 40 ft.	**Area (sq. in.)**	4.41

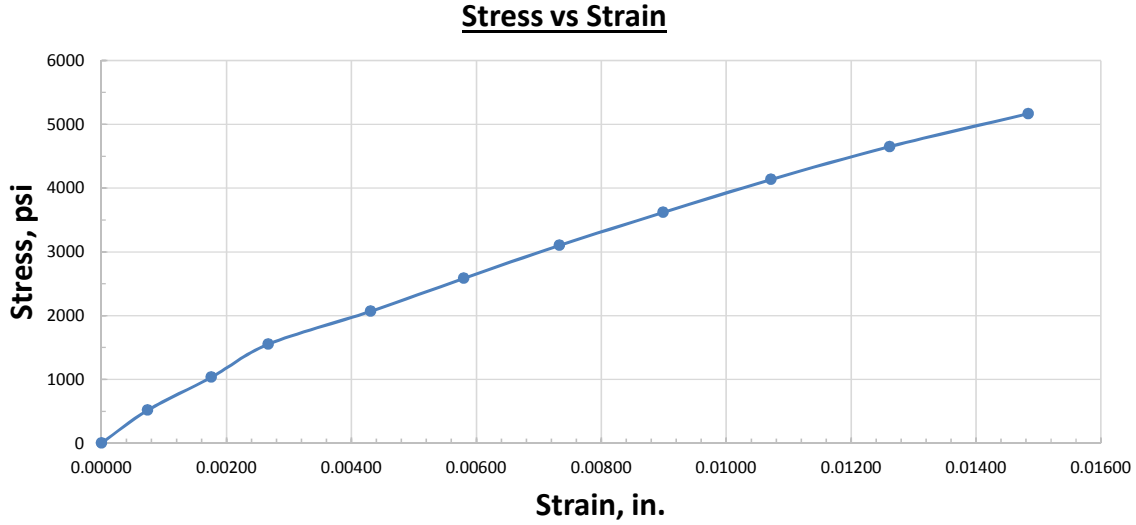
Test Results

Date Tested:	10/16/2017	**Gauge Length (in.):**	1.00
Tested By:	S. Chang	**Ultimate Load (lbs.):**	22800
Test Method:	ASTM D 7012	**Unconfined Compressive Strength (psi.)**	**5200**

Test Data

Percent Load (%)	Load (lbs.)	Stress (psi.)	Strain Gauge 1 (in.)	Strain Gauge 2 (in.)	Average Deflection (in.)	Incremental Deflection (in.)	Strain (in./in.)
0	0	0	0.00000	0.00000	0.00000	0.00000	0.00000
10	2280	517	0.00074	0.00000	0.00074	0.00074	0.00074
20	4560	1034	0.00176	0.00000	0.00176	0.00102	0.00176
30	6840	1550	0.00267	0.00000	0.00267	0.00091	0.00267
40	9120	2067	0.00431	0.00000	0.00431	0.00164	0.00431
50	11400	2584	0.00580	0.00000	0.00580	0.00149	0.00580
60	13680	3101	0.00733	0.00000	0.00733	0.00153	0.00733
70	15960	3618	0.00899	0.00000	0.00899	0.00166	0.00899
80	18240	4135	0.01072	0.00000	0.01072	0.00173	0.01072
90	20520	4651	0.01262	0.00000	0.01262	0.00190	0.01262
100	22800	5168	0.01484	0.00000	0.01484	0.00222	0.01484

Chart



Modulus of Elasticity (psi): 400,000

Comments

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Compressive Strength and Elastic Modulus of Rock Cores

Report No: 1
Printed date: 11/8/2017 **Issue No:**

Customer:	AECOM 999 Town and Country Road, Orange, CA 92868	**Project No:**	170907.1
Project:	Vail Dam Rock Core Testing	**Permit No:**	
		OSHPD:	
		DSA File #:	
		DSA AP #:	
Jurisdiction:			
Distribution List:			

Approved by: Adrian Moreno
Project Manager

Sample Details

Date Sampled:	N/I	**Core Material:**	Gneiss
Sampled By:	Client	**Diameter (in.)**	2.38
Sample Source	Vail Dam Rock Cores	**Height (in.)**	6.06
Sample Location:	B-106 at 92 ft.	**Area (sq. in.)**	4.45

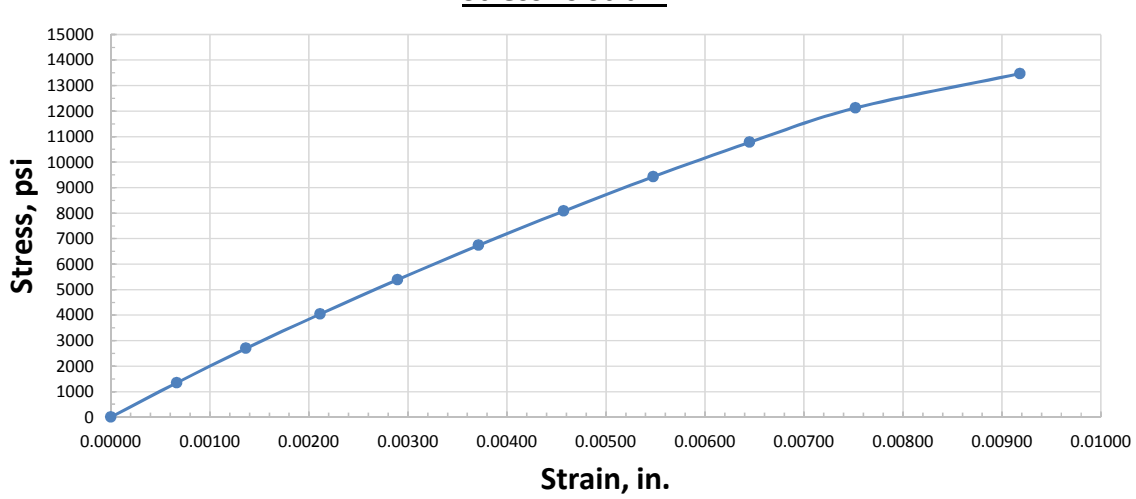
Test Results

Date Tested:	10/14/2017	**Gauge Length (in.):**	2.00
Tested By:	S. Chang	**Ultimate Load (lbs.):**	59930
Test Method:	ASTM D 7012	**Unconfined Compressive Strength (psi.)**	**13500**

Test Data

Percent Load (%)	Load (lbs.)	Stress (psi.)	Strain Gauge 1 (in.)	Strain Gauge 2 (in.)	Average Deflection (in.)	Incremental Deflection (in.)	Strain (in./in.)
0	0	0	0.00000	0.00000	0.00000	0.00000	0.00000
10	5993	1347	0.00136	0.00130	0.00133	0.00133	0.00067
20	11986	2694	0.00278	0.00268	0.00273	0.00140	0.00137
30	17979	4041	0.00429	0.00416	0.00423	0.00150	0.00211
40	23972	5388	0.00588	0.00570	0.00579	0.00157	0.00290
50	29965	6736	0.00755	0.00730	0.00743	0.00164	0.00371
60	35958	8083	0.00929	0.00901	0.00915	0.00173	0.00458
70	41951	9430	0.01113	0.01079	0.01096	0.00181	0.00548
80	47944	10777	0.01313	0.01268	0.01291	0.00195	0.00645
90	53937	12124	0.01542	0.01466	0.01504	0.00214	0.00752
100	59930	13471	0.01995	0.01678	0.01837	0.00333	0.00918

Chart



Modulus of Elasticity (psi): 1,700,000

Comments

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Compressive Strength and Elastic Modulus of Rock Cores

Report No: 1
Printed date: 11/8/2017 **Issue No:**

Customer:	AECOM 999 Town and Country Road, Orange, CA 92868	**Project No:**	170907.1
Project:	Vail Dam Rock Core Testing	**Permit No:** **OSHPD:** **DSA File #:** **DSA AP #:**	
Jurisdiction: **Distribution List:**		**Approved by:** Adrian Moreno Project Manager	

Sample Details

Date Sampled:	N/I	**Core Material:**	Gneiss
Sampled By:	Client	**Diameter (in.)**	2.39
Sample Source	Vail Dam Rock Cores	**Height (in.)**	5.64
Sample Location:	B-107 at 43.5 ft.	**Area (sq. in.)**	4.49

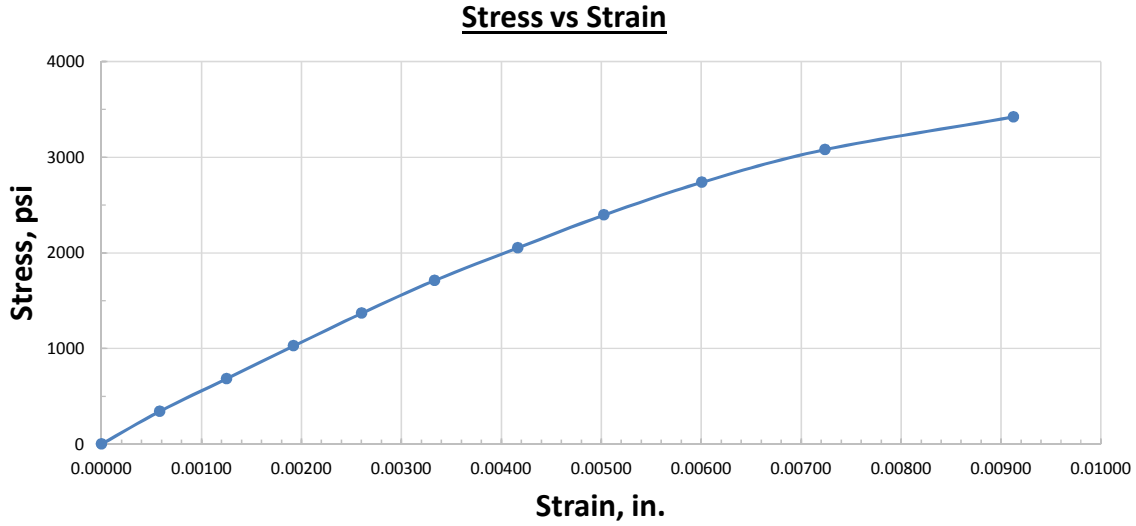
Test Results

Date Tested:	10/14/2017	**Gauge Length (in.):**	2.00
Tested By:	S. Chang	**Ultimate Load (lbs.):**	15350
Test Method:	ASTM D 7012	**Unconfined Compressive Strength (psi.)**	**3400**

Test Data

Percent Load (%)	Load (lbs.)	Stress (psi.)	Strain Gauge 1 (in.)	Strain Gauge 2 (in.)	Average Deflection (in.)	Incremental Deflection (in.)	Strain (in./in.)
0	0	0	0.00000	0.00000	0.00000	0.00000	0.00000
10	1535	342	0.00203	0.00030	0.00117	0.00117	0.00058
20	3070	684	0.00429	0.00072	0.00251	0.00134	0.00125
30	4605	1026	0.00647	0.00122	0.00385	0.00134	0.00192
40	6140	1369	0.00857	0.00185	0.00521	0.00137	0.00261
50	7675	1711	0.01073	0.00260	0.00667	0.00146	0.00333
60	9210	2053	0.01312	0.00355	0.00834	0.00167	0.00417
70	10745	2395	0.01551	0.00460	0.01006	0.00172	0.00503
80	12280	2737	0.01814	0.00589	0.01202	0.00196	0.00601
90	13815	3079	0.02130	0.00766	0.01448	0.00247	0.00724
100	15350	3422	0.02567	0.01084	0.01826	0.00378	0.00913

Chart



Modulus of Elasticity (psi): 500,000

Comments

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Compressive Strength and Elastic Modulus of Rock Cores

Report No: 1
Printed date: 11/8/2017 **Issue No:**

Customer:	AECOM 999 Town and Country Road, Orange, CA 92868	**Project No:**	170907.1
Project:	Vail Dam Rock Core Testing	**Permit No:** **OSHPD:** **DSA File #:** **DSA AP #:**	
Jurisdiction: **Distribution List:**		**Approved by:** Adrian Moreno Project Manager	

Sample Details

Date Sampled:	N/I	**Core Material:**	Gneiss
Sampled By:	Client	**Diameter (in.)**	2.38
Sample Source	Vail Dam Rock Cores	**Height (in.)**	6.05
Sample Location:	B-107 at 79 ft.	**Area (sq. in.)**	4.45

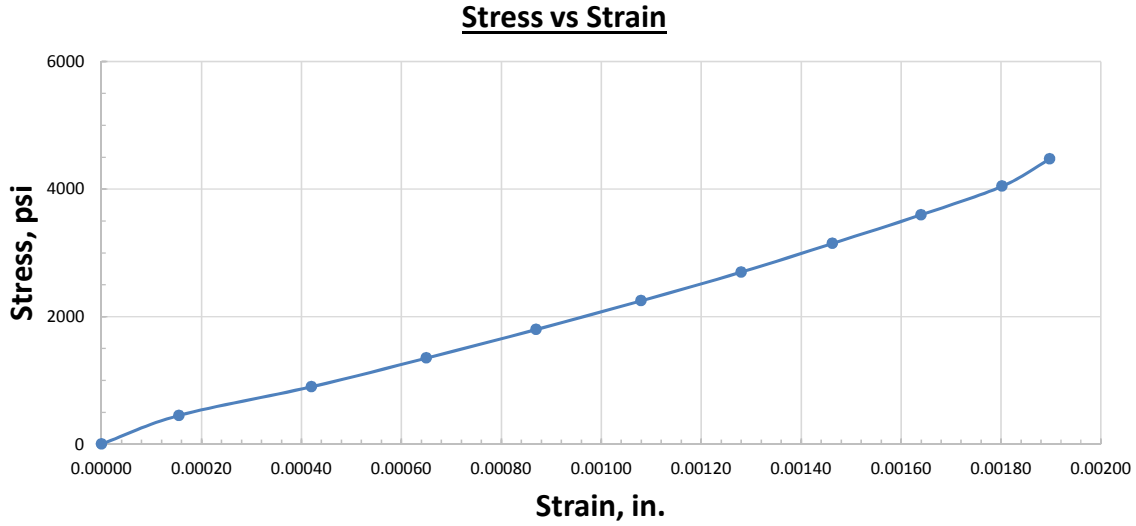
Test Results

Date Tested:	10/14/2017	**Gauge Length (in.):**	2.00
Tested By:	S. Chang	**Ultimate Load (lbs.):**	19924
Test Method:	ASTM D 7012	**Unconfined Compressive Strength (psi.)**	**4500**

Test Data

Percent Load (%)	Load (lbs.)	Stress (psi.)	Strain Gauge 1 (in.)	Strain Gauge 2 (in.)	Average Deflection (in.)	Incremental Deflection (in.)	Strain (in./in.)
0	0	0	0.00000	0.00000	0.00000	0.00000	0.00000
10	2000	450	0.00047	0.00015	0.00031	0.00031	0.00016
20	4000	899	0.00118	0.00050	0.00084	0.00053	0.00042
30	6000	1349	0.00170	0.00090	0.00130	0.00046	0.00065
40	8000	1798	0.00217	0.00131	0.00174	0.00044	0.00087
50	10000	2248	0.00263	0.00169	0.00216	0.00042	0.00108
60	12000	2697	0.00308	0.00204	0.00256	0.00040	0.00128
70	14000	3147	0.00352	0.00233	0.00293	0.00037	0.00146
80	16000	3596	0.00396	0.00260	0.00328	0.00036	0.00164
90	18000	4046	0.00437	0.00284	0.00361	0.00033	0.00180
100	19900	4473	0.00468	0.00291	0.00380	0.00019	0.00190

Chart



Modulus of Elasticity (psi): 2,200,000

Comments

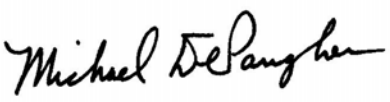
Petrographic Report #A3D

September 27, 2017

for

Christopher Goetz
AECOM
999 Town and Country Road
Orange, CA 92868

by



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Spectrum Petrographics, Inc.

Key to Petrographic and Photomicrographic Descriptions - v. 170118

Clay minerals common in altered rocks must often be identified by X-ray diffraction either because their optic properties are not diagnostic or because they are too fine grained to be reliably identified by optical methods. The term "clay" is used herein to denote fine grained phyllosilicates in general. Under ideal conditions, it is often possible to optically discriminate between 4 major groups: kaolinite, smectite, mica (including illite), and chlorite. This is done whenever conditions permit.

The term "sericite" is applied to fine grained colorless phyllosilicates that show upper 2nd order maximum interference colors. These could include muscovite, illite, paragonite, lepidolite, margarite, clintonite, pyrophyllite, and talc. The term "intermediate clay" is applied to fine grained very pale or colorless phyllosilicates that show upper 1st order maximum interference colors. These are probably dominated by chlorite, smectite, and mixed-layer illite/smectite.

The term "opaques" is used to refer to all materials opaque (and sometimes semi-opaque) to transmitted light. The term "FEOH" is herein used to indicate fine grained, yellowish to reddish brown, earthy materials of varying opacity in transmitted light. FEOH is probably mostly Fe oxy-hydroxides but may sometimes include sphalerite, realgar, orpiment, jarosite, a number of Mn oxy-hydroxides, and organic matter.

A question mark after a rock or mineral name in a petrographic description means that there is uncertainty about the identification of that rock or mineral.

Particle size distributions are given as (A-B µm), where A and B are the median and largest particle sizes, respectively, in microns. A question mark (?) in the position of A or B indicates that the value of A or B was indeterminate, probably because of excessively large or small particle size or statistically insignificant numbers of particles.

Mineral abundances are visual estimates for an entire slide. For multi-lithologic materials (cuttings, etc...), mineralogy, textures, and alteration are described only for the dominant lithology.

Section preparation codes are as follows: (1) Format: 27 x 46 mm; 51 x 76 mm; or 1" round; (2) Finish: standard lapping (STD); or polished (POL); (3) Stains: sodium cobaltinitrite (SCN); alizarin red S + potassium ferricyanide (ARSPF); and barium chloride + potassium rhodizonate (BCPR); and (4) Cover: none; or permanent Loctite acrylic (PLA).

Photomicrograph captions contain the following items of information in consecutive order separated by forward slashes: (1) sample identifier; (2) JPG image file name composed of concatenated [job identification code + sequence number]; (3) illumination type; and (4) field of view (FOV). For illumination types: "PPL" indicates plane-polarized light; "XPL indicates cross-polarized light; "R" indicates reflected light. "550" means that a 550 nanometer wavelength plate was inserted in the light path. "C" indicates that the substage condenser was in (sometimes used for Fe-oxides). "O" indicates oblique incident illumination. These various illuminations can be combined. "CON" indicates conoscopic illumination. POL means that a polarizing filter was used with the lens, and DAY means the sample was photographed in diffused daylight. Unless otherwise noted, sequential images are taken in XPL and PPL of a single field of view.

Features on photomicrographs are indicated by the number of the feature in the ALTERATION section of the text or by a mineral name abbreviation, e.g., **Q**uartz, **P**lagioclase, **K**-feldspar, **ser**icite, **b**io**t**ite, **fe**rroan **c**al**c**ite, **act**inolite.

Igneous rock classifications are according to IUGS (1973; 1979); sandstones are classified according to McBride (1963); mudrocks are classified according to Picard (1971); carbonates are classified according to Folk (1959); and metamorphic rocks classified according to IUGS (Fettes and Desmons, 2011).

The term “protolith” is used for the interpreted primary lithology. The term “precursor” is used for a secondary lithology from which the current rock was derived.

SAMPLE # **B-201-67** September 27, 2017

ROCK NAME ALTERED PLAGIOCLASE-MICA-QUARTZ GRANOFELS -- probably formed by alteration (secondary muscovite + opaques) of a plagioclase-quartz-biotite precursor derived by regional dynamothermal metamorphism from a clayey arkose protolith.

MINERALS Quartz (42%) + biotite (20%) + plagioclase (20%) + muscovite (10%) + opaques (7%) + tourmaline (1%).

TEXTURES Ductile deformation during regional dynamothermal metamorphism has produced a granoblastic texture with a non-directed fabric.

Porphyroblasts (0%) were not observed.

Porphyroclasts (0%) were not observed.

Matrix (100%) is dominated by quartz + [biotite moderately altered to muscovite] + [plagioclase weakly altered to muscovite] + opaques.

Cement (0%) was not observed.

ALTERATION Alteration features of indeterminate relative ages: (1) regional dynamothermal metamorphism; and (2) veinlets of opaques.

SECTIONING Format: 27 x 46 mm Finish: STD Stains: SCN (top 2/3) + ARSPF (none) Cover: PLA

IMAGES B-201-67. A3D_001.jpg/XPL/FOV = 27 x 46 mm ALTERED PLAGIOCLASE-MICA-QUARTZ GRANOFELS showing typical appearance.

B-201-67 A3D_002.jpg/PPL/FOV = 27 x 46 mm Same.

B-201-67 A3D_005.jpg/XPL/FOV = 4.00 x 5.83 mm ALTERED PLAGIOCLASE-MICA-QUARTZ GRANOFELS showing typical appearance.

B-201-67 A3D_006.jpg/PPL/FOV = 4.00 x 5.83 mm Same.

SAMPLE # **B-202-43** September 27, 2017

ROCK NAME TONALITE -- probably formed by alteration (secondary chlorite + leucoxene + K-feldspar) of a fine to medium tonalite intrusive protolith.

MINERALS Plagioclase (65%) + quartz (20%) + biotite (10%) + actinolite (3%) + chlorite (1%) + leucoxene (<1%) + apatite (<1%) + zircon (<1%) + tourmaline (<1%) + K-feldspar (<1%).

TEXTURES Intrusive, fine to medium grained, igneous protolith.

Phenocrysts (0%) were not observed.

Xenoliths/Xenocrysts (0%) were not observed.

Groundmass (100%) is dominated by plagioclase + quartz + [biotite weakly altered to chlorite + leucoxene ± K-feldspar].

Vesicles (0%) were not observed.

ALTERATION No other alteration features were observed.

SECTIONING Format: 27 x 46 mm Finish: STD Stains: SCN (top 2/3) + ARSPF (none) Cover: PLA

IMAGES B-202-43. A3D_003.jpg/XPL/FOV = 27 x 46 mm TONALITE showing typical appearance.

B-202-43 A3D_004.jpg/PPL/FOV = 27 x 46 mm mm Same.

B-202-43 A3D_007.jpg/XPL/FOV = 4.00 x 5.83 mm TONALITE showing typical appearance.

B-202-43 A3D_008.jpg/PPL/FOV = 4.00 x 5.83 mm Same

Appendix I

Field Photographs

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Gneiss (KJm1) Exposure along west side of Borrow Area adjacent to Boring B-201



Gneiss (KJm1) Exposure along west side of Borrow Area

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FIELD INVESTIGATION PHOTOGRAPHS

DRAWN BY: C. Goetz	DATE: 10/11/2017	FIGURE NO: I-1
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Gneiss (KJm1) Exposure along west side of Borrow Area



Gneiss (KJm1) Exposure along west side of Borrow Area

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FIELD INVESTIGATION PHOTOGRAPHS

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Migmatitic Gneiss (KJm2) Exposure in Borrow Area



Migmatitic Gneiss (KJM2) Exposure in Borrow Area

Rancho California Water District	AECOM	FIELD INVESTIGATION PHOTOGRAPHS	
		DRAWN BY: C.Goetz DATE: 10/11/2017	FIGURE NO: I-3
		CHECKED BY: D. Schug DATE: 10/20/2017	



Migmatitic Gneiss (KJm2) Exposure in Borrow Area



Migmatitic Gneiss (KJm2)Exposure in Borrow Area

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FIELD INVESTIGATION PHOTOGRAPHS

DRAWN BY: C.Goetz	DATE: 10/11/2017	FIGURE NO: I-4
CHECKED BY: D. Schug	DATE: 10/20/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix I- Field Photographs\Figure I-4 Migmatitic Gneiss.xlsx\Migmatic Gneiss



Highly weathered Tonalite (Kt) exposure adjacent to Boring B-202



Slightly to moderately weathered Tonalite (Kt) exposure on West slope of Borrow Area

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FIELD INVESTIGATION PHOTOGRAPHS

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Foliation jointing parallel to rock hammer handle and cross cutting non-foliation jointing



Prominent non-foliation jointing at northeast edge of Borrow Area

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FIELD INVESTIGATION PHOTOGRAPHS

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Left abutment of existing and proposed replacement dam



Left abutment of proposed replacement dam showing bottom of Temecula Creek in the foreground

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FIELD INVESTIGATION PHOTOGRAPHS

DRAWN BY: C.Goetz	DATE: 10/11/2017	FIGURE NO: I-7
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Right abutment of existing and proposed replacement dam



Right abutment of proposed replacement dam showing area where discontinuity data were collected

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FIELD INVESTIGATION PHOTOGRAPHS

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Ogee weir spillway looking from left abutment towards the flat-crested weir spillway



Ogee weir spillway looking downslope parallel to the training wall

Rancho California Water District	AECOM	FIELD INVESTIGATION PHOTOGRAPHS	
		DRAWN BY: C.Goetz DATE: 10/11/2017	FIGURE NO: I-9
		CHECKED BY: D. Schug DATE: 10/20/2017	



View of the overpour weir showing outcrops at each abutment



View from the overpour weir spillway showing the flat-crested spillay and Vail Dam

Rancho California Water District	AECOM	FIELD INVESTIGATION PHOTOGRAPHS		
		DRAWN BY: C.Goetz	DATE: 10/11/2017	FIGURE NO: I-10
		CHECKED BY: D. Schug	DATE: 10/20/2017	



Mapping outcrops downstream from the ogee weir spillway



Bedding parallel shear exposed down stream from the overpour spillway

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		DRAWN BY: C.Goetz	DATE: 10/11/2017	FIGURE NO: I-11
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Foliation parallel shear. Note concrete cover on upper surface.

Rancho California Water District	AECOM	FIELD INVESTIGATION PHOTOGRAPHS	
		DRAWN BY: C.Goetz DATE: 10/11/2017	FIGURE NO: I-12
		CHECKED BY: D. Schug DATE: 10/20/2017	



Test Pit TP-1 Looking Southwest



Test Pit TP-1 Looking Southeast

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FIELD INVESTIGATION PHOTOGRAPHS

Vail Dam Geotechnical Investigation, Temecula, California

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Test Pit TP-2 Looking Northwest

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		DRAWN BY: M. Skakun	DATE: 10/13/2021	FIGURE NO: I-14
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Test Pit TP-2, Fill/Bedrock Contact on South Wall

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FIELD INVESTIGATION PHOTOGRAPHS

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: M. Skakun	DATE: 10/13/2021	FIGURE NO: I-15
CHECKED BY: C. Goetz	DATE: 10/15/2021	

File: \\na.aecomnet.com\lfs\AMER\Orange-USORA1\DCS\Projects\WTR\60580537_VAIL_DSGN\500_Deliverables\503_GDR and GBDR\2021 Updated GDR\Appendix I- Field Photographs\2021 Photo Figures\Figure I-13 to I-20 Test Pit photo figures.xlsx\I-15



Test Pit TP-2 Moderately Weathered Gneiss Bedrock

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FIELD INVESTIGATION PHOTOGRAPHS

Vail Dam Geotechnical Investigation, Temecula, California

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CHECKED BY: C. Goetz	DATE: 10/15/2021	



Gneiss Exposed in Floor of Test Pit TP-2. Gray Rock is Moderately Weathered and White/Tan Rock is Highly Weathered.

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		DRAWN BY: M. Skakun	DATE: 10/13/2021	FIGURE NO: I-17
		CHECKED BY: C. Goetz	DATE: 10/15/2021	



View South of Test Pit TP-3

Rancho California Water District	AECOM	**FIELD INVESTIGATION PHOTOGRAPHS** Vail Dam Geotechnical Investigation, Temecula, California		
		DRAWN BY: M. Skakun	DATE: 10/13/2021	FIGURE NO: I-18
		CHECKED BY: C. Goetz	DATE: 10/15/2021	



Test Pit TP-3, East wall, South half



Test Pit TP-3, East wall, North half

Rancho California Water District	AECOM	**FIELD INVESTIGATION PHOTOGRAPHS** Vail Dam Geotechnical Investigation, Temecula, California		
		DRAWN BY: M. Skakun	DATE: 10/13/2021	FIGURE NO: I-19
		CHECKED BY: C. Goetz	DATE: 10/15/2021	



Moderately Weathered Gneiss Exposed in Floor of Test Pit TP-3

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		DRAWN BY: M. Skakun	DATE: 10/13/2021	FIGURE NO: I-20
		CHECKED BY: C. Goetz	DATE: 10/15/2021	

Appendix J

Discontinuity Data

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Appendix J
Discontinuity Data

Rock discontinuity mapping was performed within the bedrock areas of the project site. The discontinuity data were collected in six locations where bedrock outcrops were present: the borrow area, the right and left abutments of the proposed dam, and downstream from each of the three spillways.

Rock discontinuity orientations were collected using a Brunton™ compass. The data collected included the strike and dip (in azimuth dip direction), and the type of discontinuity (either a joint or foliation parallel joint). The majority of the discontinuities encountered were foliation parallel joints, with a lesser number of joints that were not parallel to the foliation.

The discontinuity data were compiled into separate tables for each of the six areas of outcrop mapping (See Figures J-1 through J-6). On these tables a designation of “J” for the type indicates that the discontinuity is a joint that is not parallel to foliation and designation of “F” indicates that it is a foliation parallel joint. The data provided in this appendix were utilized to produce the stereonet plots that are presented in the main body of this report (see Figures 12, 17, 18, 22, 23, and 24).

DRAFT

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DRAFT

Type	Dip	Dip Direction		Type	Dip	Dip Direction
F	75	55		F	75	55
F	80	63		F	70	60
F	75	240		J	73	240
F	83	64		J	30	10
F	80	84		J	70	165
F	79	78		J	38	120
F	76	68		J	27	50
F	90	61		J	37	44
F	90	64		J	82	132
F	69	230		J	44	32
F	84	18		J	39	155
F	85	340		J	35	45
F	85	20		J	76	8
F	74	36		J	40	145
F	65	265		J	32	20
F	85	70		J	46	146
F	85	55		J	59	86
F	76	70		J	75	112
F	55	240		J	41	25
F	61	240		J	60	110
F	58	234		J	27	34
F	85	70		J	74	170

Rancho California Water District

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BORROW AREA ERODIBILITY ANALYSIS DATA

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: E. Marquez	DATE: 10/18/2017	FIGURE NO: J-1
CHECKED BY: L. Handfelt	DATE: 10/18/2017	

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Type	Dip	Dip Direction	Type	Dip	Dip Direction
F	86	260	J	70	345
J	59	156	J	43	192
F	84	86	F	79	235
F	89	252	J	10	235
J	29	211	F	88	73
F	78	250	J	21	357
J	78	153	F	89	80
F	80	87	J	12	311
F	90	250	F	88	246
J	38	176	J	60	149
F	82	253	F	74	95
J	39	93	F	80	237
F	89	276	J	87	150
F	80	250	F	89	72
J	61	151	J	76	171
J	39	231	F	80	63
J	40	145	J	62	175
F	81	258	F	89	264
F	89	90	J	81	181
J	27	212	F	78	69
F	89	60	J	28	9
J	89	3	F	80	251
F	79	65	F	82	7
F	72	248	F	80	245
J	32	54	J	41	32
F	89	264	F	90	254
J	42	40	J	87	0
F	83	254	F	80	69
F	67	230	J	37	128
J	20	99	J	70	326
F	71	260	F	89	241
J	57	9	J	77	144
F	89	76	F	89	256
F	80	63	J	49	353
J	67	337	F	88	238
J	21	175	J	60	336
F	81	247	F	90	261
F	70	235	J	60	4
F	88	70	F	90	262
J	80	355	J	79	176
F	89	175	F	65	80
J	88	8	J	35	5
J	29	1	F	83	74
F	71	45	F	69	95
F	90	65	J	64	330

Rancho California Water District

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RIGHT ABUTMENT ERODIBILITY ANALYSIS DATA

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: E. Marquez	DATE: 10/18/2017	FIGURE NO: J-2
CHECKED BY: L. Handfelt	DATE: 10/18/2017	

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Type	Dip	Dip Direction	Type	Dip	Dip Direction	Type	Dip	Dip Direction
J	69	212	F	80	263	J	28	226
J	40	146	J	41	159	F	83	84
J	83	175	J	43	280	J	52	44
F	82	276	F	90	84	F	87	82
J	75	356	J	90	356	J	80	38
J	90	279	J	89	335	J	68	180
J	90	3	J	70	49	F	78	262
J	83	293	J	40	157	J	86	174
F	81	297	F	87	250	J	48	7
F	78	81	J	51	190	J	88	45
J	52	247	J	68	227	J	79	163
J	75	250	J	30	176	J	66	337
F	89	97	J	38	80	F	77	77
J	89	5	F	78	91	J	82	157
F	82	82	J	89	197	J	45	0
F	67	90	F	80	86	J	90	3
F	80	86	F	84	96	F	62	81
J	82	238	J	70	326	F	84	78
J	40	232	J	69	189	F	88	246
J	26	35	F	87	277	J	68	357
J	70	79	F	68	88	F	88	279
J	30	212	F	61	83	J	65	356
J	70	260	J	80	335	F	78	78
J	81	7	J	87	83	J	76	352
J	82	55	F	76	157	F	68	70
J	73	160	F	78	66	F	57	80
F	89	254	F	90	295	F	76	80
F	83	266	J	72	260	F	77	310
F	89	250	F	84	93	J	22	150
F	71	250	J	84	118	F	85	290
J	90	355	J	74	243	F	72	263
J	43	149	F	90	88	F	70	205

Rancho California Water District

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LEFT ABUTMENT ERODIBILITY ANALYSIS DATA

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: E. Marquez	DATE: 10/18/2017	FIGURE NO: J-3
CHECKED BY: L. Handfelt	DATE: 10/18/2017	

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Type	Dip	Dip Direction		Type	Dip	Dip Direction
F	86	260		F	89	270
F	87	111		F	70	94
F	84	270		F	70	96
F	75	165		F	56	90
F	74	155		F	88	265
F	27	353		F	88	260
F	71	162		F	80	80
F	78	110		F	90	81
F	88	90		F	81	90
F	90	90		F	87	100
F	77	341		F	82	262
F	88	300		F	82	266
F	87	90		F	88	275
F	85	84		F	88	240
F	72	260		F	90	94
F	77	263		F	88	80
F	87	110		F	89	260
F	81	82		F	65	85
F	89	290		F	58	97
F	72	260		F	76	195
F	77	263		F	62	4
F	87	110		J	79	190
F	81	82		J	80	43
F	46	336		J	68	219
F	71	71		J	80	43
F	80	90		J	68	219
F	77	88		J	88	205
F	80	76		J	73	205
F	70	83		J	32	220
F	69	101		J	86	172
F	70	264		J	85	6
F	89	275		J	80	230
F	87	95		J	87	85
F	60	62		J	59	334
F	88	73		J	69	346
F	90	250		J	70	200
F	87	304		J	78	220
F	89	84		J	70	230
F	72	87		J	50	191
F	80	90		J	82	240

Rancho California Water District

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OGEE WEIR SPILLWAY ERODIBILITY ANALYSIS DATA

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: E. Marquez	DATE: 10/18/2017	FIGURE NO: J-4
CHECKED BY: L. Handfelt	DATE: 10/18/2017	

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Type	Dip	Dip Direction		Type	Dip	Dip Direction
F	57	95		F	90	81
F	89	91		F	86	275
F	79	86		F	80	260
F	80	270		F	88	105
F	79	82		F	78	285
F	71	96		F	87	270
F	39	20		F	80	299
F	70	175		F	70	110
F	70	35		F	56	55
F	88	20		J	42	52
F	34	322		J	48	61
F	84	265		J	50	10
F	87	290		J	70	182
F	79	210		J	68	300
F	74	300		J	71	282
F	88	275		J	80	253
F	54	95		J	79	283
F	79	280		J	70	270
F	90	268		J	50	40
F	88	80		J	49	189
F	89	274		J	83	165
F	76	96		J	89	4
F	80	98		J	89	7
F	89	85		J	47	200
F	59	85		J	82	240
F	80	255		J	81	236
F	88	275		J	80	182
F	82	266		J	50	191
F	90	94		J	62	338
F	80	82		J	79	212
F	89	268		J	39	7
F	79	92		J	60	168
F	82	262		J	79	240
F	89	83		J	60	41
F	85	85				

Rancho California Water District

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FLAT-CRESTED WEIR SPILLWAY ERODIBILITY ANALYSIS DATA

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: E. Marquez	DATE: 10/18/2017	FIGURE NO: J-5
CHECKED BY: L. Handfelt	DATE: 10/18/2017	

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Type	Dip	Dip Direction		Type	Dip	Dip Direction
F	88	172		F	89	275
F	64	96		F	80	274
F	59	340		F	84	280
F	22	242		F	90	252
F	52	87		F	88	80
F	79	280		F	80	260
F	76	20		F	80	100
F	84	110		F	89	277
F	89	285		F	82	265
F	50	278		F	89	253
F	70	270		J	79	175
F	70	270		J	388	166
F	90	120		J	19	85
F	80	75		J	45	186
F	90	97		J	67	70
F	88	270		J	28	70
F	72	262		J	54	20
F	90	270		J	50	5
F	52	3		J	54	33
F	58	298		J	90	4
F	76	262		J	77	12
F	69	135		J	49	320
F	46	268		J	68	194
F	83	257		J	70	175
F	87	263		J	57	44
F	90	110		J	89	190
F	81	283		J	70	170
F	90	269		J	83	38
F	80	280		J	82	205
F	84	95		J	36	320
F	80	310		J	22	324
F	88	280		J	22	56
F	86	105		J	50	30
F	62	260		J	72	339
F	75	272		J	71	25
F	85	101		J	38	45
F	86	290		J	39	30
F	90	255		J	44	30
F	89	276		J	90	165
F	88	290		J	82	215
F	89	95		J	62	55
F	80	292		J	65	44
F	84	281		J	81	36

Rancho California Water District

AECOM

OVERPOUR WEIR SPILLWAY ERODIBILITY ANALYSIS DATA

Vail Dam Geotechnical Investigation, Temecula, California

DRAWN BY: E. Marquez	DATE: 10/18/2017	FIGURE NO: J-6
CHECKED BY: L. Handfelt	DATE: 10/18/2017	

File: Q:\DCS\Projects\WTR\60539527_VailDamGeo\500-Deliverables\GDR\Appendix J - Discontinuity Data for Spillway Analysis\Appendix J - Discontinuity Data for Analysis.xlsx\Overpour

Appendix K

Topographic Mapping

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CD OF TOPOGRAPHIC DATA

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APPENDIX F

HAZARDOUS MATERIALS REPORT

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Phase I Environmental Site Assessment Vail Dam Seismic and Hydrologic Remediation Project 37115 De Portola Road Temecula, California

LSA Associates, Inc. and
Rancho California Water District

Project Number: Project Number 60623135

November 2022

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Revision History

Revision	Revision Date	Details	Authorized	Name	Position
01	9/7/22	LSA Review	Project Manager	Jimmy Medellin	Project Manager
02	11/28/22	Final Report	Project Manager	Jimmy Medellin	Project Manager

Distribution List

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Acronyms and Abbreviations

#	number
ACM	Asbestos-containing materials
AECOM	AECOM Technical Services, Inc.
amsl	above mean sea level
APN	Assessor's Parcel Number
AST	aboveground storage tank
ASTM	ASTM International (formerly known as American Society of Testing and Materials)
ASTM E1527-13	ASTM Designation E1527-13, *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process*
ASTM E2600-15	ASTM Designation E2600-15, *Standard Guide for Vapor Encroachment Screening on Property Involved in Real Estate Transactions* dated October 2015
AUL	Activity and Use Limitation
bgs	below ground surface
CalEPA	California Environmental Protection Agency
CalGEM	California Department of Conservation, Geologic Energy Management Division
CAM	California Administrative Manual
CEQA	California Environmental Quality Act
CERCLIS	Comprehensive Environmental, Compensation and Liability Information System
CERS	California Environmental Reporting System
CIWQS	California Integrated Water Quality System
CPS	Cleanup Program Sites
CREC	controlled recognized environmental condition
CUPA	Certified Unified Program Agency
CVOC	chlorinated volatile organic compound
DEH	County of Riverside Department of Environmental Health
DMC	de minimis condition
DOGGR	California Department of Conservation, Division of Oil, Gas, and Geothermal Resources
DTSC	Department of Toxic Substances Control
EDR	Environmental Data Resources, Inc.
EIR	Environmental Impact Report
EP	Environmental Professional
EPA	Environmental Protection Agency
ESA	Environmental Site Assessment
FINDS	Facility Index System
GBDR	geotechnical basis of design report
HMMD	County of Riverside DEH, Hazardous Materials and Management Division
HREC	historical recognized environmental condition
ID	identification
LBP	Lead-based paint
LLP	landowner liability protections
LSA	LSA Associates, Inc.
No.	number
NOA	Naturally occurring asbestos
NPL	National Priorities List
NPMS	National Pipeline Mapping System
OCPs	organochlorine pesticides
OEHHA	Office of Environmental Health Hazard Assessment
PCB	polychlorinated biphenyl
PHMSA	Pipeline and Hazardous Materials Safety Administration
RC	remote control

RCWD	Rancho California Water District
REC	recognized environmental condition
RWQCB	Regional Water Quality Control Board
SCE	Southern California Edison
SEMS	Superfund Enterprise Management System
SVOC	semi-volatile organic compound
SWRCB	State Water Resources Control Board
TPH	total petroleum hydrocarbons
TVF	Temecula Valley Flyers
USGS	United States Geological Survey
UST	underground storage tank
VDC	Valle De Los Caballos
VEC	vapor encroachment condition
VES	vapor encroachment screening
VOC	volatile organic compound

Executive Summary

LSA Associates, Inc. (LSA), in cooperation with the property owner (Rancho California Water District [RCWD]), contracted with AECOM Technical Services, Inc. (AECOM) to perform a Phase I Environmental Site Assessment (ESA) of the Vail Dam Seismic and Hydrologic Project property and associated access roads, the access for which is located at 37115 De Portola Road, near the intersection of De Portola Road and Oak Mountain Road, located to the east of the City of Temecula in the southwestern area of unincorporated Riverside County, California (the proposed project area). AECOM previously conducted a Phase I ESA of this property in September 2020, and this report serves as an update to that initial Phase I ESA and incorporates project changes and new proposed project area boundaries. The purpose of this Phase I ESA is to provide the client and owner with information for use in evaluating recognized environmental conditions (RECs) associated with the proposed project area, which will be incorporated into a California Environmental Quality Act (CEQA) Environmental Impact Report (EIR) document being prepared for the proposed project area by LSA. This Phase I ESA was performed in general conformance with the scope and limitations of ASTM International (formerly known as American Society of Testing and Materials) (ASTM) Standard Practice Designation E1527-13 for ESAs. Exceptions to, or deletions from, this practice are described in this report.

This Phase I ESA was performed on the proposed project area property in conformance with the scope and limitations of ASTM Practice E 1527-13, which meets the requirements of 40 CFR Part 312 and is intended to constitute all appropriate inquiry for purposes of the landowner liability protections (LLPs). No physical environmental sampling was performed. Any exceptions to, or deletions from, this practice are described in Section 1.4 and 1.5 of this report. Additional services included in this ESA are described in Section 1.2 of this report.

Per the ASTM standard, potential findings can include RECs, historical RECs (HRECs), controlled RECs (CRECs), and de minimis conditions (DMCs). A REC is defined by the ASTM standard as “the presence or likely presence of any hazardous substances or petroleum products in, on, or at a property: (1) due to any release to the environment; (2) under conditions indicative of a release to the environment; or (3) under conditions that pose a material threat of a future release to the environment.” The term includes hazardous substances or petroleum products even under conditions in compliance with laws. HRECs are generally conditions that in the past have been remediated to the satisfaction of the responsible regulatory agency. CRECs are generally conditions that in the past have been remediated to the satisfaction of the responsible regulatory agency, with hazardous substances or petroleum products allowed to remain in place subject to the implementation of required controls. DMCs are those situations that do not present a material risk of harm to public health or the environment and generally would not be subject to enforcement action if brought to the attention of the regulating authority.

The site visit occurred on July 27, 2022. The approximately 83.4-acre proposed project area consists of:

- portions of an approximate 50-acre former horse ranch property at the western end,
- the portion of the RCWD-owned property that is currently leased to the Temecula Valley Flyers (TVF) and used as a remote-control (RC) airfield,
- an approximate existing 1-mile, unimproved one-lane road known as Pond Access Road, to the south of Oak Mountain Road, located along the north side of the Upper Valle de Los Caballos Recharge Basins, which connects to Canyon Access Road and North Access Road to the east,
- an approximate existing 950-foot, unimproved one-lane road known as the Secondary Entry Road, which connects De Portola Road to Pond Access Road, located north of the former horse ranch property,
- a second proposed entrance from De Portola Road at the western end of the project known as the Primary Entry Road (50 Acre Parcel), which traverses the former horse ranch property, located south of the Secondary Entry Road, and connects to Pond Access Road,

- two existing approximate 2-mile, unimproved, single-lane roads (known as North Access Road and Canyon Access Road), both of which are accessed via Pond Access Road, and
- the current Vail Dam and associated features at the eastern end of the proposed project area.

Permanent structures/improvements within the proposed project area include the Vail Dam and associated ancillary downstream structures at the eastern end, a paved landing strip utilized by the TVF as an RC airfield, an overhead shade canopy adjacent to (north of) the landing strip, an irrigation well in and three former farm-related structures on the former horse ranch property at the western end of the proposed project area. Only two of these structures are considered on-site in the context of this report. A Conex storage container and portable toilet were observed adjacent to the northeast of the paved landing strip on the TVF property. The Conex container is used to store model airplanes and spare parts, and small amounts (less than 5-gallons) of model airplane fuels and oils. The use and storage of small amounts (5-gallons or less) of petroleum products and/or hazardous materials does not present a REC in connection with the proposed project area, and is considered a DMC, in AECOM's opinion.

Permanent buildings on the former horse ranch property include a former haybarn, stables, and an indoor riding arena. The only buildings on the former horse ranch property that are within the proposed project area boundary are the former haybarn and stable building; the former indoor riding arena is considered off-site within the context of this report. With the exception of two of the former horse ranch structures, a reported irrigation well in the open field on the western end of the former horse ranch property, the paved landing strip and adjacent overhead shade canopy, the existing dam and associated ancillary structures, and various unpaved roadways, there are no other permanent buildings or improvements on the other portions of the proposed project area.

As part of the proposed project, the RCWD proposes to remediate seismic and hydrologic hazards associated with the existing Vail Dam by constructing a new straight-axis gravity concrete dam immediately downstream of the existing dam. The North Access Road and Canyon Access Roads will require grading and widening in some areas to allow for construction equipment access and installation of turnout areas. Portions of the former horse ranch and the property leased to the TVF for use as an RC airfield may also be utilized as construction staging and laydown areas and/or a concrete batch plant during construction of the proposed project; however, plans for these areas during construction have not been confirmed. There are also construction equipment staging and laydown areas proposed downstream (west) of the dam and along portions of Canyon Access Road.

During the site visit, no visual evidence of aboveground storage tanks (ASTs), underground storage tanks (USTs), (e.g., vent pipes, fill ports), monitoring wells, dry wells, oil/gas wells, or clarifiers were identified within the proposed project area. An approximate 36-inch vertical concrete pipe reportedly associated with an irrigation well was observed in the open field to the north of the former horse ranch property structures, approximately 100 feet west of the unpaved access road to 37115 De Portola Road and within a proposed construction staging and laydown area. According to the RCWD, this well is associated with a regional irrigation system present throughout this area of Temecula. No other information was available pertaining to this well in records reviewed or persons interviewed. A RCWD Valle De Los Caballos (VDC) well was observed within a fenced enclosure approximately 70 feet south, southwest of the former indoor riding arena building. No construction activities are planned in this area and this well is considered off-site within the context of this report. A concrete berm enclosure, which was reportedly historically used to store 55-gallon drums of diesel fuel used for farm equipment, is present on the former horse ranch property to the north and west of the Primary Entry Road (50 Acre Parcel). No drums or other equipment was observed during the July 2022 site reconnaissance, and no staining was observed within or adjacent to the concrete secondary containment enclosure. A 2015 Phase I ESA indicated that the former horse ranch property utilized a septic tank; however, no other information on the location of the septic system and associated leaching fields was found. During the July 2022 site reconnaissance, an approximately 3-foot by 5-foot hole with a large piece of plywood over the top and an adjacent sewer cleanout manhole were observed approximately 30 to 40 feet to the south, southwest of the former horse stable building,

which may be the location of the septic tank, but this could not be confirmed. This area is within the boundary of a proposed construction staging and laydown area. Currently, there are no facilities in use on the former horse ranch property, and the RCWD indicated that, if a septic system is present, it is no longer in use. Based on the historical use of this property as a horse ranch, it is likely that the on-site septic system was utilized for disposal and storage of sanitary wastes and possibly horse-related wastes. The presence of a former septic system on this property does not represent a REC in connection to the proposed project area and is considered a DMC, in AECOM's opinion.

The proposed project area is located in a rural area approximately three miles east of the City of Temecula, in an unincorporated area of southwestern Riverside County, California. The area to the north of the Secondary Entry Road entrance adjacent to De Portola Road in the western end of the proposed project area is bordered by the RCWD Los Caballos Pump Station, beyond which is undeveloped/open space. The area to the south of the former horse ranch property and proposed Primary Entry Road (50 Acre Parcel) is bordered by an active horse-boarding facility and residence. The Pond Access Road, which is located between the convergence of the proposed Primary Entry Road (50 Acre Parcel) and Secondary Entry Road and Canyon Access Road is bordered to the north by Oak Mountain Road (also known as Las Pulgas Road), beyond which is a residential property and horse ranch, and to the south by the RCWD Upper Valle De Los Caballos Recharge Basins, beyond which is undeveloped/open space, and to the west by De Portola Road, across which are vineyards/wineries. The areas to the north and south of Canyon Access Road and North Access Road is undeveloped/open space. The areas surrounding the dam to the north, south, and west are also undeveloped areas, and Vail Lake is present adjacent to the east of the dam. Based on AECOM's site reconnaissance of the surrounding areas, no off-site sources of environmental concern were identified.

The Vail Dam was originally constructed in 1948 to 1949 to store local runoff for the purpose of irrigation and water supply. The dam and reservoir were acquired by the RCWD in 1978 and have been used since that time for water supply and replenishment of the RCWD's groundwater basins, which occupy the area adjacent to (south of) Pond Access Road, between the intersection of the Pond Access Road with the Secondary Entry Road and proposed Primary Entry Road (50 Acre Parcel) in the western end of the proposed project area and west to the North Access Road/Canyon Access Road split. Improvements to the dam were conducted in the 1980s to address erosion issues, and in 2007 a rehabilitation of the outlet works was completed. The former horse ranch buildings in the western end of the proposed project area were constructed in the early 2000s, and this property operated as a horse ranch between approximately 2002 and 2015. The RCWD acquired the former horse ranch property in 2015. The western end of the proposed project area in the vicinity of the Secondary Entry Road, Pond Access Road, the proposed Primary Entry Road (50 Acre Parcel), the TVF RC airfield, and the 50-acre former horse ranch property were utilized as agricultural row crops during at least the mid-1940s through the late 1960s or early 1970s. All other unimproved roads included within the proposed project area have been utilized as such since construction of the dam in the late 1940s. The areas to the north and south of Canyon Access Road and North Access Road are and have historically been undeveloped, open space.

A previous Phase I and Phase II ESA was conducted by Phase One, Inc. (Phase One) on the 50-acre former horse ranch property in 2015. The 2015 Phase I ESA identified the following RECs associated with the former horse ranch property: historical agricultural use of the property during at least the mid-1940s through the late 1960s or early 1970s; on-site soil piles that originated from adjacent properties that may have also been used for agricultural purposes; potential releases to soils surrounding the concrete berm enclosure that was previously used to store 55-gallon drums of diesel fuel; and accumulated organics in soil due to the presence of a horse farm that may have led to methane production in soil. During the Phase II ESA, concentrations of organochlorine pesticides (OCPs) and select California Administrative Manual (CAM) 17 metals were detected in soil at concentrations below regulatory action levels, and no total petroleum hydrocarbons (TPH) or volatile organic compounds (VOCs) were detected above laboratory detection limits. Methane was not detected in the soil vapor samples analyzed. The Phase II report concluded that minimal impacts resulting from historical operations on the former horse ranch property had occurred. AECOM concurs with these conclusions and considers the presence of

subsurface impacts resulting from historical agricultural use at the former horse ranch property to present a DMC to the proposed project area.

Two database listings were identified within the respective ASTM E1527-13 and/or Environmental Data Resources, Inc. (EDR) search distances within the proposed project area. An RCWD VDC well was identified on the 37100 block of De Portola Road, which is mapped by EDR within the boundary of the proposed project in the southeastern area of the proposed construction staging and laydown area adjacent to (northwest of) the Primary Entry Road (50 Acre Parcel); however, this well was not identified in the EDR database report previously reviewed in 2020. It is possible that this is the well observed beyond the southern extent of the proposed construction staging and laydown area connected to the Primary Entry Road (50 Acre Parcel), which is not within the boundary of the proposed project, The other database listing is related to the Vail Lake Transmission & Pump Station, which is also mapped within the project boundary at the far eastern end near the dam. The Vail Lake Transmission & Pump Station is associated with the Vail Lake Transmission Line water pipeline that was constructed in 2009, which connects Vail Dam to the Upper VDC recharge basins located downstream of the dam to the west of the mouth of the canyon, immediately south of Pond Access Road in the western end of the proposed project area. The transmission line follows the same general path as the Canyon Access Road and portions of Pond Access Road; however, the Upper VDC recharge basin property is considered off-site in the context of this report. Based on AECOM's review and analysis of the database listings and the type of listings (i.e., water supply, non-contamination-related), these database listings are not expected to present a REC to the proposed project area. No other database listings were identified in the EDR database report.

No vapor encroachment conditions were identified during completion of a Tier 1 vapor encroachment screening following ASTM Designation E2600-15, *Standard Guide for Vapor Encroachment Screening on Property Involved in Real Estate Transactions* dated October 2015 (ASTM E2600-15).

Based on the above-described activities, no RECs, CRECs, or HRECs were identified in connection with the proposed project area.

The following DMCs were identified in connection with the proposed project area:

- Low concentrations of select CAM metals and OCPs were detected in soil samples collected during the Phase II investigation conducted at the former horse ranch property in October 2015. Concentrations of these contaminants of concern were detected below their respective regulatory action levels. The previous report concluded that, if percolation ponds were to be installed during future site redevelopment, surface grading for these ponds would substantially reduce the presence of residual pesticide impacts and recommended that, once grading is complete, the bottom of the ponds should be resampled to ensure very low or non-detect concentrations of pesticides exist. AECOM concurs with the previous conclusion and considers the presence of pesticides in soil on this property to present a DMC in connection with the proposed project area.

- A portion of the RCWD-owned property is leased to TVF for use as a RC airfield. A Conex storage container used to store model airplanes and spare parts was observed in this area. A 1-gallon container of model engine fuel and a 2.5-gallon container of herbicide were observed on the unpaved ground beneath a folding table near the Conex storage container. AECOM considers the use and storage of small amounts (5-gallons or less) of petroleum products and/or hazardous materials a DMC in connection with the proposed project area.

- The former horse ranch property reportedly utilized a septic tank; however, no other information on the location of the septic system and associated leaching fields was found. An approximately 3-foot by 5-foot hole with a large piece of plywood over the top and an adjacent sewer cleanout manhole were observed during the July 2022 site reconnaissance. The covered hole was located approximately 30 to 40 feet to the south, southwest of the former horse stable building. This may be the location of the septic tank, but this could not be confirmed. The septic system is reportedly no

longer in use. Based on the historical use of this property as a horse ranch, it is likely that the on-site septic system was utilized for disposal and storage of sanitary wastes and possibly horse-related wastes. The presence of a former septic system on this property does not represent a REC in connection to the proposed project area and is considered a DMC, in AECOM's opinion.

- Based on the date of construction of the dam and associated ancillary structures (circa 1949), PCB-containing dielectric fluids associated with on-site electrical equipment may be present, and PCBs may be present in paint and/or caulk (if any) on the stream release valve building.

Based on the above-described activities, the following non-ASTM scope considerations were identified in connection with the proposed project area:

- Based on the date of construction of the dam and associated ancillary structures (circa 1949), asbestos containing materials (ACMs) and lead based paint (LBP) may be present in materials used during the original construction of the dam and associated ancillary structures. No asbestos or lead paint surveys were provided for review as part of this ESA, and ACM and LBP surveys were not included within the scope of this ESA.

1. Introduction

1.1 Purpose

This Phase I Environmental Site Assessment (ESA) was performed pursuant to AECOM Technical Services, Inc.'s (AECOM's) written proposal, dated September 25, 2019, between LSA Associates, Inc. (LSA) and AECOM. The purpose of this Phase I ESA is to provide the client and owner with information for use in evaluating recognized environmental conditions (RECs) associated with the proposed project area, which will be incorporated into a California Environmental Quality Act (CEQA) Environmental Impact Report (EIR) document being prepared for the proposed project area by LSA. The Phase I ESA was of the Vail Dam property and associated access roads, the access for which is located at 37115 De Portola Road, near the intersection of De Portola Road and Oak Mountain Road, located to the east of the City of Temecula in the southwestern area of unincorporated Riverside County, California (the proposed project area). This Phase I ESA is based on a review of existing conditions, reported pre-existing conditions, and observed operations within the proposed project area and adjacent properties.

Per ASTM International (formerly known as American Society of Testing and Materials) (ASTM) Designation E1527-13, *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process* (ASTM E1527-13), potential findings can include RECs, historical RECs (HRECs), controlled RECs (CRECs), and de minimis conditions (DMCs). A REC is defined by the ASTM standard as "the presence or likely presence of any hazardous substances or petroleum products in, on, or at a property: (1) due to any release to the environment; (2) under conditions indicative of a release to the environment; or (3) under conditions that pose a material threat of a future release to the environment." The term includes hazardous substances or petroleum products even under conditions in compliance with laws. HRECs are a past release of any hazardous substances or petroleum products that has occurred in connection with the site and has been addressed to the satisfaction of the applicable regulatory authority or is meeting unrestricted use criteria established by a regulatory authority, without subjecting the site to any required controls. CRECs are a recognized environmental condition resulting from a past release of hazardous substances or petroleum products that has been addressed to the satisfaction of the applicable regulatory authority, with hazardous substances or petroleum products allowed to remain in place subject to the implementation of required controls. DMCs are those situations that do not present a material risk of harm to public health or the environment and generally would not be subject to enforcement action if brought to the attention of the regulating authority.

In addition, a Tier 1 vapor encroachment screening (VES) was completed as part of this assessment. This screening was conducted in general accordance with the ASTM Designation E2600-15, *Standard Guide for Vapor Encroachment Screening on Property Involved in Real Estate Transactions* dated October 2015 (ASTM E2600-15). The objective of the VES is to evaluate if a vapor encroachment condition (VEC) exists.

1.2 Scope of Work

The Phase I ESA included a site visit, regulatory research, historical review, environmental database analysis, and a review of the proposed project area. In conducting the Phase I ESA, AECOM assessed the proposed project area for visible signs of possible contamination, researched public records for the proposed project area and adjacent properties (as applicable), and conducted interviews with persons knowledgeable about the proposed project area.

This assessment was performed in general accordance with ASTM E1527-13 and AECOM's proposal, dated September 25, 2019. Conclusions reached in this report are based upon the assessment performed and are subject to limitations set forth in Sections 1.3, 1.4, and 1.5 below.

1.3 Study Limitations

This report describes the results of AECOM's Phase I ESA to identify the presence of conditions materially affecting the proposed project area and/or property within the limits of the established scope of work as described in our proposal.

As with any due diligence assessment, there is a certain degree of dependence upon oral information provided by facility or site representatives, which is not readily verifiable through visual observations or supported by any available written documentation. AECOM shall not be held responsible for conditions or consequences arising from relevant facts that were concealed, withheld, or not fully disclosed by facility or site representatives at the time this assessment was performed. In addition, the findings and opinions expressed in this report are subject to certain conditions and assumptions, which are noted in the report. Any party reviewing the findings of the report must carefully review and consider all such conditions and assumptions.

This report and all field data and notes were gathered and/or prepared by AECOM in accordance with the agreed upon scope of work and generally accepted engineering and scientific practice in effect at the time of AECOM's assessment of the proposed project area. The statements, findings and opinions contained in this report are only intended to give approximations of the environmental conditions at the proposed project area.

As specified in ASTM E1527-13, it is incumbent that the client and any other parties who review and rely upon this report understand the following inherent conditions surrounding any Phase I ESA:

- Uncertainty Not Eliminated - No Phase I ESA can wholly eliminate uncertainty regarding the potential for REC in connection with a property. Performance of this practice is intended to reduce, but not eliminate, uncertainty regarding the potential for REC in connection with a property, and this practice recognizes reasonable limits of time and costs. (Section 4.5.1 of ASTM E1527-13)
- Not Exhaustive - "All appropriate inquiry" does not mean an exhaustive assessment of a clean property. There is a point at which the cost of information obtained outweighs the usefulness of the information and, in fact, may be a material detriment to the orderly completion of transactions. One of the purposes of this practice is to identify a balance between the competing goals of limiting the costs and time demands inherent in performing a Phase I ESA and the reduction of uncertainty about unknown conditions resulting from additional information. (Section 4.5.2 of ASTM E1527-13)
- Comparison with Subsequent Inquiry – Phase I ESAs must be evaluated based on the reasonableness of judgments made at the time and under the circumstances in which they were made. Subsequent Phase I ESAs should not be considered valid standards to judge the appropriateness of any prior assessment based on hindsight, new information, use of developing technology or analytical techniques, or other factors. (Section 4.5.4 of ASTM E1527-13)

A similar set of inherent limitations exist in cases where the Phase I ESA included a screening-level assessment of vapor migration or vapor encroachment; such an assessment is a required part of a Phase I ESA when ASTM E1527-13 is employed. According to ASTM E2600-15, the following limitations apply:

- Uncertainty Not Eliminated in Screening - No VES can wholly eliminate uncertainty regarding the identifications of VECs in connection with the target property. (Section 4.5.1 of ASTM E2600-15)
- Not Exhaustive - The guide is not meant to be an exhaustive screening. There is a point at which the cost of information obtained outweighs the usefulness of the information and, in fact, may be a material detriment to the orderly completion of real estate transactions. One of the purposes of this guide is to identify a balance between the competing goals of limiting the costs and time demands inherent in performing a VES and the reduction of uncertainty about unknown conditions resulting from additional information. (Section 4.5.2 of ASTM E2600-15)

- Comparison with Subsequent Investigations - It should not be concluded or assumed that an investigation was not adequate because the investigation did not identify any VECs in connection with a property. The VES must be evaluated based on the reasonableness of judgments made at the time and under the circumstances in which they were made. Subsequent VESs should not be considered valid bases to judge the appropriateness of any prior screening if based on hindsight, new information, use of developing technology or analytical techniques, or similar factors. (Section 4.5.4 of ASTM E2600-15)

This report was prepared pursuant to an agreement between LSA (Client) and AECOM and is for the exclusive use of the Client, in cooperation with the RCWD. No other party is entitled to rely on the conclusions, observations, specifications, or data contained herein without first obtaining AECOM's written consent and provided any such party signs an AECOM-generated Reliance Letter. A third party's signing of the AECOM Reliance Letter and AECOM's written consent are conditions precedent to any additional use or reliance on this report.

The passage of time may result in changes in technology, economic conditions, site variations, or regulatory provisions, which would render the report inaccurate. Reliance on this report after the date of issuance as an accurate representation of current site conditions shall be at the user's sole risk.

1.4 Site-Related Limiting Conditions

The following site-specific limitations were encountered during the course of this assessment:

- Due to safety concerns related to the condition of the North Access Road, which is not a maintained roadway, AECOM did not drive this portion of the proposed project area during the July 2022 site reconnaissance. Observations of portions of the North Access Road were made along Pond Access Road, Canyon Access Road, and from the top of Vail Dam. Based on the rural nature of this area and information obtained from other sources, this site-related limiting condition is not considered significant and should not have an effect on the conclusions and recommendations contained herein.
- Due to safety concerns, AECOM did not lift the large piece of plywood covering the approximate 3-foot by 5-foot hole that was observed approximately 30 to 40-feet south, southwest of the former horse stable building. Based on the presence of the adjacent sewer cleanout and approximate size of the hole visible beneath the plywood, this may be the location of the septic tank, but this could not be confirmed. This area is within the boundary of a proposed construction staging and laydown area. There are currently no facilities in use on the former horse ranch property, and the RCWD indicated that if a septic system is present, it is no longer in use. Based on the historical use of this property as a horse ranch, it is likely that the on-site septic system was utilized for disposal and storage of sanitary wastes and possibly horse-related wastes. If this property is redeveloped, the septic tank and associated leach field may be encountered and will need to be excavated and disposed of in accordance with local and state regulations at that time. This site-related limiting condition is not considered significant and should not have an effect on the conclusions and recommendations contained herein.
- AECOM was not provided access to the interior of the stream release valve building, located approximately 200 feet downstream of the dam. According to the RCWD contact present during the July 2022 site reconnaissance, this building is used to release water from Vail Lake into Temecula Creek for dry season flows. No staining was observed surrounding the exterior of this structure. It is AECOM's understanding that this building will be demolished as part of the proposed project. Based on the use and condition of this building, this site-related limiting condition is not considered significant.
- A Conex storage container is present adjacent to the northeast of the paved landing strip on the TVF property. According to TVF members present on-site during AECOM's site reconnaissance,

the Conex storage container is used to store model airplanes and spare parts, and small amounts (less than 5-gallons) of model airplane fuels and oils. AECOM did not inspect the interior of the Conex storage container. This storage container is only used by TVF members and no staining of visual evidence of a release was observed in the vicinity of the storage container. Based on the reported use and condition of this structure and visual observation made surrounding the structure, this site-related limiting condition is not considered significant.

1.5 Data Gaps/Data Failure

The following data failure/data gaps were encountered during the course of this assessment:

- A title search and environmental lien search were not conducted as part of this Phase I ESA. However, based upon historical data collected from other sources, this data gap is not expected to impact the results of this assessment. In addition, the property owner (RCWD) was not aware of environmental liens or activity and use limitations (AULs) that have been placed on the proposed project area.
- A limitation was encountered in determining the historical use of the western end of the proposed project area. The earliest source of historical information reasonably ascertainable within the timeframe of this report in which usage could be determined was a topographic map from 1901. At the time of the map, the western end of the proposed project area in the vicinity of the former horse ranch property and the proposed Primary Entry Road (50 Acre Parcel) and Secondary Entry Road appeared to have two unimproved, light duty roads, and the Canyon Access Road is also shown as an unimproved, light duty road. Therefore, the ASTM E1527-13 requirement to determine all obvious uses of the property from the present back to the property's first obvious developed use, or back to 1940, whichever is earlier, could not be achieved. However, based upon the identified use (roadway), it is unlikely that significant prior development had occurred; therefore, this data failure is not expected to impact the results of this assessment.
- It should be noted that not all standard historical sources, as defined per ASTM, were reviewed as part of this assessment. In addition to recorded land title records, zoning/land use records were not reviewed. Furthermore, according to Environmental Data Resources, Inc. (EDR), Sanborn Fire Insurance Map coverage was not available for the proposed project area. However, based on information provided from the remaining standard historical sources, additional historical information obtained from other historical sources would not likely have assisted in meeting the historical use requirement; therefore, this data gap is not expected to impact the results of this assessment.
- Per ASTM E1527-13, past owners, operators, and occupants of the proposed project area who are likely to have material information regarding the potential for contamination within the proposed project area shall be contacted to the extent that they can be identified and that the information likely to be obtained is not duplicative of information already obtained from other sources. AECOM was unable to interview past owners and/or operators associated with the proposed project area. However, based upon historical data collected from other sources, this data gap is not expected to impact the results of this assessment.
- AECOM submitted public records requests to several county and state agencies to determine if they have additional files since the 2020 Phase I ESA that are related to hazardous materials use, storage, and/or releases that may have occurred within the proposed project area. As of the date of this report, responses have been received acknowledging AECOM's requests, but additional records have not yet been provided. Based on the unchanged use of the proposed project area since 2020 and AECOM's research to date, AECOM does not anticipate that receipt of additional records will significantly alter the conclusions or recommendations of this report. However, if information is received from public records requests that significantly impacts the conclusions of this report, this information will be forwarded upon receipt.

2. Proposed Project Area Description

2.1 Project Background

As part of the proposed project, the RCWD proposes to remediate seismic and hydrologic hazards associated with the existing Vail Dam by constructing a new straight-axis gravity concrete dam immediately downstream of the existing dam. Hydrologic and seismic evaluations of the existing dam, conducted by the California Department of Water Resources Division of Safety of Dams, indicate that the existing dam's spillway is insufficient to pass the Probable Maximum Flood without overtopping the dam and that the existing concrete arch dam would not resist the stresses induced by the Maximum Credible Earthquake.

The Vail Dam was originally constructed by the Vail Company in 1948 to 1949 to store local runoff for the purpose of irrigation and water supply. The dam and reservoir were acquired by the RCWD in 1978 and have been used since that time for water supply and replenishment of the RCWD's groundwater basins. Improvements to the dam were conducted in the 1980s to address erosion issues, and a rehabilitation of the outlet works was completed in 2007. In 2009, the Vail Lake Transmission Line water pipeline was constructed, which connects Vail Dam to the Upper Valle De Los Caballos (VDC) recharge basins located downstream of the dam to the west of the mouth of the canyon, in the western end of the proposed project area. The Upper VDC recharge basin property is not included as part of this assessment.

Collectively, the access roads and associated construction staging and laydown areas that are included as part of this Phase I ESA are known as the Vail Dam Seismic and Hydrologic Remediation Project (proposed project area).

2.2 Proposed Project Area Location and Parcel Description

The proposed project area is located approximately 3 miles to the east of the City of Temecula in the southwestern area of unincorporated Riverside County, California. The approximate location of the proposed project area is presented on Figure 1 – Site Location Map.

Although there is no physical address for the proposed project area, the address observed posted at the main entrance to the proposed project area from De Portola Road to the primary access road (proposed Primary Entry Road (50 Acre Parcel) is 37115 De Portola Road, which is also the address associated with the former horse ranch property. The Riverside County Assessor's Parcel Number (APN) associated with the proposed Primary Entry Road (50 Acre Parcel) is 927-150-018. A second access road, known as the Secondary Entry Road (APN 927-150-039), is present approximately 600 feet to the north of this entrance, immediately adjacent to and south of the RCWD Los Caballos Pump Station located at 37205 De Portola Road (APN 927-150-037), which is considered off-site for the purposes of this assessment. The proposed Primary Entry Road (50 Acre Parcel) connects to the Pond Access Road, which continues northerly and connects to the Secondary Entry Road just south of Oak Mountain Road, approximately 1,000 feet east-southeast of De Portola Road at APN 927-320-045. The Pond Access Road continues east for approximately 1 mile [1]. The Pond Access Road terminates at the North Access Road and Canyon Access Road split at the mouth of the canyon (APN 927-320-080). The North Access Road traverses the hillside to the north of the canyon and the Canyon Access Road traverses through the canyon floor. Both roads are approximately two miles long. Canyon Access Road ends approximately 200 feet downstream of Vail Dam, and North Access Road ends at the top of the dam on the northern end. Some portions of

[1] According to Google Earth, Oak Mountain Road begins at De Portola Road approximately 1,700 feet north of the Secondary Entry Road entrance, and meets the Pond Access Road at the western corner of the Upper VDC Recharge Basins. Oak Mountain Road then follows the general path of the Pond Access Road immediately to the north, and continues through the canyon along the same path as what is referred to as the Canyon Access Road in the context of the proposed project. For the purposes of this report, the access road that follows the canyon floor between the Pond Access Road terminus and Vail Lake will be referred to as Canyon Access Road.

the Canyon Access Road boundary encroach onto the adjacent parcel (APN 927-320-081). Vail Dam is located within the boundary of APN 927-320-040 in the northwestern corner of Vail Lake. A portion of the current South Access Road, which currently lies within APN 927-320-040, is located approximately 150 feet downstream (west of) of the dam and is also included within the boundary of the proposed project. The northern portion of the South Access Road will be relocated within the boundary of APN 927-320-080 as part of the proposed project.

Portions of an approximate 50-acre former horse ranch property in the western end of the proposed project area are included within the proposed project area boundary. The former horse ranch property is comprised of three APNs (927-150-018, 927-150-038, and 927-150-048), which total approximately 50-acres. APN 927-150-018, which comprises approximately 10-acres and an approximate 6.6-acre portion of the adjacent APN 927-150-048 to the south are proposed for use as a construction staging and laydown area and/or concrete batch plant during construction of the proposed project. An approximate 6.15-acre portion of APN 927-320-045, which totals just under 171-acres, is currently leased to the Temecula Valley Flyers (TVF) as a remote-control (RC) airfield, and this portion of the property is also being considered for use as a construction staging and laydown area and/or concrete batch plant during construction of the proposed project; however, plans for either of these areas during construction have not been confirmed. The proposed Primary Entry Road (50 Acre Parcel), which has not yet been constructed , will pass through APN 927-150-018 and continue east past the former horse ranch buildings including a former haybarn and stable building on a portion of APN 927-150-048, where it meets Pond Access Road on APN 927-320-045, which continues eastward to the mouth of the canyon, as described in the previous paragraph. APN 927-150-048 comprises just under 30-acres, but only the portion associated with proposed Primary Entry Road (50 Acre Parcel) and the southern approximate 6.6-acres adjacent to (south of) APN 927-150-018 is included within the boundary of the proposed project area. The location of the proposed Secondary Entry Road and Pond Access Road and the proposed location of the Primary Entry Road (50 Acre Parcel) are shown in Figure 2 – Site Plan. There is a former residence on the approximate 10-acre parcel at APN 927-150-038, which is situated between the Secondary Entry Road to the northeast and the proposed Primary Entry Road (50 Acre Parcel) to the southwest. Representatives from RCWD and the AECOM project design team have indicated the former residence will be demolished; however, this residence is not included within the proposed project area boundary and therefore is not included as part of this Phase I ESA.

According to the County of Riverside Tax Assessor's maps, all land parcels (parent parcels) that the proposed project encroaches onto are owned by the RCWD. While the total acreage of all of the parent parcels is greater than 1,100 acres, the total acreage of the proposed project area is approximately 83.4-acres. The parent parcel APN boundaries are shown on Figure 2 – Site Plan.

For the proposed project, improvements to North Access Road and Canyon Access Road will be necessary to allow construction vehicle access. Currently, these roads are both unimproved, one-lane roads that are each approximately 2-miles in length. The North Access Road will remain a one-lane road; however, the Canyon Access Road will likely be widened to a two-lane road during construction. In addition, vehicle turn-out areas and temporary construction staging areas will be placed in various areas along each of these roads. The current South Access Road, adjacent to (west of) the dam, will be relocated and graded to provide access to the spillway area with a proposed construction staging area immediately downstream of the dam. There are two separate areas in the western end of the proposed project that are under consideration for use as proposed construction staging and laydown areas. These include a 10-acre parcel (APN 927-150-018) in the northern portion of the approximate 50-acre former horse ranch and an adjacent approximate 6.6-acre portion of APN 927-150-048 to the south, southeast; and an approximate 6.15-acre portion of APN 927-320-045 that is currently leased to TVF as an RC airfield; however, the use of either of these areas during construction have not been confirmed. It is AECOM's understanding that some or all of the structures on the former horse ranch (APN-927-150-048) and/or on the TVF RC airfield property may be demolished. A third area along the eastern-central section of Canyon Access Road on APN 927-320-080 and a small sliver of APN 927-320-081 is also being

considered as a proposed construction staging and laydown area. The total acreage of this proposed construction staging and laydown area is just under approximately 13-acres.

2.3 Proposed Project Area Ownership

According to County of Riverside Tax Assessor's Records, the parent parcels within the proposed project area boundary are owned by the RCWD.

2.4 Proposed Project Area Visit

Ms. Sarah Perhala with AECOM's San Diego, California office visited the proposed project area on July 27, 2022. Ms. Perhala initially visited the proposed project area on June 22, 2020, during AECOM's 2020 Phase I ESA. Ms. Perhala was accompanied by Mr. Tom Greene of the RCWD during the 2022 proposed project area site visit. Due to road safety issues, at the time of the site visit, AECOM and RCWD did not drive on the North Access Road during the proposed project area visit and only drove in the area of the two proposed access roads (Primary Entry Road (50 Acre Parcel) and Secondary Entry Road) in the western end of the proposed project area, Pond Access Road (adjacent to and south of Oak Mountain Road) in the central portion of the proposed project area, and Canyon Access Road to Vail Dam at the eastern end of the proposed project area. Observations of portions of the North Access Road were made along Pond Access Road , Canyon Access Road, and from the top of Vail Dam. The interior and exterior areas of the former horse ranch property including the 10-acre property (APN 927-150-018), which includes the former haybarn and stable building, and portions of the 30.5-acre property (APN 927-150-048) including the exterior and interior of the former indoor riding arena building, the TVF airfield structures (paved landing strip and shade canopy) on APN 927-320-045, and exterior areas along Canyon Access Road and east to Vail Dam, were observed during the site visit. The former indoor riding arena building on the former horse ranch property is considered outside the boundary of the proposed project and off-site; however, interior access to this building was provided at the time of the site visit. The southern portion of APN 927-150-048 and the northwestern portion of APN 927-150-038 (both are part of the former horse ranch property) were not inspected at the time of the site visit, as it is AECOM's understanding that these areas are outside of the proposed project area. Observations of the interior of the former residence (APN 927-150-038) were made from the exterior of this building, through the windows, even though it is AECOM's understanding that this building is also outside of the proposed project area. The interior of the stream release valve building downstream from Vail Dam was also not inspected. Site-related limiting conditions encountered during this assessment were previously summarized in Section 1.4 of this report.

The proposed project area visit methodology consisted of a visual reconnaissance by driving over the proposed project area access roads and walking over the accessible areas of the former horse ranch property and the TVF RC airfield property that are within western portion of the proposed project area, and accessible areas of the dam in the eastern end of the proposed project area. A driving, visual reconnaissance of portions of the surrounding area was also conducted. The following sections summarize the results of the proposed project area visit.

2.4.1 Proposed Project Area and Facility Description

The approximately 83.4-acre proposed project area consists of:

- portions of an approximate 50-acre former horse ranch property at the western end,
- the portion of the RCWD-owned property that is currently leased to the TVF and used as a RC airfield,

- an approximate existing 1-mile, unimproved one-lane road known as Pond Access Road, to the south of Oak Mountain Road, located along the north side of the Upper Valle de Los Caballos Recharge Basins, which connects to Canyon Access Road and North Access Road to the east,
- an approximate existing 950-foot, unimproved one-lane road known as the Secondary Entry Road, which connects De Portola Road to Pond Access Road, located north of the former horse ranch property,
- a second proposed entrance from De Portola Road at the western end of the project known as the Primary Entry Road (50 Acre Parcel) which traverses the former horse ranch property, located south of the Secondary Entry Road, and connects to Pond Access Road,
- two existing approximate 2-mile, unimproved, single-lane roads (known as North Access Road and Canyon Access Road), both of which are accessed via Pond Access Road, and
- the current Vail Dam and associated features at the eastern end of the proposed project area.

Permanent structures within the proposed project area include Vail Dam and associated ancillary structures in the eastern end, two of the three buildings on the former horse ranch property at the western end of the proposed project area, and a paved landing strip and adjacent shade canopy on the TVF RC airfield property. The proposed project area is shown to pass through or near the northern two structures of the former horse ranch property; however, because use of these buildings during construction has not been determined and these buildings may be demolished during the proposed project, a discussion of these structures is provided herein. Other improvements within the proposed project area boundary primarily consist of unpaved roadways.

Vail Dam is a concrete arch dam spanning between concrete and rock abutments and is approximately 120 feet high in the middle. The dam has a maximum height of 152 feet from the dam crest to the lowest point in the foundation and has a 3.5-foot-high concrete parapet wall extending above the upstream dam crest. An at-grade meter vault is located approximately 100 feet downstream of the dam, and an approximate 120 square foot stream release valve building is located approximately 200 feet downstream of the dam.

The former horse ranch property at the western end of the proposed project area includes a former haybarn, a stable building, and an indoor riding arena on APN 927-150-048. These structures total approximately 41,000 square feet of building space. According to the previous Phase I ESA prepared for the former horse ranch property in 2015 (discussed in Section 4.3), this property was developed as a horse ranch in approximately 2002 when these structures were constructed. The horse ranch operated at this location until approximately 2015 when it was purchased by the RCWD. As discussed above, only the former haybarn and stables appear to be located within the boundary of the proposed project area, and these two structures are discussed in further detail below.

- The former haybarn is an open-sided steel-framed canopy structure with earthen floors throughout most of the structure. A concrete slab is present in the southern end of this structure that is currently utilized by the RCWD as a salt storage area. Secondary containment reservoirs made from a tarpaulin material were present on the earthen floor in the eastern portion of the structure. The secondary containment reservoirs are associated with two former out-of-service emergency generators that were previously located in this area. Mr. Greene indicated that these generators were removed from the property in August 2021. A salt hopper is also present beneath the canopy of this structure, which was situated on top of a concrete pad. The planned use or demolition of this building during construction has not been determined.
- The former horse stable building (not currently in use) consists of a large, open-sided steel-framed canopy structure with earthen floors throughout most of the structure. This structure includes an enclosed bar/lounge area, and remnants of former building slabs in the southwestern

and northeastern ends of this structure. The bar/lounge area consists of concrete slab flooring and sheetrock walls and ceiling. The exterior of this portion of the building appears to be steel framed. Recessed fluorescent lighting was present in the ceiling of the bar/lounge area of the former horse stable building. The former building slab in the western end of the former horse stable structure appeared to be an irregular-shaped concrete slab consisting of what appears to be two former restroom areas and associated plumbing, and an area utilized for (presumably) horse maintenance. Two floor drains, two openings associated with former toilets, an electrical panel, and pipe connections presumably used for water/sinks in the former restroom areas were observed. No staining was observed in the area of the pipe openings or floor drains. A roughly rectangular, metal enclosure, presumably a horse stall was also present on this slab area. A second, roughly rectangular concrete slab was observed in the northeastern end of this structure; however, no piping, floor drains, or other noteworthy features were observed in this slab. The planned use and/or demolition of this building during construction has not been determined.

Other exterior features on this portion of the former horse ranch property at APN 927-150-048 include exterior gated stable areas, a riding circle, and open space. Several small soil piles were observed in the area to the east of the former stable building and north of the former haybarn. Concrete rubble was observed in some of the soil piles, and others appeared to have been sitting for some time, based on sparse vegetation growing on them. According to an RCWD staff member working onsite during AECOM's 2022 site visit, these soil piles may originate on-site or may have been brought from an off-site area as a result of construction activities conducted on other RCWD-owned properties. Many of these soil piles were present on-site during the 2020 Phase I ESA conducted by AECOM, and according to RCWD staff interviewed at that time, these soil piles primarily consisted of weeds that had been removed from the ponds on the recharge basin property (APN 927-320-045) and were stored in this area to dry out and may also have been spoils that had been excavated during repair of water line leaks conducted on this property. Several additional soil piles with organic (plant) matter and denser vegetation growing on them were observed within a fenced area to the northwest of the former indoor riding arena at the time of the recent (2022) site visit. Mr. Greene did not have information related to the soil piles present in this area. These soil piles were not observed during AECOM's previous site reconnaissance conducted in 2020. An additional small (approximately 10-feet by 10-feet) storage building was observed to the east of the former hay barn building. This structure was empty at the time of AECOM's site visit, and according to RCWD staff present on-site at that time, this structure was recently temporarily placed there from another RCWD property and will not be used.

An approximate 500-foot long by 50-foot wide, paved landing strip is present in the central portion of the TVF RC airfield property. A shade canopy with several tables beneath it are present adjacent to (north of) the paved landing strip, and the pavement extends for an additional 50 by 160-foot area to the north of the landing strip and beneath the canopy. A Conex storage container and portable toilet are present adjacent to the northeast of the shade canopy and landing strip. According to TVF members present on-site during AECOM's site reconnaissance, the Conex container is used to store model airplanes and model airplane spare parts. A 1-gallon container of model engine fuel and a 2.5-gallon container of herbicide were observed on the ground beneath a folding table adjacent to the Conex storage container. No staining or visual evidence of a release was observed in this area or other portions of the RC airfield property. The use and storage of small amounts (5-gallons or less) of petroleum products and/or hazardous materials does not present a REC in connection with the proposed project, and is considered a DMC, in AECOM's opinion. The RCWD pump station adjacent to the northeastern corner of the RC airfield property is excluded from this proposed project area, and observations of this area were only made from adjacent to (east of) the locked access gate on the eastern end of this area of the property.

With the exception of the former horse ranch, the TVF RC airfield property structures, and the existing dam and associated ancillary structures, there are no permanent buildings or other improvements on the other portions of the proposed project area or within the site access roadways. The vacant residence on APN 927-150-038 (former horse ranch property) is not located within the boundary of the proposed project area and therefore is not included as part of this assessment.

During the site visit, no visual evidence of aboveground storage tanks (ASTs), underground storage tanks (USTs) (e.g., vent pipes, fill ports), monitoring wells, dry wells, oil/gas wells, or clarifiers were identified within the boundary of the proposed project area. A 2015 Phase I ESA indicated that the horse ranch property utilized an on-site septic system when in operation. No occupied structures that currently utilize a septic system are currently present on-site, and no information on the location of the reported former septic system and associated leach fields was available. The RCWD did not have information on the location of the septic system and associated leaching fields. During the July 2022 site reconnaissance, an approximately 3-foot by 5-foot hole with a piece of plywood over the top and an adjacent sewer cleanout manhole were observed approximately 30 to 40 feet to the south, southwest of the former horse stable building (proposed construction staging and laydown area), which may be the location of the septic tank, but could not confirmed. Currently, there are no facilities in use on the former horse ranch property, and the RCWD indicated that, if a septic system is present, it is no longer in use. Based on the historical use of this property as a horse ranch, it is likely that the on-site septic system was utilized for disposal and storage of sanitary wastes and possibly horse-related wastes. In AECOM's opinion, the presence of a septic system on this property does not represent a REC in connection to the proposed project area.

No visual evidence of discolored soil, water, or unusual vegetative conditions or odors was identified anywhere within the proposed project area during AECOM's July 2022 site visit. In addition, no visual evidence of significant corrosion was identified on the floors or walls of the buildings on the former horse ranch property or other exterior areas of the proposed project area. The general layout of the proposed project area is provided on Figure 2. Representative photographs are provided in Appendix A.

2.4.2 Surrounding Properties

The proposed project area is located in a rural area approximately 3 miles east of the City of Temecula, in an unincorporated area of southwestern Riverside County, California. De Portola Road is present to the west of the proposed project area, beyond which are vineyards/wineries. The area to the north of the Secondary Entry Road adjacent to (east of) De Portola Road, in the western end of the proposed project area, is bordered by the RCWD Los Caballos pump station (37205 De Portola Road), Nexstar Ranch (37215 De Portola Road), and a tree farm known as The Tree Plantation (37300 Oak Mountain Road), beyond which are ranchlands, residences, vineyards/wineries, and undeveloped/open space.

The former horse ranch property includes a former indoor riding arena. This building is considered to be in an off-site area and will likely not be utilized during the proposed project. The former indoor riding arena is a steel-framed warehouse building with a concrete floor in the northeastern portion of the building, and an earthen floor in the western portion of the building. This building was mostly empty, with the exception of a pontoon boat, several stacked pieces of stainless-steel well pipe, steel gaskets, and a few wood pallets. There is also a small office area in the northeastern corner of this building that has ceramic floor tiles, wood-paneled walls, and a sheetrock ceiling with recessed fluorescent lighting.

The former horse ranch property and the proposed Primary Entry Road (50 Acre Parcel) are bordered to the south by an active horse boarding facility and residence. The western end of Pond Access Road, from approximately the Secondary Entry Road and east to just west of the Canyon Access Road/North Access Road split, is bordered to the north by Oak Mountain Road, beyond which are vineyards, a ranch, a tree farm, and undeveloped/open space; and to the south by the RCWD Upper VDC Recharge Basins, beyond which is undeveloped/open space. A number of production and monitoring wells are present off-site on the Upper VDC Recharge Basin property (APN 927-320-045) to the south. An RCWD VDC well was observed within a fenced enclosure approximately 70 feet south, southwest of the former indoor riding arena building on the former horse ranch property. No construction activities are planned in this area and this well is considered off-site within the context of this report. The 2015 Phase I ESA identified a former production well (USGS Well Site #333001117005702) off-site and adjacent to the southwestern corner of APN 927-150-048. Both of these wells are shown in Figure 2. The RCWD Los Caballos Pump Station is also present off-site and adjacent to (north of) the proposed Secondary Entry Road adjacent to

(east of) De Portola Road. Potable water is supplied to the surrounding area utilizing wells at the surrounding area.

The areas to the north and south of Canyon Access Road and North Access Road are undeveloped/open space. A crashed truck was observed on the hillside to the south of the North Access Road, approximately one mile east of the North Access Road/Canyon Access Road split. According to AECOM's 2020 Phase I ESA, LSA indicated that this truck had been present in this area since at least 2007. It is AECOM's understanding that this truck is not within an area that will be disturbed during the proposed project. Given the limited quantity of oils and/or hazardous liquids that would have been released from this truck when it crashed, long-term impacts to soil in this area are not expected. Furthermore, this truck has been present for at least 13 years and materials released as a result of this crash are likely to have been washed away by the elements. Should disturbance of soil in this area occur during the proposed project, the truck itself would need to be handled and disposed of in accordance with state and federal regulations.

The areas surrounding the dam to the north, south, and west are also undeveloped/open space areas; Vail Lake is present adjacent to the eastern side of the dam. Based on AECOM's site reconnaissance of the surrounding areas, no off-site sources of environmental concern were identified.

2.4.3 Petroleum Products and Hazardous Materials

A Conex storage container was observed adjacent to the northeast of the paved landing strip on the TVF property. According to TVF members present on-site during AECOM's site reconnaissance, the Conex storage container is used to store model airplanes and spare parts, and small amounts (less than 5-gallons) of model airplane fuels and oils. AECOM did not inspect the interior of the Conex storage container. A 1-gallon container of model engine fuel and a 2.5-gallon container of herbicide were observed on the unpaved ground surface beneath a folding table adjacent to the Conex storage container. No staining or visual evidence of a release was observed in this area or other portions of the TVF RC airfield property. The use and storage of small amounts (5-gallons or less) of petroleum products and/or hazardous does not present a REC in connection with the proposed project, and is considered a DMC, in AECOM's opinion. No other petroleum products or hazardous materials storage areas were observed in the proposed project area at the time of the 2022 site visit.

According to AECOM's 2020 Phase I ESA, two 1,000-gallon capacity diesel-powered emergency generators were formerly located in the former haybarn on the former horse ranch property. The diesel-powered emergency generators observed are further discussed in Section 2.3.6. A concrete bermed enclosure is present to the north of the former haybarn (currently used for salt storage) on APN 927-150-048. According to the previous Phase I ESA conducted for the former horse ranch property in 2015 (refer to Section 4.3), this enclosure was utilized to store drums of diesel fuel associated with farm equipment. According to County of Riverside Department of Environmental Health (DEH) documentation reviewed from the mid-2000s during AECOM's 2020 Phase I ESA, the previous operators of the former horse ranch stored and handled hazardous materials and hazardous wastes. County of Riverside DEH Hazardous Materials Management Division (HMMD) supplemental inspection forms indicated that up to six drums of hazardous materials and hazardous wastes were present within the concrete berm enclosure during inspections conducted between 2003 through 2007. The contents of the drums were not specified in DEH documents reviewed. A County of Riverside Community Health Agency DEH HMMD Change of Status form from May 2008 indicated there were no hazardous materials or hazardous wastes present at the former horse ranch property at that time. This enclosure was empty at the time of AECOM's 2020 and 2022 site visits. No staining or other indications of a release were observed in this area during AECOM's site visits. The concrete berm containment area is further discussed in Section 4.3, and records reviewed from the County of Riverside DEH HMMD are further discussed in Section 5.5.1.

2.4.4 Hazardous Waste

No hazardous wastes are generated in the proposed project area, and the proposed project area was not listed as a generator of hazardous waste in the site-specific environmental database report obtained as part of this assessment. According to records provided by the County of Riverside DEH, the previous occupant of the former horse ranch property was registered as a hazardous waste handler (Facility Identification [ID] No. PR0033275 and PR0023533). Records associated with this occupant are further discussed in Section 5.5.

2.4.5 Polychlorinated Biphenyls

Polychlorinated biphenyl (PCB)-containing dielectric fluids have been widely used as coolants and lubricants in transformers, capacitors, and other electric equipment due to their insulating and nonflammable properties. There are no permanent structures within the proposed project area, except for on the former horse ranch property, the TVF property, the dam itself, the at grade meter vault approximately 100 feet downstream of the dam, and an approximate 120 square foot stream release valve building approximately 200 feet downstream of the dam. Based on the age of development at the former horse ranch property (circa 2002) and the TVF RC airfield (mid to late 1980s), PCBs are not expected to be present on this portion of the proposed project area. Based on the age of construction of the dam (circa 1948), the stream release valve building downstream of the dam and any other oil-containing electrical equipment may contain PCB-containing oil. As previously stated, AECOM was not provided access to the interior of the stream release valve building; however, this building is relatively small in size (approximately 10 feet by 12 feet) and it is AECOM's understanding that the only equipment inside this building are the stream release valve at the end of the pipe that comes into the structure from Vail Lake, and some electrical controls. AECOM was unable to confirm the presence or absence of potential PCB-containing electrical equipment inside of this building. In addition, based on the age of construction of the stream release valve building (late 1940s), it is possible that PCB-containing building materials, such as paint or caulk (if present) may have been used. The presence of potentially PCB-containing electrical equipment and/or building materials within the stream release building or other areas within the proposed project area boundary is considered a DMC in connection with the proposed project area, in AECOM's opinion.

No pole- or pad-mounted transformers were observed within the proposed project area boundary. A pad-mounted transformer and electrical panel were observed adjacent to the southwest of the former indoor riding arena (current storage building) in an off-site area. Labeling indicating PCB content was not observed on the transformer, and no staining was observed on the ground surface surrounding this transformer. Based on AECOM's experience, the local utility company typically owns and maintains these transformers and would be responsible in the event of a release, regardless of PCB content. Southern California Edison (SCE) provides electrical service to the surrounding area.

No other hydraulic equipment (i.e., compactors, elevators, lifts) was observed in the proposed project area, or reported by the RCWD to be located on-site.

2.4.6 Aboveground Storage Tanks

No ASTs were observed within the boundary of the proposed project area at the time of the 2022 site visit. During AECOM's 2020 Phase I ESA, three out-of-service diesel-powered emergency generators were observed beneath the canopy of the former haybarn building (now referred to as the salt storage building by the RCWD) on the former horse ranch property. Two of the generators were reported to be fueled by an approximately 1,000-gallon diesel fuel AST contained within the base of each unit and the third generator was also reported to be diesel powered; however, the capacity of the smaller generator tank was not known. The two larger generators were stored on temporary secondary containment reservoirs made from tarpaulin material on the earthen floor beneath the canopy and the third generator did not have a secondary containment structure beneath it. No staining or other indication of a release were

observed on or around the generator trailers, the secondary containment, or on the earthen floors surrounding the generators at that time. Because these generators were out-of-service and were stored properly, the ASTs associated with these generators were not considered to represent RECs in connection to the proposed project area based on the lack of reported releases and visual condition of these generators at the time of AECOM's 2020 site visit. According to Mr. Greene, these generators were removed from this area in August 2021. The secondary containment structures for the two larger generators were still present during AECOM's 2022 site visit and no staining or odors were observed within or around these structures at that time.

According to records provided by the County of Riverside DEH HMMD, two ASTs were present on the former horse ranch property during the mid-2000s. No information related to the size or exact location of the ASTs was provided. The ASTs reportedly contained diesel fuel and unleaded gasoline. These ASTs were presumably removed when the previous occupant (Blackridge RJH, Inc.) registered an out-of-business Change of Status form with the County of Riverside DEH in 2008; however, the date of removal of these ASTs was not verified. The ASTs were not present during the previous Phase I ESA conducted at the site in 2015 (discussed in Section 4.3), or at the time of AECOM's 2020 or 2022 site reconnaissance.

No additional ASTs were observed within the boundary of the proposed project area or reported by the site contacts to be located on-site. No ASTs were listed associated with the proposed project area in the site-specific environmental database report reviewed by AECOM. A water silo was observed adjacent to the southeast of the equipment storage building (former indoor riding arena) in an area that is considered off-site. According to the RCWD, this silo is currently empty. No odors or staining were observed on or around the area of the silo.

2.4.7 Underground Storage Tanks

No visual evidence of USTs (e.g., vent pipes, fill ports) was observed in the proposed project area during the site visit. According to the 2015 Phase I ESA report, no USTs were reported to have been present on the former horse ranch property. In addition, no USTs were listed in the site-specific environmental database report associated with the proposed project area.

2.4.8 Solid Waste

Solid wastes are not currently generated in the proposed project area. No solid waste receptacles (trash cans, dumpsters, etc.) were observed on or adjacent to the proposed project area. The RCWD indicated there is no solid waste service for the proposed project area.

2.4.9 Water

Based on the information provided, the RCWD provides potable water to the surrounding area. Vail Lake, adjacent to the eastern end of the proposed project area, is utilized for recreation and as a groundwater supply reservoir. Water is occasionally released from the dam and flows over the ground surface through the canyon, where it percolates into the pervious ground surfaces within the canyon areas downstream (west of) the dam, contributing to groundwater recharge and groundwater storage for the public water supply.

The Upper VDC Recharge Basins occupy the off-site area and adjacent to (south of) Pond Access Road in the western end of the proposed project area, from approximately the Secondary Entry Road to the Canyon Access Road and North Access Road split at the mouth of the canyon. According to the RCWD, water is pumped from Lake Skinner, approximately 7 miles to the north, to these recharge basins. The Vail Lake Transmission Line (water pipeline) was constructed in 2009 and is present adjacent to the Canyon Access Road. This transmission line is intended to provide a backup to the drinking water supplied by Lake Skinner. Several cathode stations and blow-off valves associated with this pipeline were observed adjacent to Canyon Access Road between the dam and the recharge basins during AECOM's

July 2022 site reconnaissance. A number of production and monitoring wells are present on the Upper VDC Recharge Basins property, all of which are in areas that are considered off-site in the context of this ESA. Several wells were identified in the State Water Resources Control Board (SWRCB) online GeoTracker database. The approximate well locations and corresponding well numbers are depicted on Figure 2. An RCWD VDC well was observed within a fenced enclosure approximately 70 feet south, southwest of the former indoor riding arena building on the former horse ranch property. This well was not identified in the online GeoTracker database. No construction activities are planned in this area and this well is considered off-site within the context of this report. The RCWD Los Caballos Pump Station is also present off-site and adjacent to (north of) the Secondary Entry Road adjacent to (east of) De Portola Road. Potable water is supplied to the surrounding area utilizing these wells.

An approximate 36-inch vertical concrete pipe was observed in the open field to the north of the former horse ranch property structures, approximately 100 feet west of the unpaved access road to 37115 De Portola Road and within the proposed construction staging and laydown area in this area of the proposed project. According to an RCWD employee that was on-site at the time of AECOM's July 2022 site reconnaissance, this concrete pipe is an irrigation well associated with a regional irrigation system that is present throughout this area of Temecula. No other information was available pertaining to the irrigation well. AECOM observed other similar structures on several off-site properties in the surrounding area.

2.4.10 Wastewater

There are currently no wastewater discharges at the proposed project area. According to a 2015 Phase I ESA (refer to Section 4.3.1), the former horse ranch property utilized an on-site septic system. At the time of AECOM's 2020 Phase I ESA, the site contact at the RCWD indicated that this septic system was no longer in use. No details pertaining to the location of the septic system and/or associated leach fields were provided by the RCWD; however, during the July 2022 site reconnaissance, an approximately 3-foot by 5-foot hole with a piece of plywood over the top and an adjacent sewer cleanout manhole were observed approximately 30 to 40 feet to the south, southwest of the former horse stable building within the boundary of a proposed construction staging and laydown area. AECOM did not lift the plywood off the opening in the ground. It is possible that this is the location of the septic tank, but this could not be confirmed. Currently, there are no facilities in use on the former horse ranch property. Based on the historical use of this portion of the proposed project area as a horse ranch, no potentially high-risk activities were conducted, and it is likely that the on-site septic system was utilized for disposal of sanitary wastes. In AECOM's opinion, the presence of a septic system on this property does not represent a REC in connection to the proposed project area. If this property is redeveloped, the septic tank and associated leach field may be encountered and will need to be excavated and disposed in accordance with local and state regulations at that time.

2.4.11 Stormwater

With the exception of the TVF RC airfield landing strip, almost the entire proposed project area is unpaved. Stormwater either percolates into the pervious surfaces or flows toward the groundwater recharge basins and/or canyon floor adjacent to the access roads. No stormwater conveyances were observed in the proposed project area.

2.4.12 Heating and Cooling

No heating or cooling systems are present for the buildings on the former horse ranch property. According to Mr. Greene a propane AST was historically present adjacent to the residence at APN 927-150-038 in an area that is considered off-site in the context of this ESA. Mr. Greene indicated that this propane tank was removed from the property in August 2021. The approximate location of the former propane AST is shown in Figure 2. SCE provides electricity, and Southern California Gas provides natural gas service to the proposed project area and the surrounding area.

2.4.13 Non-ASTM Scope Considerations

2.4.13.1 Asbestos

Based on the date of construction of the dam (circa 1949), asbestos-containing materials (ACMs) may be present in materials used during the original construction of the dam (e.g., concrete, Transite) and associated ancillary structures, such as the at-grade meter vault and/or the stream release valve building. No asbestos surveys were provided for review as part of this ESA. It should be noted that an asbestos survey by a licensed inspector was not included within the scope of this assessment.

Based on the age of the buildings on the former horse ranch property (early 2000s) and the canopy structure on the TVF RC airfield property (mid to late 1980s), ACMs are not expected to be present in these structures.

Asbestos is also a naturally occurring fibrous mineral found in many parts of California. It is commonly found in ultramafic rocks such as serpentine, and near fault zones. Naturally occurring asbestos (NOA) can be released from ultramafic rock when crushed or due to weathering and erosion processes and may become airborne and stay in the air for long periods of time. Review of geologic conditions of the proposed project area did not identify the potential presence of NOA.

2.4.13.2 Lead-Based Paint

Based on the date of construction of the stream release valve building located approximately 200 feet downgradient of the dam (late 1940s), it is possible that LBP is present on this building. Depending on the date of construction and installation of other painted surfaces within the proposed project area, such as painted protective bollards and the structures associated with the at-grade meter vault, LBP may be present if such features were installed and painted prior to the late 1970s. No LBP surveys were provided for review as part of this ESA. It should be noted that an LBP survey was not included within the scope of this assessment.

Based on the date of construction of the buildings present on the former horse ranch property (circa early 2000s) and the TVF RC airfield property canopy structure (mid to late 1980s), it is unlikely that lead-based paint (LBP), which was banned from residential use in the late 1970s, was used.

3. Environmental Setting

3.1 Topography

According to a review of the United States Geological Survey (USGS) topographic maps and the Google Earth application, the western end of the proposed project area, in the vicinity of the former horse ranch property, is generally flat and is located at approximately 1,300 feet above mean sea level (amsl). Topography dips slightly to approximately 1,265 feet amsl to the east near the entrance to the Upper VDC Recharge Basins property and remains generally flat through this section of Pond Access Road #1 to the mouth of the canyon at the North Access Road/Canyon Access Road split, which is also approximately 1,300 feet amsl. The topography along the southern Canyon Access Road steadily climbs to the east to approximately 1,360 feet above msl at the base of the dam. Conversely, the North Access Road climbs quickly to just over 2,000 feet amsl at its height, approximately half-way (1 mile) to the dam. This access road then gradually decreases in elevation to the east where it meets the top of the dam at approximately 1,435 feet amsl. The dam itself is at approximately 1,410 feet amsl, with the adjacent spillways on the northern and southern sides of the dam slightly higher, between approximately 1,450 and 1,480 feet amsl, respectively.

3.2 Soil/Geology

According to the Geotechnical Basis of Design Report (GBDR) for the proposed Vail Dam Seismic and Hydrologic Remediation Project completed by AECOM in 2017 and as discussed in AECOM's 2020 Phase I ESA report, Vail Dam is located within the Peninsular Ranges Province, which is a 500-mile-long mountain range in southern California and Baja California that is formed by a continuous belt of Cretaceous gabbroic through granitic plutonic rocks that intruded late Paleozoic and Mesozoic metamorphic host rock. Vail Dam spans Temecula Creek, a northwesterly draining tributary of the Santa Margarita River that drains the north side of Palomar Mountain. Vail Lake inundates a portion of Butterfield Valley and a portion of the adjacent Lancaster Valley. Vail Lake, Butterfield Valley, and Lancaster Valley are surrounded by highland areas to the north (Oak Mountain), to the South (Wild Horse Peak/Palomar Mountain), and to the east (Cahuilla Mountain, Thomas Mountain). Collectively, these physiographic features comprise a rugged highland terrain that is dissected by Wilson Creek, Temecula Creek, and their tributaries.

The terrain in the vicinity of Vail Dam is underlain by regionally metamorphosed rocks of Jurassic to Cretaceous age, plutonic (intrusive igneous) rocks of Cretaceous age, volcanic rocks of Miocene age, the Pliocene Temecula Arkose, and Holocene to Pleistocene age alluvial deposits. This information was compiled from the Sage 7.5-foot Quadrangle, the Vail Lake 7.5-foot Quadrangle, the Oceanside 30-foot by 60-foot Quadrangle, and the San Bernardino and Santa Ana 30-foot by 60-foot Quadrangle. The dam is founded on metamorphic rock that is described as undifferentiated meta-volcanic and metasedimentary rocks of Cretaceous and Jurassic age consisting of schist, gneiss and quartzite that is commonly mixed with meta-granitic rock. In the vicinity of the dam site, the metamorphic rock is entirely gneiss that has a well-developed metamorphic layering (foliation) that strikes northwesterly and dips steeply to both the northeast and southwest. In the central area of Canyon Access Road, the metamorphic rock consists of gneiss and migmatitic gneiss that is mixed with granitic rock (tonalite).

The Temecula Creek canyon downstream of the existing dam, which encompasses the Canyon Access Road and proposed construction staging and laydown areas within the canyon in the eastern end of the proposed project area, and the proposed grading material disposal area near the mouth of the canyon, is underlain primarily by wash deposits, with some artificial fill immediately downstream of the dam. The proposed dam construction area, temporary construction area, South Access Road and construction area, and associated proposed construction staging and laydown area in the eastern end of the proposed project area extend above the alluvial deposits underlying the canyon floor up the sides of the canyon

through zones of fill, Temecula Arkose, and old alluvial flood plain deposits. The North Access Road is mostly underlain by old landslide deposits, Temecula Arkose, and gneiss. It is also underlain in parts by young channel deposits (Qya), basalt of Temecula area, and Holocene landslide deposit. The proposed Primary Entry Road (50 Acre Parcel), the proposed Secondary Entry Road, the western portion of Pond Access Road and the adjacent TVF RC air field property to the south, and the western proposed construction staging and laydown area near the entrance to the proposed project area (former horse ranch property) are underlain by young channel and wash deposits.

3.3 Surface Water

According to the GBDR, Vail Lake is a man-made reservoir adjacent to (east of) Vail Dam. Vail Lake impounds 42,680 acre-feet of water within the reservoir at the spillway crest. The reservoir is currently used primarily for drinking water supply and recreation. Vail Dam spans Temecula Creek, a northwesterly draining tributary of the Santa Margarita River that drains the north side of Palomar Mountain. The proposed project area is located within the Santa Margarita Watershed. The major surface water body within the Santa Margarita Watershed is the Santa Margarita River, which drains in a westerly direction from headwaters in Riverside County to the Santa Margarita Estuary and the Pacific Ocean. Major tributaries to the Santa Margarita River include Temecula Creek, Murrieta Creek, De Luz Creek, Sandia Creek, and Rainbow Creek. The watershed for Vail Lake is approximately 318 square miles and the lake is fed by Temecula Creek, Wilson Creek, Kolb Creek, and Arroyo Seco. Water released from Vail Lake flows through the canyon via Temecula Creek to the Santa Margarita River and to the Upper VDC Recharge Basins property, where it is re-stored in the Pauba Valley groundwater basin.

3.4 Groundwater/Hydrology

According to the Regional Water Quality Control Board (RWQCB) Basin Plan, the proposed project area is located within the Pauba Hydrologic Subarea of the Pechanga Hydrologic Area, within the Santa Margarita Hydrologic Unit. From Vail Lake to areas to the east are also within the Santa Margarita Hydrologic Unit, but this area falls within the Vail Hydrologic Subarea of the Aguanga Hydrologic Area. Groundwater in both the Pauba and Aguanga Hydrologic Subareas has been designated by the RWQCB as beneficial for use in municipal, agricultural, and industrial supply.

According to the GBDR completed by AECOM for the proposed project in 2017, the depth to groundwater ranges from between approximately 12 and 22 feet below ground surface (bgs) in the vicinity of the dam. In June 2019, the depth to groundwater in the western portion of the proposed project area was measured at approximately 64 feet bgs at USGS well number 333010117003101. This well is located in the wash deposits approximately a quarter-mile south of Pond Access Road (Figure 2). In USGS well 333001117005702, which is approximately one-third of a mile south of the proposed Primary Entry Road (50 Acre Parcel) (Figure 2) within the young channel deposits, the depth to groundwater was measured at approximately 323 feet bgs in July 2022 (USGS 2022). Based on area topography, groundwater beneath the proposed project area is likely to flow in a westerly direction toward the downstream area and west toward De Portola Road.

4. Site and Area History

Historical information for the site and surrounding properties is based on AECOM's review and analysis of the following historical sources that were obtained from Environmental Data Resources, Inc. (EDR) at the time of our 2020 Phase I ESA:

- Aerial photographs dated 1949, 1953, 1961, 1967, 1971, 1985, 1989, 1996, 2002, 2005, 2009, 2012, and 2016;
- Google Earth aerial images dated 1995, 1996, 2002, 2003, 2005, 2006, 2007, 2009 through 2014, 2016, and 2018 through 2021;
- Topographic maps dated 1901, 1903, 1939, 1942, 1943, 1947, 1950/1953/1954, 1957, 1968/1971/1973, 1978/1982, 1988, 1997, and 2012; and
- City directories for the years 1971, 1974, 1979, 1986, 1991, 1996, 2001, 2006, 2010, 2014, and 2017.

According to Environmental Data Resources, Inc. (EDR), Sanborn® Fire Insurance Map coverage is not available for the proposed project area. A copy of the historical sources provided by EDR in 2020 are included in Appendix B of the 2020 Phase I ESA report, which is provided in Appendix B of this report.

4.1 Proposed Project Area

The western portion of the proposed project area is shown as a wash in the 1901 topographic map with an east/west traversing light duty road shown to the north and south of the wash, in the general vicinity of the proposed Primary Entry Road (50 Acre Parcel), Secondary Entry Road, and Pond Access Road. The full extent of Pond Access Road and the adjacent Oak Mountain Road to the north is not shown on this map, but the eastern portion of the proposed project area is labeled as Oak Mountain. The North Access Road is not present on this map, and there is no coverage of the eastern portion of the proposed project (in the vicinity of Canyon Access Road) on this map; however, a portion of the Canyon Access Road is shown in the 1903 map. A light-duty road is shown in this area that follows the general path of the current Canyon Access Road and a perennial stream follows the general path of this road. This same section of road is also shown in the 1939 topographic map; however, the former unimproved road that traverses through the canyon is not shown and the stream is depicted as an intermittent stream. Several wash areas are shown adjacent to the north and south of the stream within the canyon. Coverage of the western end of the proposed project area, west of the canyon, is not provided on the 1939 map.

The proposed project area is largely unchanged on the 1942 topographic map; however, the intermittent stream in the eastern portion of the proposed project area is labeled as Temecula River, and the wide wash area in the western end of the proposed project area includes a wide stream labeled as Temecula Creek that flows through the center of the wash. The light duty roads in the western end of the proposed project area are now shown as unimproved roads. The unimproved road in the vicinity of present-day Secondary Entry Road and the adjacent Oak Mountain Road to the north terminate at the mouth of the canyon, near the junction of the Temecula Creek and Temecula River.

The proposed project area is essentially unchanged in the 1947 topographic map. The 1949 aerial photograph shows the dam at the eastern end of the proposed project area. A winding, unimproved road that follows the general path of the Canyon Access Road and follows the canyon downstream to a large outwash area is shown in the western end of the proposed project and surrounding area.

The 1950/1953/1954 topographic map series shows an unimproved road in the western end of the proposed project area, which previously terminated at the mouth of the canyon in the 1947 map, is now shown to follow the canyon floor all the way east to the dam and terminates at the eastern end of the proposed project. Another road shown as an unpaved, light duty road is shown to exit the proposed

project area to the south, just west of the dam, in the vicinity of the current South Access Road. The water bodies at both ends of the proposed project area are now labeled as Temecula Creek in mapping from this time period; however, the wide stream in the center of the wide wash at the western end of the proposed project is no longer present and the entire area is shown as a large wash, which aligns with what was observed in the 1949 aerial photograph. A black vertical line marked as 'Top of Dam' is depicted approximately ¾-mile east of the mouth of the canyon, along the Canyon Access Road, in the topographic map series from the early 1950s; however, the actual dam is over a mile downstream in the northwestern corner of Vail Lake.

There are no other roads or development in the western end of the proposed project area until the 1967 aerial photograph, at which time the outline of Oak Mountain Road, between the mouth of the canyon at Canyon Access Road and west to the vicinity of the current now De Portola Road, is visible. The area to the south of Oak Mountain Road and the portion of Pond Access Road that parallels Oak Mountain Road to the south that was previously occupied by an outwash area, appears to be agricultural row crops according to the aerial photographs from this time period. This area is further discussed in Section 4.2.

Unimproved roadways in the vicinity of De Portola Road, adjacent to the western end of the proposed project, and Pauba Road to the south, are visible on the 1971 aerial photograph. The agricultural row crops south of Oak Mountain Road and the adjacent Secondary Entry Road and Pond Access Road to the south in the western portion of the proposed project area, approximately 2,000 feet downstream of the canyon, are no longer present. The area to the south of Oak Mountain Road and Pond Access Road, between approximately 2,000 feet downstream of the canyon and west to De Portola Road, remain as agricultural row crops in this photograph. The row crops are present in the area of the proposed Primary Entry Road (50 Acre Parcel). An unimproved path in the vicinity of the proposed Secondary Entry Road entrance adjacent to (east of) De Portola Road is also visible on this photograph.

The North Access Road is not visible on the topographic maps or aerial photographs reviewed until the 1985 photograph, at which time a portion of an unimproved roadway exiting the dam to the north is present; however, at approximately 2,500 feet northwest of the dam, this path continues to the north, away from the current North Access Road route. The North Access Road is not shown in the topographic map from this time period, or on any of the maps reviewed. The Canyon Access Road remains essentially unchanged in the 1985 aerial photograph and is shown in its approximate current configuration on this and all future photographs. Oak Mountain Road and Pond Access Road, from Canyon Access Road and west to the Secondary Entry Road and its terminus with De Portola Road, northwest of the proposed project area, is also present in its approximate current configuration. The agricultural row crops in the area to the south of Oak Mountain Road and the adjacent Secondary Entry Road, and in the vicinity of the former horse ranch property and the Secondary Entry Road and proposed Primary Entry Road (50 Acre Parcel) entrances adjacent to (east of) De Portola Road, appears to be unmaintained, open space. Topographic mapping from 1988 also reflects the absence of orchards and/or vineyards in the area to the south of the proposed project (further discussed in Section 4.2). There is an approximate 300-foot by 175-foot, roughly rectangular clearing adjacent to (southeast of) De Portola Road, in the vicinity of the adjacent RCWD Los Caballos Pump Station on the 1985 aerial photograph. The Secondary Entry Road entrance adjacent to (east of) De Portola Road is faintly visible on this photograph. A large rectangular clearing with a second linear clearing adjacent to the rectangular area is present adjacent on a portion of the former horse ranch property.

The western portion of the proposed project area, west of the mouth of the canyon, as well as Canyon Access Road, is largely unchanged on the 1989 aerial photograph. At this time, there are several paths traversing the adjacent RCWD Upper VDC Recharge Basins property. The large rectangular clearing on the former horse ranch property is no longer present, but rather a roughly rectangular mowed area that is oriented 90 degrees different than the previous rectangular area is present in this area. An unpaved, cleared area that resembles the approximate extent of the current TVF RC airfield adjacent to (south of) Pond Access Road in the western portion of the proposed project area is first visible on the 1989

photograph. The full extent of the North Access Road is also visible on this photograph, though the central portion of this road is very faint.

The project area roads are essentially unchanged through the 1990s, and there were no other notable changes observed within the proposed project area on the aerial photographs or topographic maps reviewed until the 1996 aerial photograph, which shows the paved TVF RC airfield property and associated features in its approximate current configuration. No structures were visible on the former horse ranch property in the 1996 aerial photograph. The 1997 topographic map which shows a total of eight structures in the area adjacent to (southeast of) De Portola Road. Some of these structures may be within the project area boundary in the western end of the proposed project area; however, it is unclear which are actually within the project area boundary based a review of the topographic map. The 2002 aerial photograph shows the former horse ranch property has been developed to its approximate current configuration. The three buildings on this property are visible, and the round and rectangular riding and gated areas throughout this property are present. There are three small white structures along the eastern end of this property, in the vicinity of the proposed Primary Entry Road (50 Acre Parcel). According to the previous Phase I ESA conducted for this property in 2015 (discussed in Section 4.3.1), these structures are mobile homes that were present at that time. A small residence is also present on the portion of the property to the southwest of the junction of the Pond Access Road and Secondary Entry Road on APN 927-150-038. This residence is considered to be in an off-site area and was not included as part of this Phase I ESA.

Other than variations in vegetation and the configuration of the fields on the former horse ranch property, and the roads within proposed project area remain largely unchanged on the aerial photographs and topographic mapping reviewed through the mid-2000s until approximately 2012 when portions of the three mobile homes on the eastern end of the former horse ranch property appear to be have been demolished and several piles of construction debris are present to the east and south of the current equipment storage building, south of the proposed Primary Entry Road (50 Acre Parcel).

Based on aerial photography, the debris piles in the vicinity of the former mobile homes remained in this area until late 2016 when the mobile homes and all structures associated with the mobile homes were no longer present. One pile of scrap steel beams remains in the southern area of this property, near one of the RCWD Upper VDC Recharge Basins property entrances to the south of the proposed project area, outside of the current project area boundary in the 2016 aerial photograph. The soil piles within the fenced area adjacent to (north, northwest of) the former indoor riding arena are first visible in Google Earth imagery from 2021. These soil piles were observed during AECOM's 2022 site visit; however, these soil piles were not observed during AECOM's 2020 site visit. The soil piles to the northeast of the former horse stable building and northwest of the former hay barn that were observed during AECOM's 2020 and 2022 site visits are also visible in the 2021 aerial imagery.

City directories reviewed for De Portola Road between 1971 through 2017 are largely residential, with several vineyards/wineries and ranch properties listed in the area.

No on-site historical sources of environmental concern were identified during the historical review.

4.2 Off-site Properties

The surrounding area is primarily vacant land based on the topographic maps reviewed from 1901 and 1903. A few residences are depicted to the north and an unimproved road in the vicinity of De Portola Road in 1901; however, this road is incomplete and does not follow the same path as the current De Portola Road. An unimproved road continues to the east in the vicinity of present-day Vail Lake, beyond the location of the dam. Two water features consistent with a river or creek are shown to traverse the area currently occupied by Vail Lake.

The surrounding area to the south and southeast of the proposed project area is essentially unchanged in the 1939 topographic map, and the surrounding areas to the north and south of Temecula Creek and to the south of Temecula River are shown as woodland areas. There are several streams and wide river wash areas shown to the west of the dam, in the vicinity of Vail Lake, in topographic mapping from this time period.

The former woodland areas to the north and south of the western end of the proposed project area are shown as vineyards in the 1943 topographic map. The surrounding area to the south of Temecula River and Temecula Creek is shown as a vineyard, and the area to the north of Temecula Creek, north of the western portion of the proposed project area, is also shown as a vineyard. The area to the north of Canyon Access Road and the North Access Road remains vacant. The surrounding area between the approximate location of De Portola Road and east to the Vail Lake area is essentially unchanged in the topographic maps from 1939 through 1947.

Vail Dam and Vail Lake are first shown in the 1950 through 1954 topographic map series, and the dam and western end of the lake is visible in the 1949 aerial photograph. Other surrounding area features are largely unchanged in the available topographic mapping reviewed between 1950 and 1988. The primary notable changes in the surrounding area during this time period are that the surrounding area vineyards to the northwest and southeast are shown as orchards, the former vineyard area to the southwest of the proposed project area is no longer shown as a vineyard, and the area to the northeast of the canyon is shown as orchards in these maps. The area immediately adjacent to the south side of the Temecula Creek, from the mouth of the canyon to approximately ¾ mile to the east, is shown as a woodland area in the maps from this time period. The full extent of De Portola Road, west of the proposed project area, is first shown as an improved road in the 1968 through 1973 map series. Row crops and open space are visible in the area beyond (west of) the present-day De Portola Road in the 1967 aerial photograph. De Portola Road to the west and Pauba Road to the south are visible in the 1971 aerial photograph.

The surrounding area is essentially unchanged through the late 1980s, when one structure is shown to the south of the proposed project area in the vicinity of the dead-end street called Winners Circle in the 1989 aerial photograph, and the vineyards across De Portola Road to the west are visible in this area.

By the 1996 aerial photograph, the RCWD Upper VDC property adjacent to the south of Oak Mountain Road is developed in its approximate current configuration. There are three vineyard properties visible across De Portola Road to the west of the proposed project area, and an off-site ranch property to the north and east of the Los Caballos Pump Station is present at this time. Further development is also visible along Pauba Road, south, southwest of the Upper VDC Recharge Basins property.

By the 2002 aerial photograph, additional development is visible on the property to the north and east of the RCWD Los Caballos Pump Station. Row crops are visible in the rear of (northern end) this property. Some additional development is also visible in the surrounding areas to the north and south along De Portola Road in the 2002 aerial photograph and in photographs reviewed through the 2000s and 2010s; however, the development in these areas are minimal and mostly appear to occur within the boundaries of the surrounding area properties that were already developed. The areas to the north and south of North Access Road and Canyon Access Road remain undeveloped, open space on the historical aerial photographs and topographic maps reviewed. An additional RCWD pump station occupies an approximate 200-foot by 150-foot area in the northeastern corner of the of the TVF RC airfield property, which is first visible in the 2011 aerial photograph. This area is excluded from the boundary of the proposed project and is considered off-site in the context of this report. The 2012 topographic map shows the full extent of what is now called Oak Mountain Road, north of Pond Access Road, as an unpaved, light duty road that follows the canyon all the way to the dam. In 2012, Oak Mountain Road was called Pulgas Creek Road according to the topographic map for this area. No substantive changes or further development are visible in the surrounding area in Google Earth imagery reviewed through 2021.

No historical off-site sources of environmental concern were identified during the historical review.

4.3 Previously Prepared Environmental Reports

4.3.1 Phase One, Inc. – Phase I ESA, September 2015

AECOM reviewed a previous Phase I ESA report provided by Ms. Nicole West of LSA that was completed for the former horse ranch property at 37115 De Portola Road in September 2015 by Phase One, Inc. (Phase One). The Phase I ESA indicated that a horse ranch operated on this property between approximately 2002 through 2015, and there were previously three additional mobile home structures present in the eastern end of APN 927-150-048. The Phase I ESA identified the following as RECs associated with the former horse ranch property: historical agricultural use at the property during at least the mid-1940s through the late 1960s or early 1970s; on-site soil piles that originated from adjacent properties that were also used for agricultural purposes; potential releases to the soil surrounding the concrete bermed enclosure that was used to store 55-gallon drums of diesel fuel; and accumulated organics in soil due to the operation of a horse farm that may have led to methane production in soil. AECOM notes that the soil piles identified during the 2015 Phase I ESA were not the same soil piles observed by AECOM during the 2020 or 2022 site visits, and the soil piles referenced in the 2015 Phase I ESA were actually located in the southern portion of APN 927-150-048, which is considered an off-site area in the scope of this Phase I ESA. AECOM did not inspect the area of these soil piles during the 2020 or 2022 site visits and did not verify the presence or absence of these soil piles. No other RECs were identified in connection with the former horse ranch property or historical or current site operations in the 2015 Phase I ESA. Based on the RECs identified, a Phase II ESA was recommended and subsequently conducted by Phase One (discussed below).

4.3.2 Phase One, Inc. – Phase II ESA, October 2015

AECOM reviewed a previous Phase II ESA report provided by Ms. West that was completed for the former horse ranch property at 37115 De Portola Road in October 2015 by Phase One. During the Phase II ESA, 69 soil borings were completed to depths ranging from 2 to 15 feet bgs, depending on the potential source of impacts. Nine of these borings were also used as soil vapor sampling points to evaluate the potential presence of methane in soils. Soil vapor samples were collected from five and 15 feet bgs. Concentrations of organochlorine pesticides (OCPs) and select CAM 17 metals were detected in soil at low concentrations, below regulatory action levels. No total petroleum hydrocarbons (TPH) or volatile organic compounds (VOCs) were detected above laboratory detection limits in the soil samples analyzed. In addition, methane was not detected in the soil vapor samples analyzed. The Phase II ESA report concluded that, based on the results of the subsurface investigation, minimal impacts resulting from historical operations on the former horse ranch property had occurred. The Phase II report also concluded that, if percolation ponds were to be installed during future site redevelopment of this property, surface grading for these ponds would substantially reduce the presence of residual pesticide impacts present in this area, and it was recommended that, once grading is complete, the bottom of the ponds be resampled to ensure very low or non-detect concentrations of pesticides exist. AECOM concurs with the previous conclusion and considers the presence of impacts resulting from historical agricultural use to present a DMC to the proposed project area.

4.3.3 AECOM – Phase I ESA, September 2020

AECOM conducted a Phase I ESA for the proposed project area in September 2020. The proposed project boundary at that time was very similar to the current proposed project boundary. The most notable changes to the current proposed project boundary from the previous proposed project area boundary evaluated in 2020 includes the addition of the TVF RC airfield property as a proposed construction staging and laydown area and/or a concrete batch facility, and the proposed construction staging and laydown area boundary on the former horse ranch property has been expanded to the south to include approximately 6.6-acres of the adjacent (approximate) 30-acre former horse ranch property (APN 927-150-048).

According to the environmental database report provided in the 2020 Phase I ESA, there was only one property listed within the respective ASTM E1527-13 and/or EDR search distances from the proposed project area. The property listed was the adjacent RCWD Los Caballos Pump Station at 37205 De Portola Road. The listing for this property was plotted as the target property; however, this property is actually located off-site. The database listings were listed under the names RCWD VDC Chloramination, LH Woods & Sons, Inc. field office, and Vail Lake Transmissions. RCWD VDC Chloramination was listed in the Facility Index System (FINDS) database and Vail Lake Transmission Main & Pump Station was listed in the California Integrated Water Quality System (CIWQS) database. Both of these listings are associated with the RCWD Vail Lake Los Caballos Station. The 2020 ESA indicates that the listing for LH Woods & Sons appeared to be associated with a field office for a project where hazardous materials were disposed of from this location in 2011. This business was listed in the HAZNET (related to disposal of hazardous waste), California Environmental Reporting System (CERS), and California Hazardous Waste Tracking System databases. The 2020 Phase I ESA report concluded that these database listings were compliance-related and not indicative of a release, and that these database listings did not present a REC to the proposed project area.

In the 2020 Phase I ESA report, AECOM did not identify on-site or off-site HRECs, CRECs, or RECs associated with the proposed project area. The following two DMCs were identified: 1) low concentrations of select CAM metals and OCPs were detected in soil samples collected during the 2015 Phase II investigation; however, concentrations detected were below their respective regulatory action levels. The 2015 Phase II report concluded that if percolation ponds were to be installed during future site redevelopment, surface grading for these ponds would substantially reduce the presence of residual pesticide impacts at the site and recommended that once grading is complete, the bottom of the ponds should be resampled to ensure very low or non-detect concentrations of pesticides exist. AECOM concurred with the previous conclusion and considered the presence of pesticides soil on this property a DMC in connection with the proposed project area; and 2) based on the date of construction of the dam and associated ancillary structures (circa 1949), PCB-containing dielectric fluids associated with on-site electrical equipment may be present, and PCBs may be present in paint and/or caulk (if present) on the stream release valve building.

In addition to these DMCs, AECOM identified the following non-ASTM scope consideration: based on the date of construction of the dam and associated ancillary structures (circa 1949), ACMs and LBP may be present in materials used during the original construction of the dam and associated ancillary structures. No asbestos or lead paint surveys were provided for review as part of this ESA, and ACM and LBP surveys were not included within the scope of the 2020 ESA. A copy of the 2020 Phase I ESA is provided in Appendix B.

5. Database and Records Review

5.1 User Provided Information

Section 6 of the ASTM Standard states that certain tasks, which will help to determine the possibility of RECs associated with the proposed project area, are generally conducted by the report user. These tasks include the following: reviewing title records for environmental liens or activity and land use limitations and considering awareness of any specialized knowledge (e.g., information about previous ownership or environmental litigation); experience related to RECs at the proposed project area; or significant reduction in the purchase price of the proposed project area. Typically, information related to these items should be provided by the report user. To assist the user in gathering information that may be material to identifying RECs, AECOM has provided the RCWD (the property owner) with the User Questionnaire from the ASTM Standard. As part of AECOM's 2020 Phase I ESA, Mr. Jacob Wiley of the RCWD completed the User Questionnaire on September 23, 2020. Mr Wiley was not aware of any environmental liens or AULs having been placed anywhere within the proposed project area boundary. Mr. Wiley also indicated that he did not have specialized knowledge or experience that is material to RECs in connection with the proposed project area. A copy of the completed ASTM E1527-13 User Questionnaire is included in Appendix C of AECOM's 2020 Phase I ESA report, which is provided in Appendix B of this report. On August 9, 2022, Mr. Wiley confirmed that there have been no changes to the proposed project area since the 2020 Phase I ESA, and that the answers provided at that time apply to the new area of the proposed project (TVF RC airfield).

AECOM was unable to interview persons with knowledge regarding title records, environmental liens, activity and use limitations, specialized information, and/or real estate value reduction issues associated with the proposed project area. Follow-up questions were presented to the property owner (RCWD) and have been discussed throughout the relevant sections of this report. All other information for this report was obtained from the EDR database report, online agency database searches, and historical reports prepared by others.

5.2 Title Records/Environmental Liens

Per the agreed upon scope of work, a chain-of-title and an environmental lien search were not performed as part of this assessment. According to County of Riverside Tax Assessor's Records, the parent parcels within the proposed project area boundary are owned by the RCWD.

5.3 Database Information

In accordance with the scope of work and ASTM E1527-13, a search of various governmental databases was conducted by EDR. The site-specific environmental database report was reviewed to evaluate if soil and or groundwater from on-site and/or off-site sources of concern has the potential to impact the proposed project area. The database abbreviations are provided in the site-specific environmental database report.

The database report includes various reports detailing database information for each of the sites identified/geocoded within the specified radius. Additional sites were identified within the database report; however, EDR was not able to map them to specific locations due to insufficient/ contradicting address information. These sites were included in the database report as "orphan" sites. Based upon AECOM's review, no significant concerns appear associated with the orphan sites. A summary of AECOM's review and analysis of the site-specific environmental database report is presented below. A copy of the database report is provided in Appendix C.

Based on AECOM's research, the site is not located on or within a 1-mile radius of tribal lands.

5.3.1 Proposed Project Area

Two database listings were identified associated with the proposed project area, as follows:

Vail Lake Transmission Main & Pump Station at Pulgas Creek Road was plotted as the "target property" in the EDR database report and was identified in the Facility Index System (FINDS) database. As discussed in Section 4.1, Oak Mountain Road is also known as Pulgas Creek Road. The Vail Lake Transmission & Pump Station is associated with the Vaile Lake Transmission Line water pipeline discussed in Section 2.1. The Vail Lake Transmission Line water pipeline was constructed in 2009, which connects Vail Dam to the Upper Valle De Los Caballos (VDC) recharge basins located downstream of the dam to the west of the mouth of the canyon (APN 927-320-045), immediately south of Pond Access Road in the western end of the proposed project area. The water line follows the same general path as the Canyon Access Road and portions of Pond Access Road; however, the Upper VDC recharge basin property is considered off-site in the context of this report.

RCWD VDC well on the 37100 block of De Portola Road is mapped within the boundary of the proposed construction staging and laydown area on the former horse ranch property; however, AECOM observed a well to the south of the former indoor riding arena building which is outside of the boundary of the proposed construction area. The RCWD VDC well is identified in the FINDS database.

These FINDS database listings are compliance in nature and not indicative of a release and therefore, are not considered to represent a REC in connection with the proposed project area, in AECOM's opinion.

5.3.2 Surrounding Sites

No sites were listed in the surrounding area in the environmental database report within the respective ASTM E1527-13 and/or EDR search distances from the proposed project area. Database listings in the surrounding area that were included in the 2020 EDR database report were discussed in Section 4.3.3. The surrounding area listings included in the 2020 EDR database report were not included in the 2022 database report.

5.3.3 Summary of Orphan EDR Listings

EDR's Orphan Summary was also reviewed, which is a listing of sites that EDR was not able to map to specific locations due to insufficient/contradicting address information. There were 72 orphan site listings provided in the EDR database report for the proposed project area. Based on a review of the Orphan Summary listings, none of the Orphans listings appear to be associated with the proposed project, and there does not appear to be a significant environmental concern associated with the Orphans sites identified. AECOM notes that the two listings described in Section 5.3.1 were previously identified as Orphans sites in the 2020 EDR database report.

5.4 Vapor Encroachment Screening

AECOM conducted a Tier 1 VES as part of this assessment. This screening was conducted in general accordance with ASTM E2600-15. The objective of the VES was to determine if a VEC exists.

5.4.1 Proposed Project Area

No on-site sources of vapor encroachment (e.g. UST, contaminated soil, groundwater plume, etc.) were identified during this assessment. There have been no documented releases within the proposed project area boundary. Based on the available information, it is AECOM's opinion that a VEC due to an on-site source does not appear to exist.

5.4.2 Off-site

To conduct the VES of the nearby area, AECOM conducted a detailed review and analysis of the site-specific environmental database report with particular focus on the following two types of sites:

1. Off-site properties that are impacted by chlorinated volatile organic compounds (CVOCs) and/or semi-volatile organic compounds (SVOCs) and are located within approximately 1,750 feet of the proposed project area, and
2. Off-site properties that are impacted by petroleum hydrocarbons and are located within approximately 525 feet of the proposed project area.

A review of the site-specific environmental database indicates there are no CVOC/SVOC or petroleum hydrocarbon-impacted sites located within the above-described radii of the proposed project area. Therefore, based on the available information, it is AECOM's opinion that a VEC at the proposed project area due to an off-site source does not appear to exist.

5.5 Agency File Review

5.5.1 City and County

AECOM searched the Riverside County online Tax Assessor's Records for information on the parent parcels associated with the proposed project area. Information obtained from this online database for the proposed project area has been incorporated throughout this report where appropriate.

AECOM submitted a public records request to the County of Riverside DEH Land Use and Water Resources Division on July 22, 2022 for any records that are available for the proposed project area. The Land Use and Water Resources Division maintains records associated with septic systems and water supply wells. A response was received on August 17, 2022 and a copy of the schematic associated with the septic system for the former residential structure on APN 927-150-038 was provided. This portion of the property is considered off-site for the purposes of this assessment. No other records pertaining to any of the APNs within the project boundary were provided for AECOM's review.

AECOM originally submitted a public records request to the County of Riverside DEH HMMD for records pertaining to the proposed project area in April and June 2020, and submitted a follow up request on July 22, 2022 for any new records available since that time. As part of the original request submitted in 2020, several records were identified for the former horse ranch property at 37115 De Portola Road and the adjacent Los Caballos Pump Station property at 37205 De Portola Road. A response was received on August 9, 2022 from the County of Riverside DEH HMMD indicating that records were identified for this property, and an in person file review was conducted at the County of Riverside DEH HMMD offices on August 30, 2022.Several County of Riverside DEH HMMD Hazardous Materials Disclosure Inspection Reports were reviewed through February 2022 for the former horse ranch property at 37155 De Portola Road. No violations were identified in any of these inspection reports. A Change of Status form dated August 11, 2021 was reviewed for this property which indicated a change of status for facility ID FA0052716, CERS ID 10779811 from "Special Handler" of hazardous materials to "not applicable" due to the removal of the three out-of-service generators that were previously present on-site. The change of status form also noted that the facility is no longer required to maintain a Spill Prevention Control, and Countermeasure Plan since the removal of these generators. Copies of the County of Riverside DEH HMMD records dated between August 2020 and August 2022 are provided in Appendix D. Several additional records were on file for the property at 37115 De Portola Road and the adjacent Los Caballos Pump Station property at 37205 De Portola Road that were reviewed as part of the 2020 Phase I ESA. These records are discussed in the following paragraphs.

Several County of Riverside DEH Community Health Agency Certified Unified Program Agency (CUPA) Hazardous Materials Management permits were on file for the property at 37115 De Portola Road dated

between December 2004 through December 2007, which were registered to Blackridge RJH, Inc., and the same permit was issued for Rock Walker Stables in December 2003. A Hazardous Materials Business Emergency Plan and Inventory Certification Form was found on file for Blackridge RJH, Inc. and dated January 2005 and 2006.

Several CUPA Riverside County Community Health Agency DEH HMMD Supplemental Report forms were reviewed for various occupants of the former horse ranch property at 37115 De Portola Road dated 2002 to 2008. A December 2002 Supplemental Report form for Rock Walker Stables indicated that several 55-gallon drums were present in the concrete bermcontainment area, and that some were open and lacking labels. A June 2006 Supplemental Report form indicated the occupant (Blackridge RJH, Inc.) had a hazardous waste permit that would no longer be needed. The occupant indicated that no vehicle maintenance or other waste generating activities were conducted on-site. The supplemental report form indicated that six 55-gallon drums were observed within the bermed area, next to a diesel and unleaded fuel AST. Two 5-gallon cans of used oil were also reported elsewhere on the property. The report indicated that the facility did not have an evacuation and emergency response procedure available, and they were given a blank business Emergency Plan package to correct this violation. The report form also indicated that the facility did not have an Environmental Protection Agency (EPA) ID number and they had not been disposing of their hazardous wastes. HMMD provided info on how to obtain a temporary EPA ID, and that once the wastes had been removed from the property, they could have their hazardous waste generator permit removed. In July 2007, a Supplemental Report form indicates that the occupant (Blackridge RJH, Inc.) inquired if they could “get out” of their county permits. The Riverside County CUPA indicated that they still had “several ASTs and 55-gallon drums of waste” (number and contents of each type of vessel not specified), and that in order to terminate their county permits, all waste materials and ASTs needed to be removed and disposed of properly, with proper disposal documentation. The occupant indicated that they did not fill up fuel or repair farm equipment on-site, and that all such activities are conducted off-site, including refueling at an off-site service station.

A May 2008 Supplemental Report form indicated that the facility had removed the two fuel ASTs from their property but that six 55-gallon drums containing hazardous materials and/or hazardous wastes and two used batteries that needed to be disposed of before their County permits could be discontinued were still present. No other Supplemental Report forms were provided for review; however, a County of Riverside Community Health Agency DEH HMMD Change of Status form from April 2008 indicated that the former occupant (Blackridge RJH, Inc.) was out of business and that the facility did not have any hazardous materials or wastes on-site at that time.

Additional Change of Status forms from the County of Riverside Community Health Agency DEH HMMD were reviewed, including a December 2002 new permit form changing the site operator from Nexstar Ranch to Rock Walker Stables (same facility, just a change of address and new owner and name), and a February 2004 new permit form indicating a change in operations from Rock Walker Stables to Blackridge RJH, Inc.

Although the previous site occupant(s) at 37115 De Portola Road generated hazardous wastes and used and stored petroleum products and hazardous materials on-site, all such materials have been removed from the property and these operations appear to have ceased since approximately 2008. A Phase II subsurface investigation was conducted on this property in 2015, no VOC or TPH impacts were detected in the soil samples collected at the property. Therefore, these historical operations do not present a REC in connection with this portion of the proposed project area. No additional records associated with the former horse ranch property were provided by the DEH HMMD as part of AECOM’s follow up request submitted in July 2022. Copies of relevant County of Riverside DEH HMMD records are provided in Appendix E of the 2020 Phase I ESA, which is included in Appendix B of this report.

Additional County of Riverside DEH HMMD records were provided for the off-site and adjacent Los Caballos Pump Station property at 37205 De Portola Road. Records provided include hazardous materials management permits, inspection forms, and a Risk Management Plan due to the presence of a

large quantity of ammonia (over 500 pounds). Violations cited by the DEH HMMD are generally regulatory in nature (i.e., faded labels on facility piping, worn or tattered windsocks, etc.) and have historically been resolved shortly after issuance by the RCWD. Given that majority of the violations reviewed for this property were generally administrative or compliance-related and no releases of petroleum products and/or hazardous materials have been identified, this adjacent property does not present a REC to the proposed project area, in AECOM's opinion.

5.5.2 State

AECOM submitted a public records request to the Office of Environmental Health Hazard Assessment (OEHHA) on July 25, 2022 for information pertaining to the proposed project area. A response was received from Ms. Monet Vela of OEHHA on August 8, 2022 indicating that the OEHHA did not have records associated with the proposed project area.

AECOM searched Department of Toxic Substances Control's (DTSC's) online EnviroStor database for California Cleanup Sites involving the DTSC. The EnviroStor database consists of federal National Priorities List (NPL) sites, state response sites, voluntary cleanup sites, and school cleanup sites. There were no records in the vicinity of the proposed project area or surrounding properties identified in the online EnviroStor database.

AECOM searched the California EPA's (CalEPA's) SWRCB online GeoTracker database. The GeoTracker database consists of Leaking Underground Storage Tank Cleanup Sites, (non-petroleum) Cleanup Program Sites (CPS), Military Cleanup Sites, and Permitted UST Sites located throughout California. There were no records in the vicinity of the proposed project area or surrounding properties identified in the online GeoTracker database. Several water wells were identified on the RCWD VDC property and in the surrounding area, as shown in Figure 2 and discussed in Section 2.4.9.

AECOM searched the online CalEPA Regulated Site Portal database. The database combines information from the CERS, EnviroStor, GeoTracker, CIWQS, and the federal Toxics Release Inventory database. The Vail Lake Transmission Main and Pump Station was listed in the Wetlands – Fill and Dredge Material database. The RCWD VDC Chloramination, Ponds, and Vail Lake Pump Station is listed in the Chemical Storage Facilities database. Several wineries in the surrounding area are listed as Chemical Storage Facilities and/or Industrial Facility Stormwater facilities.

AECOM searched the California Department of Conservation, Geologic Energy Management Division's (CalGEM) (formerly Division of Oil, Gas, and Geothermal Resources [DOGGR]) online Well Finder (WellSTAR) database. No oil/gas wells were depicted within or adjacent to the proposed project area boundary in the online CalGEM WellSTAR database. The proposed project area boundary is not located within an oil/gas field.

5.5.3 Federal

AECOM performed a review of online records available on the National Pipeline Mapping System (NPMS) public map viewer maintained by the United States Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA), for natural gas transmission or hazardous liquid pipelines on or adjacent to the proposed project area. No hazardous liquid petroleum or natural gas pipelines were identified on or adjacent to the proposed project area that are within the PHMSA's jurisdiction.

AECOM searched the EPA Enforcement & Compliance History Online (ECHO) and the EPA Envirofacts and Superfund Enterprise Management System (SEMS) online databases. The SEMS database replaced the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) which has since been retired. SEMS includes the same data fields and content as CERCLIS. The Envirofacts database retrieves information obtained from 17 national systems, including the

CERCLIS, Superfund program (NPL sites), hazardous waste sites, and potential hazardous waste sites. The address associated with the proposed project area (former horse ranch property at 37115 De Portola Road) or adjacent properties were not listed in the Envirofacts or SEMS databases.

6. Findings and Opinions

AECOM performed a Phase I ESA of the proposed project area in conformance with the scope and limitations of ASTM E1527-13, which meets the requirements of Title 40, Code of Federal Regulations Part 312 and is intended to constitute *all appropriate inquiry* for purposes of the landowner liability protections. Any exceptions to, or deletions from, this practice are described in Sections 1.3 through 1.5 of this report.

The following sections summarize the findings and opinions of this Phase I ESA of the proposed project area.

6.1 Recognized Environmental Conditions

Based on the above-described activities, no RECs were identified in connection with the proposed project area.

6.2 Controlled Recognized Environmental Conditions

Based on the above-described activities, no CRECs were identified in connection with the proposed project area.

6.3 Historical Recognized Environmental Conditions

Based on the above-described activities, no HRECs were identified in connection with the proposed project area.

6.4 Vapor Encroachment Conditions

Based on the above-described activities, no VECs were identified in connection with the proposed project area.

6.5 De Minimis Conditions

Based on the above-described activities, the following DMCs were identified in connection with the site:

- Low concentrations of select CAM metals and OCPs were detected in soil samples collected during the Phase II investigation conducted at the former horse ranch property in October 2015. Concentrations of these contaminants of concern were detected below their respective regulatory action levels. The previous report concluded that, if percolation ponds were to be installed during future site redevelopment, surface grading for these ponds would substantially reduce the presence of residual pesticide impacts and recommended that, once grading is complete, the bottom of the ponds should be resampled to ensure very low or non-detect concentrations of pesticides exist. AECOM concurs with the previous conclusion and considers the presence of pesticides in soil on this property to present a DMC in connection with the proposed project area.
- A portion of the RCWD-owned property is leased to TVF for use as a RC airfield. A Conex storage container used to store model airplanes and spare parts was observed in this area. A 1-gallon container of model engine fuel and a 2.5-gallon container of herbicide were observed on the unpaved ground beneath a folding table near the Conex storage container. AECOM considers the use and storage of small amounts (5-gallons or less) of petroleum products and/or hazardous materials a DMC in connection with the proposed project area.

- The former horse ranch property reportedly utilized a septic tank; however, no other information on the location of the septic system and associated leaching fields was found. An approximately 3-foot by 5-foot hole with a large piece of plywood over the top and an adjacent sewer cleanout manhole were observed during the July 2022 site reconnaissance. The covered hole was located approximately 30 to 40 feet to the south, southwest of the former horse stable building. This may be the location of the septic tank, but this could not be confirmed. The septic system is reportedly no longer in use. Based on the historical use of this property as a horse ranch, it is likely that the on-site septic system was utilized for disposal and storage of sanitary wastes and possibly horse-related wastes. The presence of a former septic system on this property does not represent a REC in connection to the proposed project area and is considered a DMC, in AECOM's opinion.
- Based on the date of construction of the dam and associated ancillary structures (circa 1949), PCB-containing dielectric fluids associated with on-site electrical equipment may be present, and PCBs may be present in paint and/or caulk (if any) on the stream release valve building.

6.6 Non-ASTM Scope Considerations

Based on the above-described activities, the following non-ASTM scope considerations were identified in connection with the proposed project area:

- Based on the date of construction of the dam and associated ancillary structures (circa 1949), ACMs and LBP may be present in materials used during the original construction of the dam and associated ancillary structures. No asbestos or lead paint surveys were provided for review as part of this ESA, and ACM and LBP surveys were not included within the scope of this ESA. Based on the age of the buildings on the former horse ranch property (early 2000s), ACM and LBP is not expected to be present in these buildings.

7. Conclusions and Recommendations

AECOM has performed a Phase I ESA in conformance with the scope and limitations of ASTM E1527-13 of the Vail Dam Seismic and Hydrologic Remediation Project property located in Temecula, California. Any exception to, or deletions from, this practice are described in Sections 1.3 through 1.5 of this report. This assessment has revealed no evidence of RECs, CRECs, or HRECs in connection with the proposed project area.

The DMCs identified do not warrant further action at this time, in AECOM's opinion. Should the former horse ranch property be redeveloped for use as an extension of the adjacent Upper VDC Recharge Basins property, the bottom of the recharge basins should be resampled once grading is complete to ensure very low or non-detect concentrations of pesticides exist. The on-site septic system may need to be located, excavated, and disposed off-site in accordance with local and state regulations. In addition, the presence or absence of ACM and/or LBP within any of the original dam structures that will be demolished during the proposed project, as well as potential PCB-containing electrical equipment or building materials that will be demolished during the proposed project, should be determined prior to demolition, and if identified, such materials will need to be handled and disposed in accordance with state and federal regulations.

8. Environmental Professional Statement

Ms. Jessica Himebauch was the Environmental Professional (EP) for this project. Ms. Himebauch's EP statement is below and her resume is provided in Appendix E.

I declare that, to the best of my professional knowledge and belief, I meet the definition of an EP as defined in §312.10 of 40 Code of Federal Regulations (CFR) and that I have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the site. I have developed and performed all the appropriate inquiries in conformance with the standards and practices set forth in 40 CFR Part 312.

Signature:  Date: August 5, 2022

9. References

9.1 Persons Interviewed

Mr. Tom Greene of the Rancho California Water District, 4213 Winchester Road, Temecula, California 92590, (951) 522-5953, greenet@ranchowater.com. Mr. Greene escorted Ms. Perhala during AECOM's July 2022 site visit.

Mr. Randy Neff of the Rancho California Water District, 42135 Winchester Road, Temecula, California 92590, (951) 296-6988, neffr@ranchowater.com.

Ms. Nicole West of LSA Associates, Inc., 703 Palomar Airport Road, Suite 280, Carlsbad, California 92011, (760) 931-5471, Nicole.west@lsa.com. Ms. West provided copies of previous reports conducted for the former horse ranch property on June 24, 2020.

Mr. Jacob Wiley of the Rancho California Water District, 42135 Winchester Road, Temecula, California 92590, wileyj@ranchowater.com. Mr. Wiley completed the ASTM E1527-13 User Questionnaire on September 23, 2020 and confirmed conditions were unchanged on August 9, 2022.

9.2 Agencies Contacted

Assessor – County Clerk – Recorder parcel information, reviewed for Riverside County, California at https://www.asrclkrec.com/property-and-recent-sales-viewer.

California Regional Water Quality Control Board (RWQCB) San Diego Region (9) San Diego Hydrologic Basin Planning Area Mapping. April 1995. https://www.waterboards.ca.gov/sandiego/water_issues/programs/basin_plan/docs/sdrwqcb_basinplanmap.pdf.

California Regional Water Quality Control Board (RWQCB) San Diego Region (9) San Diego Water Quality Control Plan. September 8, 1994, amended May 17 2016. https://www.waterboards.ca.gov/sandiego/water_issues/programs/basin_plan/docs/R9_Basin_Plan.pdf

California Environmental Protection Agency Regulated Sites Portal database - CalEPA Regulated Site Portal.

Environmental Protection Agency Envirofacts database - http://www.epa.gov/enviro/.

Environmental Protection Agency Superfund Enterprise Management System (SEMS) database, https://cumulis.epa.gov/supercpad/cursites/srchsites.cfm.

Public Records Request submitted to State of California Office of Environmental Health Hazard Assessment (OEHHA) at http://oehha.ca.gov/public_info/oehhapra.html. Monet Vela, Public Records Act Coordinator, 1001 I Street, PO Box 4010, MS 23B (#58c), Sacramento, California 95812, (916) 323-2517, monet.vela@oehha.ca.gov.

Public Records Request submitted to Riverside County Department of Environment Health – Hazardous Materials Management Division. Requests emailed to DEHRecordsMgmt@rivco.org.

Public Records Request submitted to Riverside County Department of Environment Health – Land Use and Water Resources Division. Requests emailed to landuserecords@rivco.org.

State, California Department of Conservation, Division of Oil, Gas, and Geothermal Resources (DOGGR) Well Finder, http://www.conservation.ca.gov/dog/Pages/wellfinder.aspx.

State Department of Toxic Substances Control (DTSC). EnviroStor database, https://www.envirostor.dtsc.ca.gov/public/map/.

State, California Environmental Protection Agency (CalEPA), Site Portal online database, https://siteportal.calepa.ca.gov.

State Water Resources Control Board GeoTracker online database, **Error! Hyperlink reference not valid.**http://geotracker.waterboards.ca.gov/.

United States Environmental Protection Agency (EPA). Enforcement & Compliance History Online (ECHO), https://echo.epa.gov/facilities/facility-search/results.

United States Department of Transportation, Pipeline and Hazardous Materials Safety Administration (PHMSA), National Pipeline Mapping System (NPMS) public map viewer, https://pvnpms.phmsa.dot.gov/PublicViewer/.

United States Environmental Protection Agency (EPA), Envirofacts Multisystem online search, https://www3.epa.gov/enviro/facts/multisystem.html.

United States EPA, Superfund Enterprise Management System (SEMS) online search, https://www.epa.gov/enviro/sems-search.

United States Geological Survey (USGS), National Water Information System: Mapper. https://maps.waterdata.usgs.gov/mapper/index.html, 2022.

9.3 Documents Reviewed

AECOM Technologies, Inc., Geotechnical Basis of Design Report – Vail Dam Seismic and Hydrologic Remediation Project, Temecula, California 92592. November 29, 2017.

AECOM Technologies, Inc., DRAFT Hydrology Study – Vail Dam Seismic and Hydrologic Remediation Project, Temecula, California 92592. May 2020.

AECOM Technologies, Inc., Phase I Environmental Site Assessment – Vail Dam Seismic and Hydrologic Remediation Project, Temecula, California 92592. September 25, 2020.

ASTM E1527-13, Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process, dated November 2013. www.astm.org.

ASTM E2600-15, Standard Guide for Vapor Encroachment Screening on Property Involved in Real Estate Transactions, dated October 2015. www.astm.org.

California Department of Conservation, Division of Mines and Geology, A General Location Guide for Ultramafic Rocks in California – Areas More Likely to Contain Naturally Occurring Asbestos, ftp://ftp.consrv.ca.gov/pub/dmg/pubs/ofr/ofr_2000-019.pdf

EDR 7.5 Minute Topographic Maps, prepared for Vail Dam Phase I ESA, Temecula, California 92592, dated April 1, 2020. Inquiry number 6025303.5. Topographic Maps 1901, 1903, 1939, 1942, 1943, 1947, 1950, 1953, 1954, 1957, 1968, 1971, 1973, 1978, 1982, 1988, 1997, and 2012. Report prepared by Environmental Data Resources Inc., 6 Armstrong Road, Shelton, Connecticut 06484, (800) 352-0050, www.edrnet.com.

EDR Aerial Photographs Decade Package prepared for Vail Dam Phase I ESA, Temecula, California 92592, dated April 1, 2020. Inquiry number 6025303.8. Aerial photographs dated 1949, 1953, 1961, 1967, 1971, 1985, 1989, 1996, 2002, 2005, 2009, 2012, and 2016. Report prepared by Environmental Data Resources Inc., 6 Armstrong Road, Shelton, Connecticut 06484, (800) 352-0050, www.edrnet.com.

EDR City Directory Abstract prepared for Vail Dam Phase I ESA, Temecula, California 92592, dated April 3, 2020. Inquiry number 6025303.9. City directories reviewed included 1971, 1974, 1979, 1986, 1991, 1996, 2001, 2006, 2010, 2014, and 2017. Report prepared by Environmental Data Resources Inc., 6 Armstrong Road, Shelton, Connecticut 06484, (800) 352-0050, www.edrnet.com.

EDR Radius Map with GeoCheck®, prepared for Vail Dam Phase I ESA, Temecula, California 92592, dated July 21, 2022. Inquiry number 7061920.5s. Report prepared by Environmental Data Resources Inc., 6 Armstrong Road, Shelton, Connecticut 06484, (800) 352-0050, www.edrnet.com.

EDR Sanborn Map Report, prepared for Vail Dam Phase I ESA, Temecula, California 92592, dated April 1, 2020. Inquiry number 6025303.6. Report prepared by Environmental Data Resources Inc., 6 Armstrong Road, Shelton, Connecticut 06484, (800) 352-0050, www.edrnet.com.

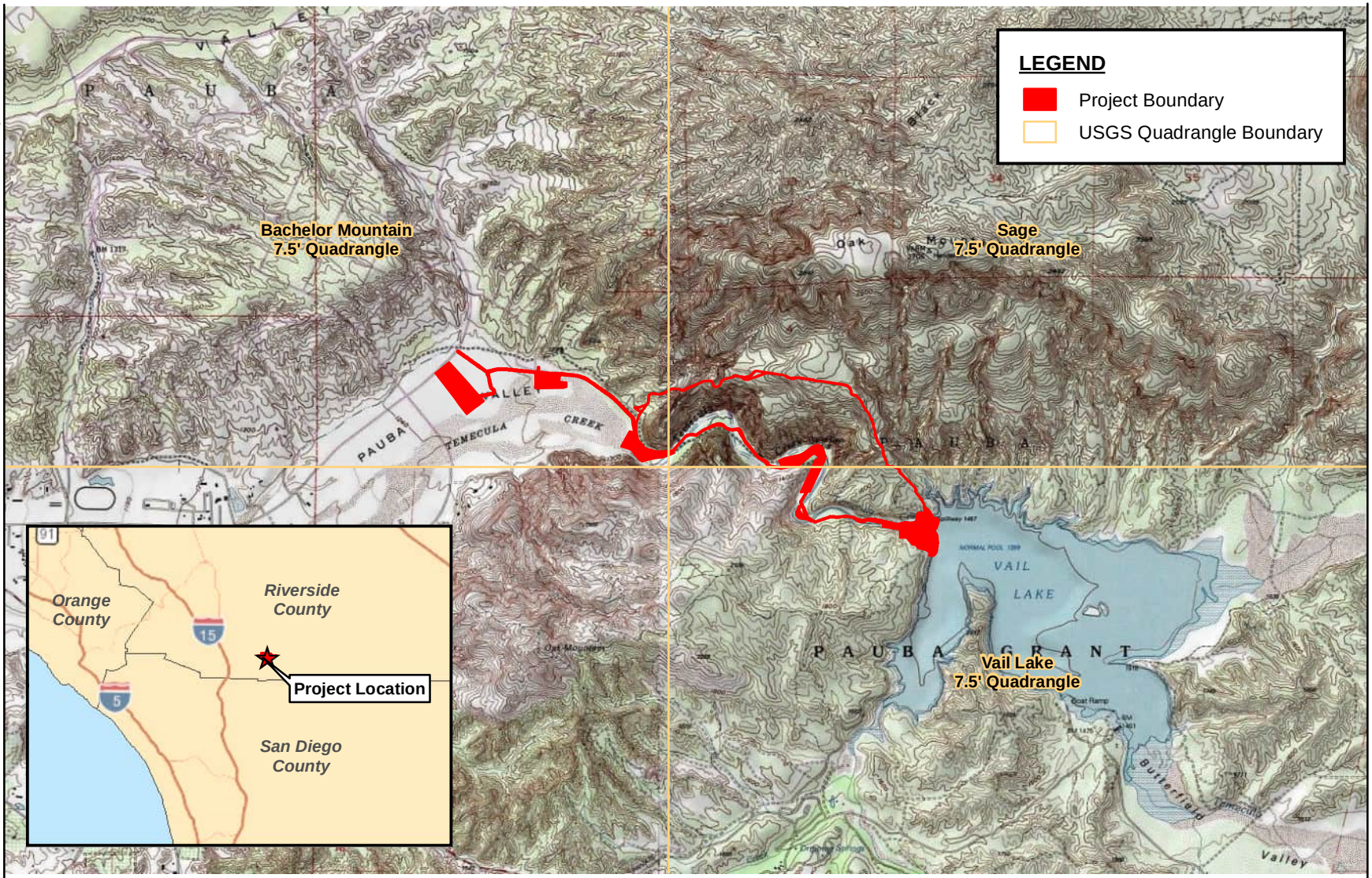
Google Earth website, www.google.earth.com

Phase One, Inc., Limited Phase II Environmental Site Assessment for 37115 De Portola Road, Temecula, California 92592. September 2015.

Phase One, Inc., Phase I Environmental Site Assessment for 37115 De Portola Road, Temecula, California 92592. October 2015.

Figures

Phase I ESA for Vail Dam Seismic and Hydrologic Remediation Project



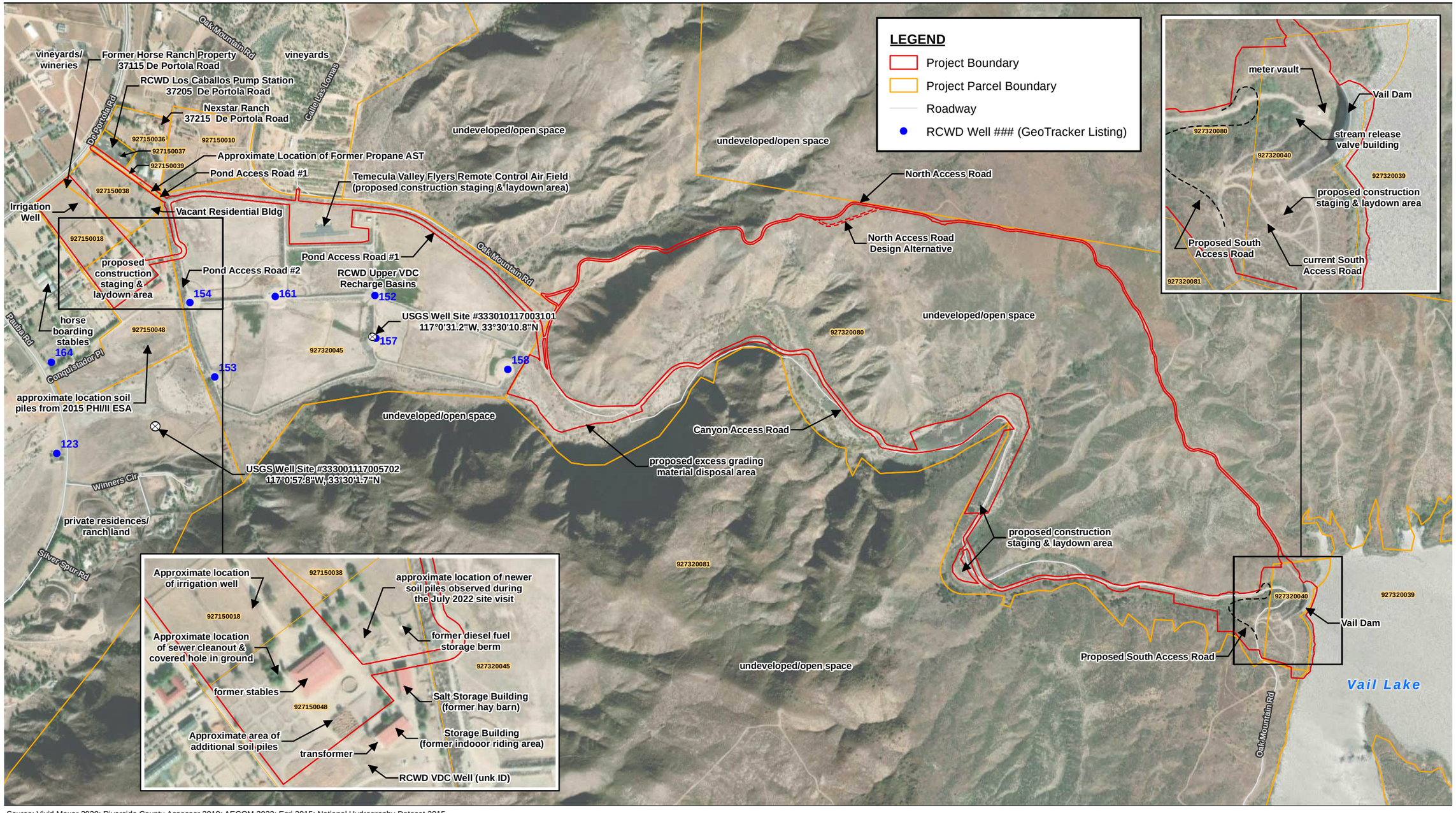
Source: USGS 7.5' Quadrangle Bachelor Mtn (1976); Sage (1960); Pechanga (1984); Vail Lake (1984).

4,000 0 4,000 Feet

Scale: 1:48,000; 1 inch = 4,000 feet

Figure 1
Site Location
37115 De Portola Road, Temecula, California

Path: \\na.aecomnet.com\lfs\AMER\Orange-USORA1\DCS\Projects\WTR\60623135_VAILENVSVS\000_CAD_GIS\920 GIS\map_docs\mxd\ESA_2022\Fig1_SiteLocation.mxd, 7/22/2022, daniel.arellano



Source: Vivid Maxar 2020; Riverside County Assessor 2019; AECOM 2022; Esri 2015; National Hydrography Dataset 2015.

1,000 500 0 1,000 Feet

Scale: 1:12,000; 1 inch = 1,000 feet

Figure 2
Site Plan
37115 De Portola Road, Temecula, California

Path: \\na.aecomnet.com\lfs\AMER\Orange-USORA1\DCS\Projects\WTR\60623135_VAILENVSVS\900_CAD_GIS\920 GIS\map_docs\mxd\ESA_2022\Fig2_SitePlan_Parcels.mxd, 8/10/2022, daniel.arellano

Appendix A

Representative Site Photographs

AECOM

PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photo No. 1	Date: 07/27/22

Direction Photo Taken:

Southeast

Description:

View of gated entrance at 37115 De Portola Road located on the western portion of the proposed project area.



Photo No. 2	Date: 07/27/22

Direction Photo Taken:

Southeast

Description:

View southeast, just inside the gate at 37115 De Portola Road.



AECOM

PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photo No. 3	Date: 07/27/22

Direction Photo Taken:

Southeast

Description:

View from De Portola Road of the former horse ranch area in the western end of the proposed project area, in the vicinity of the proposed construction staging and laydown area.



Photo No. 4	Date: 07/27/22

Direction Photo Taken:

South

Description:

View of the proposed construction staging and laydown area adjacent to the south of De Portola Road, on the northwestern side of the former horse ranch property. An irrigation well visible in the left-center of photo.



AECOM

PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photo No. 5	Date: 07/27/22

Direction Photo Taken:

West

Description:

View of the irrigation well in the northwestern area of the former horse ranch property. The well is on the right and the shorter concrete pipe on the left appears to be sitting on the ground and does not appear to be connected to anything, though this was not verified.



Photo No. 6	Date: 07/27/22

Direction Photo Taken:

South

Description:

View of the eastern side of the former horse stable building.



AECOM

PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photo No. 7	Date: 07/27/22

Direction Photo Taken:

South

Description:

View of the former riding ring adjacent to the eastern corner of the former horse stable building.



Photo No. 8	Date: 07/27/22

Direction Photo Taken:

East

Description:

View of the interior of the former horse stable building. Photo taken from western end of building.



AECOM

PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photo No.	Date:
9	07/27/22

Direction Photo Taken:

South

Description:

View of the former building slab in the western end of the former horse stable building. A horse corral is visible in the left-center of the Photo, as shown by the arrow. Plumbing, presumably associated with a former restroom is visible in the center of the photo, as shown by the circle. The former bar/lounge area structure is visible on the left side of the photo.



Photo No.	Date:
10	07/27/22

Direction Photo Taken:

South

Description:

View of interior of the bar/lounge area from the north side of the former horse stable building.



PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photo No. 11	Date: 07/27/22

Direction Photo Taken:

East

Description:

View of a covered hole and adjacent sewer cleanout was observed to the west of the former horse stable building. An arrow is pointing to the sewer cleanout. This is assumed to be associated with the septic system/septic tank present on the property.



Photo No. 12	Date: 07/27/22

Direction Photo Taken:

West

Description:

View west of the covered hole and adjacent sewer cleanout described in the previous photo. An arrow is pointing to the sewer cleanout. The former horse ring fencing present in the southwestern area of the former horse ranch property is visible in the center and center-left side of the photo.



AECOM

PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photo No.	Date:
13	07/27/22

Direction Photo Taken:

East

Description:

View of the open area to the south of the former horse stable building and north of the former indoor riding arena. Several older soil piles were observed in the area that is circled on the right side of the photo. These soil piles are further described in the following photo.



Photo No.	Date:
14	07/27/22

Direction Photo Taken:

Northwest

Description:

View northeast of several older soil piles with vegetation growing on them that are present to the south of the former horse stable building. These soil piles are present in the approximate southern extent of the proposed construction and staging laydown area. These are not the same soil piles that were sampled during the 2015 Phase II ESA. This area was outside of the boundary of the previous Phase I ESA but is within the current project area boundary.



AECOM

PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photo No. 15	Date: 07/27/22

Direction Photo Taken:

East

Description:

View east of the west-southwest side of the former indoor riding arena. A transformer is present adjacent to this building and is shown with an arrow, and a SCE electrical panel is present to the right of the transformer. No activity is anticipated in the area of this building during the proposed project, and this area is considered off-site.



Photo No. 16	Date: 07/27/22

Direction Photo Taken:

North

Description:

Closeup view of the transformer from previous photo.



AECOM

PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photo No. 17	Date: 07/27/22

Direction Photo Taken:

South

Description:

View of the eastern side of the former indoor riding arena building.



Photo No. 18	Date: 07/27/22

Direction Photo Taken:

West

Description:

View of an empty water silo adjacent to the southwestern corner of the former indoor riding arena building.



AECOM

PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photo No. 19	Date: 07/27/22

Direction Photo Taken:

West

Description:

View of the interior office area inside the northeastern corner of the former indoor riding arena building.



Photo No. 20	Date: 07/27/22

Direction Photo Taken:

West

Description:

View of the interior area of the former riding arena building.



AECOM

PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photo No. 21	Date: 07/27/22

Direction Photo Taken:

North

Description:

View of stored materials (aluminum pipe and well gaskets) and a pontoon boat present in the former indoor riding arena building. The office area in Photo 19 is visible in the right side of the photo.



Photo No. 22	Date: 07/27/22

Direction Photo Taken:

West

Description:

View of the dirt floor in the western end of the former indoor riding arena building.



AECOM

PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photo No. 23	Date: 07/27/22

Direction Photo Taken:

Northeast

Description:
View of an empty shed to the east of the former riding arena and hay barn structures. According to a RCWD employee that was present on-site during the July 2022 site visit, this structure was recently placed here from another RCWD property and is temporarily being stored here until they find another use for it. No activity is anticipated in the area of this structure during the proposed project, and this area is considered off-site



Photo No. 24	Date: 07/27/22

Direction Photo Taken:

East

Description:

Interior view of the structure from the preceding photo.



AECOM

PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photo No. 25	Date: 07/27/22

Direction Photo Taken:

North

Description:
View west of the former hay barn structure, which is currently referred to as the salt storage building. A salt hopper is visible on the left side of the photo. Secondary containment tarps associated with two 1,000-gallon capacity, out-of-service diesel generators that were previously stored beneath the canopy are visible on the right side of the photo. Portions of Pond Access Road No. 2 pass through the north side of this structure.



Photo No. 26	Date: 09/01/20

Direction Photo Taken:

Northeast

Description:

Closeup view of the two secondary containment tarps associated with the two 1,000-gallon capacity, out-of-service diesel generators that were previously stored in this area. An arrow points to the area where the newer soil piles were observed during the July 2022 site visit.



AECOM

PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photo No. 27	Date: 07/27/22

Direction Photo Taken:

South

Description:

View of a salt hopper in the southern end of the former hay barn, current salt storage building.



Photo No. 28	Date: 07/27/22

Direction Photo Taken:

North

Description:

View of the soil piles to the north of the former hay barn/current salt storage building and northeast of the former horse stable building. Several of these soil piles were observed during the June 2020 site visit, as is evident by vegetation growing on several of them.



AECOM

PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photo No. 29	Date: 07/27/22

Direction Photo Taken:

East

Description:

Additional view from the western end of the newer soil piles described in the previous photo.



Photo No. 30	Date: 07/27/22

Direction Photo Taken:

North

Description:

View of the bermed enclosure previously utilized to store 55-gallon drums of diesel fuel and two fuel ASTs.



PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photo No. 31	Date: 07/27/22

Direction Photo Taken:

North

Description:

View of the southern side of a former residence located to the south-southwest of the proposed Pond Access Road No.1. Although no activity is anticipated in the area of this structure during the proposed project and this area is considered off-site, the RCWD indicated that this structure will be demolished during project construction.



Photo No. 32	Date: 07/27/22

Direction Photo Taken:

South

Description:

View of the northern side of the former residential structure.



PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photo No. 33	Date: 07/27/22

Direction Photo Taken:

North

Description:
View north of fencing present along the proposed Pond Access Road No.1. The location of a former propane AST associated with the former residence is shown but a circle. The property adjacent to the north side of Pond Access Road No.1 is an active horse ranch, and according to the RCWD, the bermed area visible beyond the fence was presumably placed by them as a means to minimize disturbance to the horses from passing



Photo No. 34	Date: 07/27/22

Direction Photo Taken:

West

Description:

View west of the gate to the unpaved section of road that leads to the Temecula Valley Flyers airfield property. This section of road is adjacent to (south of) Oak Mountain Road and will connect with the paved section of road at the far eastern end of proposed Pond Access Road No.1.



AECOM

PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photo No. 35	Date: 07/27/22

Direction Photo Taken:

East

Description:

View east from the north side of the Temecula Valley Flyers airfield property entrance along the proposed Pond Access Road No.1.

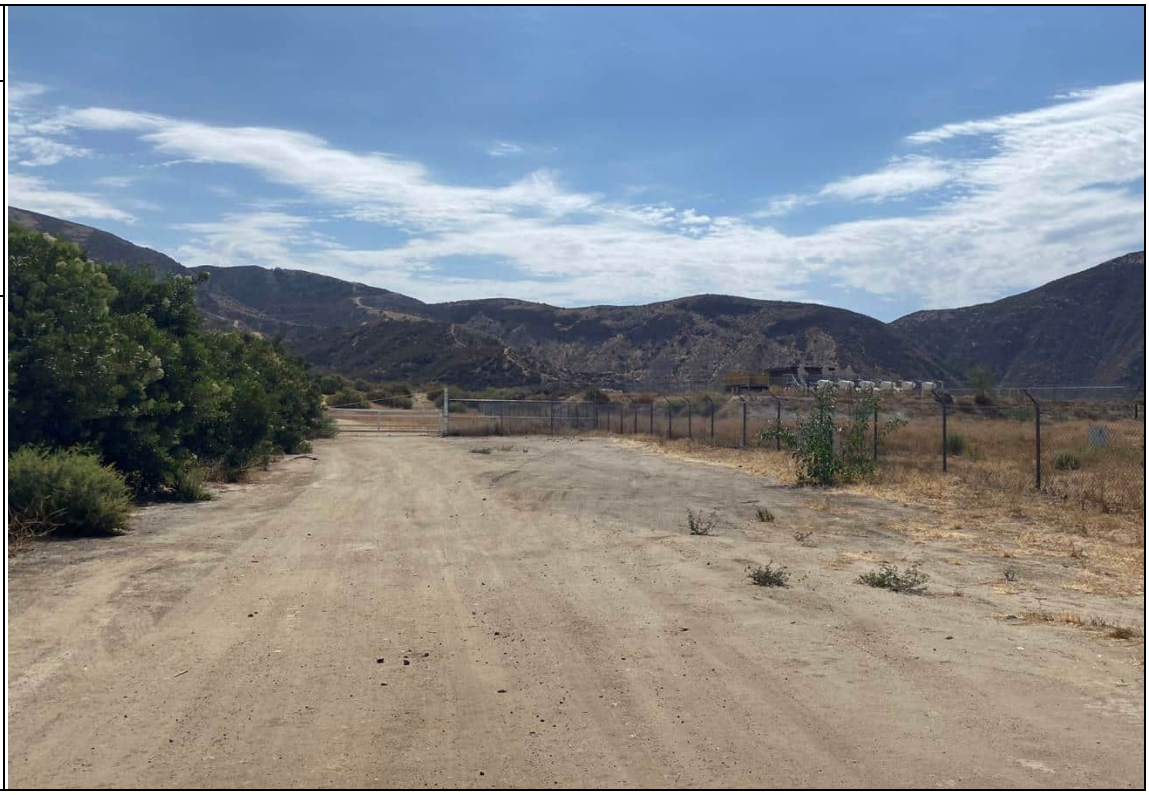


Photo No. 36	Date: 07/27/22

Direction Photo Taken:

South

Description:

View south from the entrance to the Temecula Valley Flyers airfield property. This area is a proposed construction staging and laydown area.



AECOM

PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photo No. 37	Date: 07/27/22

Direction Photo Taken:

West

Description:

View west of the Temecula Valley Flyers airfield property from the RCWD roadway adjacent to (east of) the eastern boundary of the proposed construction staging and laydown area.



Photo No. 38	Date: 07/27/22

Direction Photo Taken:

East

Description:

View east toward the Temecula Valley Flyers airfield property from the RCWD roadway adjacent to (west of) the western boundary of the proposed construction staging and laydown area.



AECOM

PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photo No.	Date:
39	07/27/22

Direction Photo Taken:

Southeast

Description:

View of a Conex storage box and portable toilet used by the Temecula Valley Flyers members. One of the members indicated the Conex is used to store remote control airplanes and parts for model airplanes.



Photo No.	Date:
40	07/27/22

Direction Photo Taken:

West

Description:

View west of the Temecula Valley Flyers airfield landing strip.



AECOM

PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photo No.	Date:
41	07/27/22

Direction Photo Taken:

East

Description:

View east of the western end of Pond Access Road No. 1 from adjacent to (east of) De Portola Road.



Photo No.	Date:
42	07/27/22

Direction Photo Taken:

Southeast

Description:

View from outside (west of) the gate near the Pond Access Road No. 1 entrance.



PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photo No. 43	Date: 07/27/22

Direction Photo Taken:

Northwest

Description:

View northwest of Pond Access Road No. 1 the gated entrance. The berm associated with adjacent horse ranch property discussed in photo 33 is visible on the right side of photo.



Photo No. 44	Date: 07/27/22

Direction Photo Taken:

East

Description:

View east along Pond Access Road No.1 toward the canyon entrance. A portion of the North Access Road is visible in the distance, as shown by the arrow.



PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photo No. 45	Date: 07/27/22

Direction Photo Taken:

North

Description:

View north of the off-site RCWD Upper VDC Retention Basin property, south of Pond Access Road No.1. A portion of the North Access Road is visible in the distance, as shown by the arrow.



Photo No. 46	Date: 07/27/22

Direction Photo Taken:

South

Description:

View of another off-site RCWD Upper VDC Retention Basin, this one was receiving.



PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photo No. 47	Date: 07/27/22

Direction Photo Taken:

West

Description:

View west from inside the gated entrance to the western end of Canyon Access Road.



Photo No. 48	Date: 07/27/22

Direction Photo Taken:

East

Description:

View east of the western end of Canyon Access Road. The North Access Road runs along the top of the ridge pictured in this Photo.



AECOM

PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photo No.	Date:
49	07/27/22

Direction Photo Taken:

South

Description:

View of a blow off valve associated with the Vail Lake Transmission Line pipeline, adjacent to (south of) Canyon Access Road.



Photo No.	Date:
50	07/27/22

Direction Photo Taken:

East

Description:

View of an area of water released from Vail Dam present on Canyon Access Road.



AECOM

PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photo No. 51	Date: 07/27/22

Direction Photo Taken:

East

Description:

First view of the dam while driving east of Canyon Access Road.



Photo No. 52	Date: 07/27/22

Direction Photo Taken:

East

Description:

View of the dam from the base of the dam. An at-grade meter vault is visible in lower half of the photo.



AECOM

PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photo No. 53	Date: 07/27/22

Direction Photo Taken:

West

Description:

Close-up view of the at-grade meter vault from the previous Photo, approximately 100 feet downstream (west of) the dam.



Photo No. 54	Date: 07/27/22

Direction Photo Taken:

North

Description:

View of a steam release valve building approximately 200 feet downstream (west of) the dam.



AECOM

PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photo No. 55	Date: 07/27/22

Direction Photo Taken:

North

Description:

Close up view of the northern side of the dam from the dam base.



Photo No. 56	Date: 07/27/22

Direction Photo Taken:

Northwest

Description:

View from the top of the southern end of the dam.



PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photo No. 57	Date: 07/27/22

Direction Photo Taken:

Northeast

Description:

View of the lakeside of the dam, with Vail Lake visible on the right side of Photo.



Photo No. 58	Date: 07/27/22

Direction Photo Taken:

North

Description:

View north of the weirs at the top of the spillway on the south side of the dam. A portion of the North Access Road is visible in the vicinity of the arrow.



AECOM

PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photo No. 59	Date: 07/27/22

Direction Photo Taken:

South

Description:

View of the southern-most spillway at the top of the dam.



Photo No. 60	Date: 07/27/22

Direction Photo Taken:

Northeast

Description:

View from the top of the dam, driving north toward the bottom. The stream release valve building can be seen in the bottom left quadrant of the Photo, and the spillway at the top of the dam on the northern side is visible in the top left quadrant, as shown by the arrow.



AECOM

PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photo No. 61	Date: 07/27/22

Direction Photo Taken:

West

Description:

View from the top of the dam of the proposed South Access Road area. This area will be graded and reconfigured for relocation of the South Access Road, such that this area may be used for a construction staging and laydown area.



Photo No. 62	Date: 07/27/22

Direction Photo Taken:

West

Description:

View of an area on the southwest side of Canyon Access Road that is proposed for use as a construction staging and laydown area



AECOM

PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photo No. 63	Date: 07/27/22

Direction Photo Taken:

West

Description:

View west, exiting the canyon on Canyon Access Road. The white well vault and bollards on the left side of the Photo are a cathode station associated with the Vail Lake Transmission Line pipeline.



Photo No. 64	Date: 07/27/22

Direction Photo Taken:

East

Description:

View of the entrance to the adjacent RCWD Los Caballos Pump Station at 37205 De Portola Road, north of Pond Access Road No. 1. .



PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photo No.	Date:
65	07/27/22

Direction Photo Taken:

Southwest

Description:

View southwest down De Portola Road of the vineyard across the street from the proposed project area entrance.



Photo No.	Date:
66	07/27/22

Direction Photo Taken:

Northeast

Description:

View of the vineyard across the street from the proposed project area entrance on De Portola Road.



Appendix B

AECOM 2020 Phase I ESA Report

Phase I Environmental Site Assessment Vail Dam Seismic and Hydrologic Remediation Project 37115 De Portola Road Temecula, California

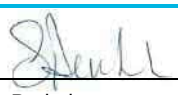
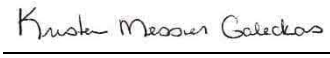
LSA Associates, Inc. and
Rancho California Water District

60623135

September 2020

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Revision	Revision Date	Details	Authorized	Name	Position
01	09/25/20	LSA Review	Project Manager	Jimmy Medellin	Project Manager

Distribution List

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Acronyms and Abbreviations

#	number
ACM	Asbestos-containing materials
AECOM	AECOM Technical Services, Inc.
amsl	above mean sea level
APN	Assessor's Parcel Number
AST	aboveground storage tank
ASTM	ASTM International (formerly known as American Society of Testing and Materials)
ASTM E1527-13	ASTM Designation E1527-13, *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process*
ASTM E2600-15	ASTM Designation E2600-15, *Standard Guide for Vapor Encroachment Screening on Property Involved in Real Estate Transactions* dated October 2015
AUL	Activity Use Limitations
bgs	below ground surface
CalEPA	California Environmental Protection Agency
CERCLIS	Compensation and Liability Information System
CERS	California Environmental Reporting System
CIWQS	California Integrated Water Quality System
CPS	Cleanup Program Sites
CREC	controlled recognized environmental condition
CUPA	Certified Unified Program Agency
CVOC	chlorinated volatile organic compound
DEH	County of Riverside Department of Environmental Health
DMC	de minimis condition
DOGGR	California Department of Conservation, Division of Oil, Gas, and Geothermal Resources
DTSC	Department of Toxic Substance Control
EDR	Environmental Data Resources, Inc.
EP	Environmental Professional
EPA	Environmental Protection Agency
ESA	Environmental Site Assessment
FINDS	Facility Index System
GBDR	geotechnical basis of design report
HMMD	County of Riverside Hazardous Materials and Management Division
HREC	historical recognized environmental condition
ID	identification
LBP	Lead-based paint
LSA	LSA Associates, Inc.
No.	number
NOA	Naturally occurring asbestos
NPL	National Priorities List
NPMS	National Pipeline Mapping System
OEHHA	Office of Environmental Health Hazard Assessment
PCB	polychlorinated biphenyl
PHMSA	Pipeline and Hazardous Materials Safety Administration
RCWD	Rancho California Water District
REC	recognized environmental condition
RWQCB	Regional Water Quality Control Board
SCE	Southern California Edison
SEMS	Superfund Enterprise Management System
SVOC	semi-volatile-organic compound
TPH	total petroleum hydrocarbons

USGS	United States Geological Survey
UST	underground storage tank
VDC	Valle De Los Caballos
VEC	vapor encroachment condition
VES	vapor encroachment screening
VOC	volatile organic compound

Executive Summary

LSA Associates, Inc. (LSA), in cooperation with the property owner (Rancho California Water District [RCWD]), contracted with AECOM Technical Services, Inc. (AECOM) to perform a Phase I Environmental Site Assessment (ESA) of the Vail Dam property and associated access roads, the access for which is located at 37115 De Portola Road, near the intersection of De Portola Road and Oak Mountain Road, located to the east of the City of Temecula in the southwestern area of unincorporated Riverside County, California (the proposed project area). This Phase I ESA was performed in general conformance with the scope and limitations of ASTM International (formerly known as American Society of Testing and Materials) (ASTM) Standard Practice Designation E1527-13 for ESAs. Exceptions to, or deletions from, this practice are described in this report.

The site visit occurred on June 22, 2020. The 65.5-acre proposed project area consists of:

- two proposed entrances at the western end from De Portola Road (known as Pond Access Roads #1 and #2),
- portions of an approximate 50-acre former horse ranch property at the western end,
- an approximate existing 1-mile, unimproved one-lane road known as Pond Access Road #1, to the south of Oak Mountain Road, and located east of the former horse ranch property,
- two existing approximate 2-mile, unimproved, single-lane roads (known as North Access Road and Canyon Access Road),
- the current Vail Dam and associated features at the eastern end.

Permanent structures within the proposed project area include the Vail Dam, associated ancillary structures at the eastern end, and three farm structures on the former horse ranch property at the western end. The structures on the former horse ranch property include a former haybarn, stables, and an indoor riding arena. The only structures within the proposed project area boundary are the former haybarn and stable building; the former indoor riding arena is considered off-site within the context of this report. With the exception of two of the former horse ranch structures, the existing dam, associated ancillary structures, and various unpaved roadways, there are no other buildings or improvements on the other portions of the proposed project area.

As part of the proposed project, the RCWD proposes to remediate seismic and hydrologic hazards associated with the existing Vail Dam by constructing a new straight-axis gravity concrete dam immediately downstream of the existing dam. The North Access Road and Canyon Access Roads will require grading and widening in some areas to allow for construction equipment access and installation of turnout areas. Portions of the former horse ranch may also be utilized as construction staging and laydown areas and/or a concrete batch plant during the proposed project; however, plans for this property during construction have not been confirmed. There are also construction equipment staging and laydown areas proposed downstream (west) of the dam and along portions of Canyon Access Road.

The Vail Dam was originally constructed in 1948 to 1949 to store local runoff for the purpose of irrigation and water supply. The dam and reservoir were acquired by the RCWD in 1978 and have been used since that time for water supply and replenishment of the RCWD's groundwater basins, which occupy the area adjacent to (south of) Pond Access Road #1, between the intersection of the Pond Access Roads #1 and #2 entrances in the western end of the proposed project area and west to the North Access Road/Canyon Access Road split. Improvements to the dam were conducted in the 1980s to address erosion issues, and in 2007 a rehabilitation of the outlet works was completed. The former horse ranch buildings in the western end of the proposed project area were constructed in the early 2000s, and this property operated as a horse ranch between approximately 2002 and 2015. The RCWD acquired the former horse ranch property in 2015. The western end of the proposed project area in the vicinity of Pond Access Roads #1 and #2 and the 50-acre former horse ranch property were utilized as agricultural row crops during at least

the mid-1940s through the late 1960s or early 1970s. All other unimproved roads included within the project area have been utilized as such since construction of the dam in the late 1940s. The areas to the north and south of Canyon Access Road and North Access Road are and have historically been undeveloped, open space.

During the site visit, no visual evidence of underground storage tanks (USTs), (e.g., vent pipes, fill ports), water wells, monitoring wells, dry wells, oil/gas wells, clarifiers, or septic tank systems was identified within the proposed project area. A concrete bermed enclosure, which was reportedly historically used to store 55-gallon drums of diesel fuel used for farm equipment, was observed on the former horse ranch property during the site reconnaissance. No drums or other equipment was observed during the June 2020 site reconnaissance, and no staining was observed within or adjacent to the concrete secondary containment enclosure. Two 1,000-gallon, portable, diesel-powered generators and a third diesel generator of an unknown capacity were observed under the former haybarn canopy building on the former horse ranch property during AECOM's June 2020 site visit. No staining or standing liquids were observed beneath these generators at the time of the site visit. The two larger generators were stored on temporary secondary containment reservoirs made from a tarpaulin material. The site contact indicated these generators are out-of-service and cannot be utilized for temporary power. An updated photograph taken by the RCWD on September 1, 2020, shows that the smaller generator had been replaced with a third 1,000-gallon diesel generator, which is also being stored on a temporary secondary containment reservoir. A 2015 Phase I ESA prepared by Phase One, Inc. (Phase One) (discussed below) indicated that the former horse ranch property utilized a septic tank; however, the current site owner (RCWD) did not have information on the location of the septic system and associated leaching fields. Currently, there are no facilities in use on the former horse ranch property, and the RCWD indicated that, if a septic system is present, it is no longer in use. Based on the historical use of this property as a horse ranch, it is likely that the on-site septic system was utilized for disposal and storage of human- and possibly horse-related wastes. In AECOM's opinion, the presence of a septic system on this property does not represent a recognized environmental condition (REC) in connection to the proposed project area.

A previous Phase I and Phase II ESA was conducted by Phase One on the 50-acre former horse ranch property in 2015. The 2015 Phase I ESA identified the following RECs associated with the former horse ranch property: historical agricultural use of the property during at least the mid-1940s through the late 1960s or early 1970s; on-site soil piles that originated from adjacent properties that may have also been used for agricultural purposes; potential releases to the soil surrounding the concrete bermed enclosure that was used to store 55-gallon drums of diesel fuel; and accumulated organics in soil due to the presence of a horse farm that may have led to methane production in soil. During the Phase II ESA, 69 soil borings, nine of which were also used as soil vapor sampling points to evaluate the presence of methane in soil, were advanced at the former horse ranch property. Concentrations of organochlorine pesticides and select California Administrative Manual 17 metals were detected in soil at concentrations below regulatory action levels, and no total petroleum hydrocarbons or volatile organic compounds were detected above laboratory detection limits. Methane was not detected in any soil vapor samples collected. The Phase II report concluded that minimal impacts resulting from historical operations on the former horse ranch property had occurred. AECOM concurs with these conclusions and considers the presence of subsurface impacts resulting from historical agricultural use at the former horse ranch property to present a de minimis condition (DMC) to the proposed project.

The proposed project area is located in a rural area approximately three miles east of the City of Temecula, in an unincorporated area of southwestern Riverside County, California. The area to the north of the Pond Access Road #1 entrance adjacent to De Portola Road in the western end of the site is bordered by the RCWD Los Caballos Pump Station, beyond which is open space. The area to the south of the former horse ranch property and proposed Pond Access Road #2 is bordered by a horse-boarding facility. The western end of Pond Access Road #1, between the proposed Pond Access Roads #1 and #2 convergence and west of the Canyon Access Road/North Access Road split, is bordered to the north by Oak Mountain Road (also known as Las Pulgas Road), beyond which is a residential property and ranch land, and to the south by the RCWD Upper Valle De Los Caballos Recharge Basins, beyond which is

open space, and to the west by De Portola Road, across which is a vineyard. The areas to the north and south of Canyon Access Road and North Access Road is undeveloped, open space. The areas surrounding the dam to the north, south, and west are also undeveloped areas, and Vail Lake is present adjacent to the east of the dam. Based on AECOM's site reconnaissance of the surrounding areas, no off-site sources of environmental concern were identified.

The proposed project area was not identified in the site-specific environmental database report. One off-site property (the adjacent RCWD Los Caballos Pump Station at 37205 De Portola Road) was identified within the respective ASTM E1527-13 and/or Environmental Data Resources, Inc. search distances from the proposed project area. Based on AECOM's review and analysis of the database listings and on the type of listings (i.e., compliance, non-contamination-related), this site is not expected to present a REC to the proposed project area.

No vapor encroachment conditions were identified during completion of a Tier 1 vapor encroachment screening following ASTM Designation E2600-15, *Standard Guide for Vapor Encroachment Screening on Property Involved in Real Estate Transactions* dated October 2015 (ASTM E2600-15).

Based on the above-described activities, no RECs, controlled RECs, or historical RECs were identified in connection with the proposed project area.

The following DMCs were identified in connection with the proposed project area:

- Low concentrations of select metals and organochlorine pesticides were detected in soil samples collected during the Phase II investigation conducted at the former horse ranch property in October 2015. Concentrations of these contaminants of concern were detected below their respective regulatory action levels. The previous report concluded that, if percolation ponds were to be installed during future site redevelopment, surface grading for these ponds would substantially reduce the presence of residual pesticide impacts at the site and recommended that, once grading is complete, the bottom of the ponds should be resampled to ensure very low or non-detect concentrations of pesticides exist. AECOM concurs with the previous conclusion and considers the presence of pesticides in soil on this property to present a DMC in connection with the proposed project area.

- Based on the date of construction of the dam and associated ancillary structures (circa 1949), PCB-containing dielectric fluids associated with on-site electrical equipment may be present, and PCBs may be present in paint and/or caulk (if present) on the stream release valve building.

Based on the above described activities, the following non-ASTM scope considerations were identified in connection with the proposed project area:

- Based on the date of construction of the dam and associated ancillary structures (circa 1949), ACMs and LBP may be present in materials used during the original construction of the dam and associated ancillary structures. No asbestos or lead paint surveys were provided for review as part of this ESA, and ACM and LBP surveys were not included within the scope of this ESA. Based on the age of the buildings on the former horse ranch property (early 2000s), ACM and LBP is not expected to be present in these buildings.

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1. Introduction

1.1 Purpose

This Phase I Environmental Site Assessment (ESA) was performed pursuant to AECOM Technical Services, Inc.'s (AECOM's) written proposal, dated September 25, 2019, between LSA Associates, Inc. (LSA) and AECOM. The purpose of this Phase I ESA is to provide the client and owner with information for use in evaluating recognized environmental conditions (RECs) associated with the proposed project area, which will be incorporated into a California Environmental Quality Act Environmental Impact Report document being prepared for the proposed project area by LSA. The Phase I ESA was of the Vail Dam property and associated access roads, the access for which is located at 37115 De Portola Road, near the intersection of De Portola Road and Oak Mountain Road, located to the east of the City of Temecula in the southwestern area of unincorporated Riverside County, California (the proposed project area). This Phase I ESA is based on a review of existing conditions, reported pre-existing conditions, and observed operations within the proposed project area and adjacent properties.

Per ASTM International (formerly known as American Society of Testing and Materials) (ASTM) Designation E1527-13, *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process* (ASTM E1527-13), potential findings can include RECs, historical RECs (HRECs), controlled RECs (CRECs), and de minimis conditions (DMCs). A REC is defined by the ASTM standard as "the presence or likely presence of any hazardous substances or petroleum products in, on, or at a property: (1) due to any release to the environment; (2) under conditions indicative of a release to the environment; or (3) under conditions that pose a material threat of a future release to the environment." The term includes hazardous substances or petroleum products even under conditions in compliance with laws. HRECs are a past release of any hazardous substances or petroleum products that has occurred in connection with the site and has been addressed to the satisfaction of the applicable regulatory authority or is meeting unrestricted use criteria established by a regulatory authority, without subjecting the site to any required controls. CRECs are a recognized environmental condition resulting from a past release of hazardous substances or petroleum products that has been addressed to the satisfaction of the applicable regulatory authority, with hazardous substances or petroleum products allowed to remain in place subject to the implementation of required controls. DMCs are those situations that do not present a material risk of harm to public health or the environment and generally would not be subject to enforcement action if brought to the attention of the regulating authority.

In addition, a Tier 1 vapor encroachment screening (VES) was completed as part of this assessment. This screening was conducted in general accordance with the ASTM Designation E2600-15, *Standard Guide for Vapor Encroachment Screening on Property Involved in Real Estate Transactions* dated October 2015 (ASTM E2600-15). The objective of the VES is to evaluate if a vapor encroachment condition (VEC) exists.

1.2 Scope of Work

The Phase I ESA included a site visit, regulatory research, historical review, environmental database analysis, and a review of the proposed project area. In conducting the Phase I ESA, AECOM assessed the proposed project area for visible signs of possible contamination, researched public records for the proposed project area and adjacent properties (as applicable), and conducted interviews with persons knowledgeable about the proposed project area.

This assessment was performed in general accordance with ASTM E1527-13 and AECOM's proposal, dated September 25, 2019. Conclusions reached in this report are based upon the assessment performed and are subject to limitations set forth in Sections 1.3, 1.4, and 1.5 below.

1.3 Study Limitations

This report describes the results of AECOM's Phase I ESA to identify the presence of conditions materially affecting the proposed project area and/or property within the limits of the established scope of work as described in our proposal.

As with any due diligence assessment, there is a certain degree of dependence upon oral information provided by facility or site representatives, which is not readily verifiable through visual observations or supported by any available written documentation. AECOM shall not be held responsible for conditions or consequences arising from relevant facts that were concealed, withheld, or not fully disclosed by facility or site representatives at the time this assessment was performed. In addition, the findings and opinions expressed in this report are subject to certain conditions and assumptions, which are noted in the report. Any party reviewing the findings of the report must carefully review and consider all such conditions and assumptions.

This report and all field data and notes were gathered and/or prepared by AECOM in accordance with the agreed upon scope of work and generally accepted engineering and scientific practice in effect at the time of AECOM's assessment of the proposed project area. The statements, findings, and opinions contained in this report are intended only to give approximations of the environmental conditions within the proposed project area.

As specified in ASTM E1527-13, it is incumbent that the client and any other parties who review and rely upon this report understand the following inherent conditions surrounding any Phase I ESA:

- Uncertainty Not Eliminated – No Phase I ESA can wholly eliminate uncertainty regarding the potential for a REC in connection with a property. Performance of this practice is intended to reduce, but not eliminate, uncertainty regarding the potential for a REC in connection with a property, and this practice recognizes reasonable limits of time and costs. (Section 4.5.1 of ASTM E1527-13)
- Not Exhaustive – "All appropriate inquiry" does not mean an exhaustive assessment of a clean property. There is a point at which the cost of information obtained outweighs the usefulness of the information and, in fact, may be a material detriment to the orderly completion of transactions. One of the purposes of this practice is to identify a balance between the competing goals of limiting the costs and time demands inherent in performing a Phase I ESA and the reduction of uncertainty about unknown conditions resulting from additional information. (Section 4.5.2 of ASTM E1527-13)
- Comparison with Subsequent Inquiry – Phase I ESAs must be evaluated based on the reasonableness of judgments made at the time and under the circumstances in which they were made. Subsequent Phase I ESAs should not be considered valid standards to judge the appropriateness of any prior assessment based on hindsight, new information, use of developing technology or analytical techniques, or other factors. (Section 4.5.4 of ASTM E1527-13)

Similar inherent limitations exist in cases where the Phase I ESA included a screening-level assessment of vapor migration or vapor encroachment; such an assessment is a required part of a Phase I ESA when ASTM E1527-13 is employed. According to ASTM E2600-15, the following limitations apply:

- Uncertainty Not Eliminated in Screening – No VES can wholly eliminate uncertainty regarding the identifications of VECs in connection with the proposed project area. (Section 4.5.1 of ASTM E2600-15)
- Not Exhaustive – The guide is not meant to be an exhaustive screening. There is a point at which the cost of information obtained outweighs the usefulness of the information and, in fact, may be a material detriment to the orderly completion of real estate transactions. One of the purposes of this guide is to identify a balance between the competing goals of limiting the costs and time demands

inherent in performing a VES and the reduction of uncertainty about unknown conditions resulting from additional information. (Section 4.5.2 of ASTM E2600-15)

- Comparison with Subsequent Investigations – It should not be concluded or assumed that an investigation was not adequate because the investigation did not identify any VECs in connection with a property. The VES must be evaluated based on the reasonableness of judgments made at the time and under the circumstances in which they were made. Subsequent VESs should not be considered valid bases to judge the appropriateness of any prior screening if based on hindsight, new information, use of developing technology or analytical techniques, or similar factors. (Section 4.5.4 of ASTM E2600-15)

This report was prepared pursuant to an agreement between LSA (client) and AECOM and is for the exclusive use of the client, in cooperation with the Rancho California Water District (RCWD). No other party is entitled to rely on the conclusions, observations, specifications, or data contained herein without first obtaining AECOM's written consent and provided any such party signs an AECOM-generated Reliance Letter. A third party's signing of the AECOM Reliance Letter and AECOM's written consent are conditions precedent to any additional use or reliance on this report.

The passage of time may result in changes in technology, economic conditions, site variations, or regulatory provisions, which would render the report inaccurate. Reliance on this report after the date of issuance as an accurate representation of current site conditions shall be at the user's sole risk.

1.4 Site-Related Limiting Conditions

The following site-specific limitations were encountered during the course of this assessment:

- Due to safety concerns related to the condition of the North Access Road, which is not a maintained roadway, AECOM did not drive this portion of the proposed project area during the June 2020 site reconnaissance. Observations of portions of the North Access Road were made from along Pond Access Roads #1 and #2, Canyon Access Road, and from the top of Vail Dam. Based on the rural nature of this area and information obtained from other sources, this site-related limiting condition is not considered significant and should not have an effect on the conclusions and recommendations contained herein.
- AECOM was not provided access to the interior of the former indoor riding arena located on the former horse ranch property. According to the project area contact at the RCWD, this building is used to store well rehabilitation equipment and potable water trailers. This building is present on the parent parcel that the proposed project area passes through, but it is AECOM’s understanding that this building is outside of the proposed project area boundary and, thus, is considered off-site in the scope of this Phase I ESA. Use of this building will likely not change as a result of the proposed project or may be demolished. Based on the age of this building (circa 2002), this site-related limiting condition is not considered significant.
- AECOM was not provided access to the interior of the stream release valve building, located approximately 200 feet downstream of the dam. According to the lead dam designer at AECOM, this building is used to release water from Vail Lake into Temecula Creek for dry season flows. No staining was observed surrounding the exterior of this structure. It is AECOM’s understanding that this building will be demolished as part of the proposed project. Based on the use and condition of this building, this site-related limiting condition is not considered significant.

1.5 Data Gaps/Data Failure

The following data failure/data gaps were encountered during the course of this assessment:

- A title search and environmental lien search were not conducted as part of this Phase I ESA. However, based upon historical data collected from other sources, this data gap is not expected to impact the results of this assessment. In addition, the property owner (RCWD) was not aware of environmental liens or activity use limitations (AULs) that have been placed on the proposed project area.
- A limitation was encountered in determining the historical use of the western end of the proposed project area. The earliest source of historical information reasonably ascertainable within the timeframe of this report in which usage could be determined was a topographic map from 1901. At the time of the map, the western end of the proposed project area in the vicinity of the former horse ranch property and Pond Access Roads #1 and #2 appeared to have two unimproved, light duty roads, and the Canyon Access Road is also shown as an unimproved, light duty road. Therefore, the ASTM E1527-13 requirement to determine all obvious uses of the property from the present back to the property's first obvious developed use, or back to 1940, whichever is earlier, could not be achieved. However, based upon the identified use, it is unlikely that significant prior development had occurred; therefore, this data failure is not expected to impact the results of this assessment.
- It should be noted that not all standard historical sources, as defined per ASTM, were reviewed as part of this assessment. In addition to recorded land title records, zoning/land use records were not reviewed. Furthermore, Sanborn Fire Insurance Map coverage was not available for the proposed project area. However, based on information provided from the remaining standard historical sources, additional historical information obtained from other historical sources would not likely have assisted in meeting the historical use requirement; therefore, this data gap is not expected to impact the results of this assessment.
- Per ASTM E1527-13, past owners, operators, and occupants of the proposed project area who are likely to have material information regarding the potential for contamination within the proposed project area shall be contacted to the extent that they can be identified and that the information likely to be obtained is not duplicative of information already obtained from other sources. AECOM was unable to interview past owners and/or operators associated with the proposed project area. However, based upon historical data collected from other sources, this data gap is not expected to impact the results of this assessment.
- AECOM submitted public records requests to several county and state agencies to determine if they have files related to a historical hazardous materials release that may have occurred within the proposed project area. As of the date of this report, responses to many of these requests have not been received. Based on AECOM's research to date, AECOM does not anticipate receipt of such responses will significantly alter the conclusions or recommendations of this report. However, if information is received from public records requests that significantly impacts the conclusions of this report, this information will be forwarded upon receipt.

2. Proposed Project Area Description

2.1 Proposed Project Area Location and Parcel Description

The Vail Dam property and associated access roads that are within the boundary of the proposed project are located to the east of the City of Temecula in the southwestern area of unincorporated Riverside County, California. The approximate location of the proposed project area is presented on Figure 1 – Site Location map.

Although there is no physical address for the proposed project, the address observed at the main entrance to proposed project area at De Portola Road to the primary access road (proposed Pond Access Road #2) is 37115 De Portola Road. The Riverside County Assessor's Parcel Number (APN) associated with this access road is 927-150-018. A second access road, known as Pond Access Road #1 (APN 927-150-039), is present approximately 600 feet to the north of this entrance, immediately adjacent to and south of the RCWD Los Caballos Pump Station located at 37205 De Portola Road (APN 927-150-037), off-site for the purposes of this assessment. These two access roads converge just south of Oak Mountain Road, approximately 1,000 feet east-southeast of De Portola Road at APN 927-320-045, and the proposed road on this portion of the proposed project area (Pond Access Road #1) continues east for approximately 1 mile, and follows the same general path as Oak Mountain Road (also known as Las Pulgas Road) immediately north of Pond Access Road #1 to the mouth of the canyon[1]. Pond Access Road #1 terminates at the North Access Road and Canyon Access Road split at the mouth of the canyon (APN 927-320-080). The North Access Road and Canyon Access Road both traverse through the canyon for approximately two miles, where the Canyon Access Road ends approximately 200 feet downstream of Vail Dam, and North Access Road ends at the top of the dam on the northern end. Some areas of the Canyon Access Road boundary encroach onto the adjacent parcel (APN 927-320-081). Vail Dam is within the boundary of APN 927-320-040, and is located in the northwestern corner of Vail Lake. A portion of the current South Access Road, which currently lies within APN 927-320-040, is located approximately 150 feet downstream (west of) of the dam and is also included within the boundary of the proposed project. The northern portion of the South Access Road will be relocated within the boundary of APN 927-320-080 as part of the proposed project.

Portions of an approximate 50-acre former horse ranch property in the western end of the proposed project area are included within the proposed project area boundary. The former horse ranch property is comprised of three APNs (927-150-018, 927-150-038, and 927-150-048), which total approximately 50-acres. APN 927-150-018, which comprises approximately 10-acres, is proposed for use as a construction staging and laydown area and/or concrete batch plant during the proposed project; however, plans for this property during construction have not been confirmed. Proposed Pond Access Road #2, which has not yet been constructed in its entirety, will pass through APN 927-150-018 and continue east past the former horse ranch buildings including a former haybarn and stable building on a portion of APN 927-150-048, where it meets Pond Access Road #1 on APN 927-320-045 and continues eastward to the mouth of the canyon, as described in the previous paragraph. APN 327-150-045 comprises approximately 30.5 acres, but only the portion associated with proposed Pond Access Road #2 is included within the boundary of the proposed project area. The location of Pond Access Road #1 and the proposed location of Pond Access Road #2 are shown in Figure 2 – Site Plan. There is a residence on the 9.9-acre parcel at APN 927-150-038, which is situated between Pond Access Road #1 to the northeast and the proposed Pond

[1] According to Google Earth, Oak Mountain Road begins at De Portola Road approximately 1,700 feet north of the Pond Access Road #1 entrance, and meets Pond Access Road #1 at the approximate Pond Access Road #1 and #2 convergence. Oak Mountain Road then follows the general path of Pond Access Road #1 immediately to the north, and continues through the canyon along the same path as what is referred to as the Canyon Access Road in the context of the proposed project. For the purposes of this report, the portion of Oak Mountain Road that follows the canyon floor between the Pond Access Road #1 terminus and Vail Lake will be referred to as Canyon Access Road.

Access Road #2 to the southwest; however, this residence is not included within the project area boundary and therefore is not included as part of this Phase I ESA.

Collectively, the total proposed project area roads and associated construction laydown areas that are included as part of this Phase I ESA are known as the Vail Dam Seismic and Hydrologic Remediation Project (proposed project). The project area boundary is detailed on Figure 2. According to the County of Riverside Tax Assessor's maps, all land parcels (parent parcels) that the proposed project encroaches onto are owned by the RCWD. While the total acreage of all of the parent parcels is greater than 1,100 acres, the total acreage of the proposed project area is approximately 65.5 acres. The parent parcel APN boundaries are shown on Figure 2.

As part of the proposed project, the RCWD proposes to remediate seismic and hydrologic hazards associated with the existing Vail Dam by constructing a new straight-axis gravity concrete dam immediately downstream of the existing dam. Hydrologic and seismic evaluations of the existing dam, conducted by the California Department of Water Resources Division of Safety of Dams, indicate that the existing dam's spillway is insufficient to pass the Probable Maximum Flood without overtopping the dam and that the existing concrete arch dam would not resist the stresses induced by the Maximum Credible Earthquake.

For the proposed project, improvements to North Access Road and Canyon Access Road will be necessary to allow construction vehicle access. Currently, these roads are both unimproved, one-lane roads that are approximately 2 miles in length each. The North Access Road will remain a one-lane road; however, the Canyon Access Road will likely be widened to a two-lane road during construction. In addition, vehicle turn-out areas and temporary construction staging areas will be placed in various areas along each of these roads; the final construction plans have not been finalized. The current South Access Road, adjacent to (west of) the dam, will also need to be relocated and will be graded to provide access to the spillway area and a proposed construction staging area immediately downstream of the dam. The 10-acre parcel (APN 927-150-018) in the northern portion of the approximate 50-acre former horse ranch may be utilized as a construction staging and laydown area and/or a concrete batch plant; however, use of these properties and the buildings on APN 927-150-048 during construction have not been confirmed. It is AECOM's understanding that some or all of the structures on APN-927-150-048 may be demolished.

The Vail Dam was originally constructed by the Vail Company in 1948 to 1949 to store local runoff for the purpose of irrigation and water supply. The dam and reservoir were acquired by the RCWD in 1978 and have been used since that time for water supply and replenishment of the RCWD's groundwater basins. Improvements to the dam were conducted in the 1980s to address erosion issues, and a rehabilitation of the outlet works was completed in 2007. In 2009, the Vail Lake Transmission Line water pipeline was constructed, which connects Vail Dam to the Upper Valle De Los Caballos (VDC) recharge basins located downstream of the dam to the west of the mouth of the canyon (APN 927-320-045), immediately south of Pond Access Road #1 in the western end of the proposed project area. The Upper VDC recharge basin property is not included as part of this assessment.

2.2 Proposed Project Area Ownership

According to County of Riverside Tax Assessor's Records, the parent parcels within the proposed project area boundary are owned by the RCWD.

2.3 Proposed Project Area Visit

Ms. Sarah Perhala and Mr. Leo Handfelt with AECOM's San Diego, California office visited the proposed project area on June 22, 2020. Ms. Perhala and Mr. Handfelt were unaccompanied during the proposed project area visit; however, follow-up questions were answered by Mr. Randy Neff of the RCWD. Due to road safety issues, AECOM did not drive on the North Access Road during the proposed project area visit and only drove in the area of the two proposed Pond Access Roads (Pond Access Roads #1 and #2) in

the western end, Pond Access Road #1 (adjacent to and south of Oak Mountain Road) in the central portion of the proposed project area, and the Canyon Access Road out to Vail Dam at the eastern end of the proposed project area. Observations of portions of the North Access Road were made from along Pond Access Road #1, Canyon Access Road, and from the top of Vail Dam. The exterior areas of the former horse ranch property including the 10-acre property (APN 927-150-018), which includes the former haybarn and stable building, and portions of the 30.5-acre property (APN 927-150-048), were observed during the site visit. Access to the interior of the former indoor riding arena on APN 927-150-018 was not provided; however, based on the information provided, this building is technically outside of the boundary of the proposed project and, therefore, is not included as part of this Phase I ESA. The southern portion of APN 927-150-048 was also not inspected, nor was the residence or any portion of APN 927-150-038, as it is AECOM's understanding that these areas are outside of the proposed project area. Site-related limiting conditions encountered during this assessment were previously summarized in Section 1.4 of this report.

The proposed project area visit methodology consisted of a visual reconnaissance by driving over the proposed project area access roads and walking over the accessible areas of the former horse ranch property that are within western portion of the proposed project area, and accessible areas of the dam in the eastern end of the proposed project area. A driving, visual reconnaissance of portions of the surrounding area was also conducted. The following sections summarize the results of the proposed project area visit.

2.3.1 Proposed Project Area and Facility Description

The 65.5-acre proposed project area consists of:

- two proposed entrances at the western end from De Portola Road (known as Pond Access Roads #1 and #2),
- portions of an approximate 50-acre former horse ranch property at the western end,
- an existing, approximate 1-mile, unimproved one-lane road (known as Pond Access Road #1, immediately south of Oak Mountain Road) east of the former horse ranch property,
- two existing approximate 2-mile, unimproved, single-lane roads (known as North Access Road and Canyon Access Road),
- existing Vail Dam and associated features at the eastern end.

Permanent structures within the project area include the Vail Dam and associated ancillary structures in the eastern end, and two of the three buildings on the former horse ranch property at the western end of the proposed project area. The proposed project area is shown to pass through or near the northern two structures on the former horse ranch property; however, because use of these buildings during construction has not been determined, a discussion of these structures is provided herein. Other improvements within the proposed project area boundary primarily consist of unpaved roadways.

Vail Dam is a concrete arch dam spanning between concrete and rock abutments and is approximately 120 feet high in the middle. The dam has a maximum height of 152 feet from the dam crest to the lowest point in the foundation and has a 3.5-foot-high concrete parapet wall extending above the upstream dam crest. An at-grade meter vault is located approximately 100 feet downstream of the dam, and an approximate 120 square foot stream release valve building is located approximately 200 feet downstream of the dam.

The former horse ranch property at the western end of the proposed project area includes a former haybarn, a stable building, and an indoor riding arena on APN 927-150-048. These structures total approximately 41,000 square feet of building space. According to the previous Phase I ESA prepared for the former horse ranch property in 2015 (discussed in Section 4.3), this property was developed as a

horse ranch in approximately 2002 when these structures were constructed. The horse ranch operated at this location until approximately 2015 when it was purchased by the RCWD. As discussed above, only the former haybarn and stables appear to be located within the proposed project area, and these two structures are discussed in further detail below.

- The former haybarn is an open-sided steel framed canopy structure with earthen floors beneath most of the structure. A concrete slab is present in the southern end of this structure that is currently utilized by the RCWD as a salt storage area. Two out-of-service emergency generators are present on the earthen floor in the eastern portion of the structure. A secondary containment reservoir made from a tarpaulin material was present beneath both 1,000-capacity generators. A third, smaller generator of with an unknown capacity tank was also present beneath this canopy structure during AECOM's June 2020 site visit. No secondary containment was present beneath the smaller generator. Based on a recent photograph provided by the RCWD (taken on September 1, 2020), the smaller generator has been replaced since the June 2020 site visit with a third 1,000-gallon capacity diesel generator in this area, which is also stored on a temporary secondary containment tarpaulin. A salt hopper is also present beneath the canopy of this structure, which is situated on top of a concrete pad. The planned use of this building during construction has not been determined.

- The former horse stable building is not currently utilized and consists of a large, steel-framed open canopy structure with earthen floors throughout most of the structure. Use of this building during construction has not been finalized. This structure includes an enclosed bar/lounge area, and remnants of former building slabs are present in the southwestern and northeastern ends of this structure. The bar area consists of concrete slab flooring and sheetrock walls and ceiling. The exterior of this portion of the building appears to be steel framed. A wooden bar, two bar stools, a console television, and several metal cabinets are present within this portion of the building. Recessed fluorescent lighting was present in the ceiling of this structure. The former building slab on this end of the structure is an irregularly-shaped concrete slab consisting of what appears to be two former restroom areas and associated plumbing, and an area utilized for (presumably) horse maintenance. Portions of two toilets still attached to the floor, two floor drains, an electrical panel, and pipe connections presumably used for water/sinks in the former restroom areas were observed. No staining was observed on any pipe opening or floor drain. A roughly rectangular, metal enclosure, presumably a horse stall was also present in this slab area. A second, roughly rectangular concrete slab was observed in the northeastern end of this structure; however, no piping, floor drains, or other noteworthy features were observed in this slab. The planned use of this building during construction has not been determined.

Other exterior features on this portion of the former horse ranch property at APN 927-150-048 include exterior gated stable areas, a riding circle, and open space. A small pile of steel scrap metal strips was observed near the northern side of the former haybarn. Another larger pile of steel beams was observed adjacent to the road near one of the gated entrances to the adjacent Upper VDC Recharge Basin property, south of the former indoor riding arena. Several small soil piles were observed in the area to the east of the former stable building and north of the former haybarn. According to the RCWD, these soil piles primarily consist of weeds that have been removed from the ponds on the recharge basin property (APN 927-320-045) and are stored in this area to dry out, and may be spoils that have been excavated during the repair of water line leaks conducted on this property.

With the exception of the former horse ranch structures and the existing dam and associated ancillary structures, there are no buildings or other improvements on any other portion of the proposed project area or within the site access roadways. The residence on APN 927-150-038 is not included as part of this assessment.

During the site visit, no visual evidence of underground storage tanks (USTs) (e.g., vent pipes, fill ports), water wells, monitoring wells, dry wells, oil/gas wells, clarifiers, or septic tank systems was identified

within the proposed project area. The 2015 Phase I ESA indicated that the horse ranch property utilized an on-site septic system when in operation. No occupied structures that currently utilize a septic system are present on-site, and no information on the location of the reported former septic system and associated leach fields was available. The RCWD indicated that this septic system is no longer in use. Two areas of standing water were observed in the earthen floor areas of the former horse stable building. Aboveground storage tanks (ASTs) present within the proposed project area are discussed in Section 2.3.6. The RCWD representative did not know the origin of these areas of standing water, and there had been no rain prior to AECOM's site visit. No visual evidence of discolored soil, water, or unusual vegetative conditions or odors was identified during the site visit. In addition, no visual evidence of significant corrosion was identified on the floors or walls of the buildings on the former horse ranch property or other exterior areas of the proposed project area. The general layout of the proposed project area is provided on Figure 2. Representative photographs are provided in Appendix A.

2.3.2 Surrounding Properties

The proposed project area is located in a rural area approximately 3 miles east of the City of Temecula, in an unincorporated area of southwestern Riverside County, California. The area to the north of the Pond Access Road #1 entrance adjacent to (east of) De Portola Road, in the western end of the proposed project area, is bordered by the RCWD Los Caballos pump station (37205 De Portola Road), beyond which are a ranch, residences, vineyards/wineries, and open space.

The former horse ranch property includes a former indoor riding arena, currently used as a storage building for well rehabilitation equipment and potable water trailers by the RCWD, which is considered off-site and adjacent to the proposed project area. The former indoor riding arena is a steel-framed warehouse building and based on photographs provided in a previous Phase I ESA that was conducted in 2015 for the former horse ranch property, this building primarily has earthen flooring, with the exception of a small office area that appears to have ceramic floor tiles. According to the RCWD, this building is used to store empty water tanks and well rehabilitation equipment. No petroleum products or hazardous materials are reportedly stored within this building. AECOM was not provided access to the interior of this structure; however, this building is in an off-site area and will likely not be utilized during the proposed project.

The former horse ranch property and the proposed Pond Access Road #2 is bordered to the south by a horse boarding facility. The western end of Pond Access Road #1, between the proposed Pond Access Road #1 and #2 convergence and west of the Canyon Access Road/North Access Road split, is bordered to the north by Oak Mountain Road, beyond which is a vineyard, a ranch, and undeveloped/open space, to the south by the RCWD Upper VDC Recharge Basins, beyond which is undeveloped/open space. A number of production and monitoring wells are present off-site on the Upper VDC Recharge Basin property (APN 927-320-045). The previous Phase I ESA identified a former production well (USGS Well Site #333001117005702) off-site and adjacent to the southwestern corner of APN 927-150-048, as shown in Figure 2. The RCWD Los Caballos Pump Station is also present off-site and adjacent to (north of) the Pond Access Road #1 entrance adjacent to (east of) De Portola Road. Potable water is supplied to the surrounding area utilizing wells at these properties. De Portola Road is present to the west of the proposed project area, across which are vineyards/wineries. The areas to the north and south of Canyon Access Road and North Access Road are undeveloped/open space. According to the site contact at LSA, there is a crashed truck on the hillside to the south of the North Access Road, approximately one mile east of the North Access Road/Canyon Access Road split. This truck has been present in this area since at least 2007. It is AECOM's understanding that this truck is not within an area that will be disturbed during the proposed project. Given the limited quantity of oils and/or hazardous liquids that would have been released from this truck when it crashed, long-term impacts to soil in this area are not expected. This truck has been present for at least 13 years and materials released as a result of this crash are likely to have been washed away by the elements. Should disturbance of soil in this area occur during the proposed project, the truck itself would need to be handled and disposed of in accordance with state and federal regulations. The areas surrounding the dam to the north, south, and west are also

undeveloped/open space areas; Vail Lake is present adjacent to the east of the dam. Based on AECOM's site reconnaissance of the surrounding areas, no off-site sources of environmental concern were identified.

2.3.3 Petroleum Products and Hazardous Materials

No petroleum products or hazardous materials storage areas were observed in the proposed project area at the time of the site visit, except for two diesel-powered emergency generators observed in the former haybarn on the former horse ranch property. The diesel-powered emergency generators observed are further discussed in Section 2.3.6. Other hazardous materials were not identified by AECOM during the site visit nor reported by the RCWD to be handled or stored on-site.

A concrete bermed enclosure is present to the north of the former haybarn (current salt storage) on APN 927-150-048. According to the previous Phase I ESA conducted for the former horse ranch property in 2015, this enclosure was utilized to store drums of diesel fuel associated with farm equipment. According to County of Riverside Department of Environmental Health (DEH) documentation reviewed from the mid-2000s, the previous operators of the former horse ranch stored and handled hazardous materials and hazardous wastes. County of Riverside DEH Hazardous Materials Management Division (HMMD) supplemental inspection forms indicated that up to six drums of hazardous materials and hazardous wastes were present within the bermed enclosure during inspections conducted between 2003 through 2007. The contents of the drums were not specified in DEH documents reviewed. A County of Riverside Community Health Agency DEH HMMD Change of Status form from May 2008 indicated there were no hazardous materials or hazardous wastes present at the former horse ranch property at that time. This enclosure was empty at the time of AECOM's 2020 site visit. No staining or other indications of a release were observed during AECOM's site visit. The bermed containment area is further discussed in Section 4.3, and records reviewed from the County of Riverside DEH HMMD are further discussed in Section 5.5.1.

2.3.4 Hazardous Waste

No hazardous wastes are generated on-site, and the proposed project area was not listed as a generator of hazardous waste in the site-specific environmental database report obtained as part of this assessment. According to records provided by the County of Riverside DEH, the previous occupant of the former horse ranch property was registered as a hazardous waste handler (Facility Identification [ID] No. PR0033275 and PR0023533).

2.3.5 Polychlorinated Biphenyls

Polychlorinated biphenyl (PCB)-containing dielectric fluids have been widely used as coolants and lubricants in transformers, capacitors, and other electric equipment due to their insulating and nonflammable properties. There are no permanent structures within the proposed project area, except for on the former horse ranch property, the dam itself, the at grade meter vault approximately 100 feet downstream of the dam, and an approximate 120 square foot stream release valve building approximately 200 feet downstream of the dam. Based on the age of development at the former horse ranch property (circa 2002), PCBs are not expected to be present on this portion of the proposed project area. Based on the age of construction of the dam (circa 1948), the stream release valve building downstream of the dam and any other oil-containing electrical equipment may contain PCB-containing oil. As previously stated, AECOM was not provided access to the interior of the stream release valve building; however, this building is relatively small in size (approximately 10 feet by 12 feet) and it is AECOM's understanding that the only equipment inside this building are the stream release valve at the end of the pipe that comes into the structure from Vail Lake, and some electrical controls. AECOM was unable to confirm the presence or absence of PCB-containing electrical equipment inside of this building.

Based on the age of construction of the stream release valve building (late 1940s), it is possible that PCB-containing building materials, such as paint or caulk (if present) may have been used. The presence of potentially PCB-containing electrical equipment and/or building materials within the stream release building or anywhere else within the proposed project area boundary is considered a DMC in connection with the proposed project area, in AECOM's opinion.

No pole- or pad-mounted transformers were observed within the proposed project area boundary. A pad-mounted transformer and electrical panel were observed adjacent to the southwestern side of the former indoor riding arena (current storage building) in an off-site area. Labeling indicating PCB content was not observed on the transformer, and no staining was observed on the ground surface surrounding this transformer. Based on AECOM's experience, the local utility company typically owns and maintains these transformers and would be responsible in the event of a release, regardless of PCB content. Southern California Edison (SCE) provides electrical service to the site.

No other hydraulic equipment (i.e., compactors, elevators, lifts) was observed in the proposed project area, or reported by the RCWD to be located on-site.

2.3.6 Aboveground Storage Tanks

Three out-of-service diesel-powered emergency generators were observed beneath the canopy of the former haybarn building (now referred to as the salt storage building by the RCWD). Two of the generators are fueled by an approximately 1,000-gallon diesel fuel aboveground storage tank (AST) contained within the base of each unit. The third generator is also diesel powered; however, the capacity of the smaller generator tank is not known. The two larger generators were stored on temporary secondary containment reservoirs made from tarpaulin material on the earthen floor beneath the canopy in this structure. No staining or other indication of a release were observed on or around the generator trailers, the secondary containment, or on the earthen floors surrounding the generators. Since these generators are out-of-service and are stored properly, and based on the lack of reported releases and visual condition of these generators, the ASTs associated with these generators are not considered to represent RECs in connection to the proposed project area, in AECOM's opinion. An updated photograph of the generators in this area, taken on September 1, 2020, and provided to AECOM by the RCWD, shows that the smaller generator is no longer present and that a third generator with an integrated 1,000-gallon capacity diesel tank has replaced the smaller generator. The third 1,000-gallon generator is stored on a temporary secondary containment reservoir of similar construction to the other two generators. No staining was observed in the photographs provided by the RCWD from September 1, 2020.

A feed silo was observed adjacent to the southeastern side of the equipment storage building (former indoor riding arena) in an off-site area. According to the RCWD, this silo is currently empty. No odors or staining were observed on or around the area of this silo.

According to records provided by the County of Riverside DEH HMMD, two ASTs were present on the former horse ranch property during the mid-2000s. No information related to the size or location of the ASTs was provided. The ASTs reportedly contained diesel fuel and unleaded gasoline. These ASTs were presumably removed when the previous occupant (Blackridge RJH, Inc.) registered an out-of-business Change of Status form with the County of Riverside DEH in 2008; however, the date of removal of these ASTs was not verified. The ASTs were not present during the previous Phase I ESA conducted at the site in 2015, or at the time of AECOM's 2020 site reconnaissance.

No additional ASTs were observed at the proposed project area or reported by the site contacts to be located on-site. No ASTs were listed associated with the site in the site-specific environmental database report reviewed by AECOM.

2.3.7 Underground Storage Tanks

No visual evidence of USTs (e.g., vent pipes, fill ports) was observed on-site during the site visit. According to the previous Phase I ESA report, no USTs were reported on the former horse ranch property. No USTs were listed in the site-specific environmental database report associated with the proposed project area.

2.3.8 Solid Waste

No solid waste receptacles (trash cans, dumpsters, etc.) were observed on or adjacent to the proposed project area. The RCWD indicated there is no solid waste service for the proposed project area.

2.3.9 Water

Based on the information provided, the RCWD provides potable water to the surrounding area. Vail Lake, adjacent to the eastern end of the proposed project area, is utilized for recreation and as a groundwater supply reservoir. Water is occasionally released from the dam and flows over the ground surface through the canyon, where it percolates into the pervious ground surfaces within the canyon areas downstream (west of) the dam, contributing to groundwater recharge and groundwater storage for the public water supply.

The Upper VDC Recharge Basins occupy the property off-site and adjacent to (south of) Pond Access Road #1 in the western end of the proposed project area, between (east of) the proposed Pond Access Roads #1 and #2 convergence and west of the Canyon Access Road and North Access Road split at the mouth of the canyon. Water is pumped from Lake Skinner, approximately 7 miles to the north, to these recharge basins. The Vail Lake Transmission Line water pipeline was constructed in 2009 and is present adjacent to the Canyon Access Road. This transmission line is intended to provide a backup to the drinking water supplied by Lake Skinner. Several cathode stations and blow-off valves associated with this pipeline were observed adjacent to Canyon Access Road between the dam and the recharge basins during AECOM's June 2020 site reconnaissance. A number of production and monitoring wells are present on the Upper VDC Recharge Basins property, all of which are in off-site areas. The RCWD Los Caballos Pump Station is also present off-site and adjacent to (north of) the Pond Access Road #1 entrance adjacent to (east of) De Portola Road. Potable water is supplied to the surrounding area utilizing wells at these properties.

2.3.10 Wastewater

There are currently no wastewater discharges at the proposed project area. According to the 2015 Phase I ESA, the former horse ranch property utilized an on-site septic system. According to the site contact at the RCWD, this septic system is no longer in use. No details pertaining to the location of the septic system and/or associated leach fields were provided by the RCWD. Based on the historical use of this portion of the proposed project area as a horse ranch, no potentially high-risk activities were conducted, and it is likely that the on-site septic system was utilized for disposal sanitary wastes. In AECOM's opinion, the presence of a septic system on this property does not represent a REC in connection to the proposed project area. If this property is redeveloped, the septic tank and associated leach field may need to be excavated and disposed of in accordance with local and state regulations.

2.3.11 Stormwater

Almost the entire proposed project area is unpaved. Stormwater either percolates into the pervious surfaces or flows toward the groundwater recharge basins and/or canyon floor adjacent to the access roads.

2.3.12 Heating and Cooling

There are no heating or cooling system for the buildings on the former horse ranch property. A propane AST is present on the adjacent residential property at APN 927-150-038 in an off-site area. SCE provides electricity, and Southern California Gas provides natural gas service to the site and surrounding area.

2.3.13 Asbestos

Based on the date of construction of the dam (circa 1949), asbestos-containing materials (ACMs) may be present in materials used during the original construction of the dam (e.g., concrete, Transite) and associated ancillary structures, such as the at-grade meter vault and/or the stream release valve building. No asbestos surveys were provided for review as part of this ESA. It should be noted that an asbestos survey by a licensed inspector was not included within the scope of this assessment. Based on the age of the buildings on the former horse ranch property (early 2000s), ACMs are not expected to be present in these buildings.

Asbestos is also a naturally occurring fibrous mineral found in many parts of California. It is commonly found in ultramafic rocks such as serpentine, and near fault zones. NOA can be released from ultramafic rock when crushed or due to weathering and erosion processes and may become airborne and stay in the air for long periods of time. Review of geologic conditions of the project area did not identify the potential presence of NOA.

2.3.14 Lead-Based Paint

Based on the date of construction of the buildings present on the former horse ranch property (circa early 2000s), it is unlikely that lead-based paint (LBP), which was banned from residential use in the late 1970s, was used. Based on the date of construction of the stream release valve building located approximately 200 feet downgradient of the dam (late 1940s), it is possible that LBP is present on this building. Depending on the date of construction and installation of other painted surfaces within the proposed project area, such as painted protective bollards and the structures associated with the at-grade meter vault, LBP may be present if such features were installed and painted prior to the late 1970s. No LBP surveys were provided for review as part of this ESA. It should be noted that an LBP survey was not included within the scope of this assessment.

3. Environmental Setting

3.1 Topography

According to a review of the United States Geological Survey (USGS) topographic maps and the Google Earth application, the western end of the proposed project area, in the vicinity of the former horse ranch property, is generally flat and is located at approximately 1,300 feet above mean sea level (amsl). Topography dips slightly to approximately 1,265 feet amsl to the east near the entrance to the Upper VDC Recharge Basins property, and remains generally flat through this section of Pond Access Road #1 to the mouth of the canyon at the North Access Road/Canyon Access Road split, which is also approximately 1,300 feet amsl. The topography along the southern Canyon Access Road steadily climbs to the east to approximately 1,360 feet above msl at the base of the dam. Conversely, the North Access Road climbs quickly to just over 2,000 feet amsl at its height, approximately half-way (1 mile) to the dam. This access road then gradually decreases in elevation to the east where it meets the top of the dam at approximately 1,435 feet amsl. The dam itself is at approximately 1,410 feet amsl, with the adjacent spillways on the northern and southern sides of the dam slightly higher, between approximately 1,450 and 1,480 feet amsl.

3.2 Soil/Geology

According to the geotechnical basis of design report (GBDR) for the proposed Vail Dam Seismic and Hydrologic Remediation Project completed by AECOM in 2017, Vail Dam is located within the Peninsular Ranges Province, which is a 500-mile-long mountain range in southern California and Baja California that is formed by a continuous belt of Cretaceous gabbroic through granitic plutonic rocks that intruded late Paleozoic and Mesozoic metamorphic host rock. Vail Dam spans Temecula Creek, a northwesterly draining tributary of the Santa Margarita River that drains the north side of Palomar Mountain. Vail Lake inundates a portion of Butterfield Valley and a portion of the adjacent Lancaster Valley. Vail Lake, Butterfield Valley and Lancaster Valley are surrounded by highland areas to the north (Oak Mountain), to the South (Wild Horse Peak/Palomar Mountain), and to the east (Cahuilla Mountain, Thomas Mountain). Collectively, these physiographic features comprise a rugged highland terrain that is dissected by Wilson Creek, Temecula Creek, and their tributaries.

The terrain in the vicinity of Vail Dam is underlain by regionally metamorphosed rocks of Jurassic to Cretaceous age, plutonic (intrusive igneous) rocks of Cretaceous age, volcanic rocks of Miocene age, the Pliocene Temecula Arkose, and Holocene to Pleistocene age alluvial deposits. This information was compiled from the Sage 7.5-foot Quadrangle, the Vail Lake 7.5-foot Quadrangle, the Oceanside 30-foot by 60-foot Quadrangle, and the San Bernardino and Santa Ana 30-foot by 60-foot Quadrangle. The dam is founded on metamorphic rock that is described as undifferentiated meta-volcanic and metasedimentary rocks of Cretaceous and Jurassic age consisting of schist, gneiss and quartzite that is commonly mixed with meta-granitic rock. In the vicinity of the dam site, the metamorphic rock is entirely gneiss that has a well-developed metamorphic layering (foliation) that strikes northwesterly and dips steeply to both the northeast and southwest. In the central area of Canyon Access Road, the metamorphic rock consists of gneiss and migmatitic gneiss that is mixed with granitic rock (tonalite).

The Temecula Creek canyon downstream of the existing dam, which encompasses the Canyon Access Road and proposed staging and laydown areas within the canyon in the eastern end of the proposed project area, and the proposed grading material disposal area near the mouth of the canyon, is underlain primarily by wash deposits, with some artificial fill immediately downstream of the dam. The proposed dam construction area, temporary construction area, South Access Road and construction area, and associated proposed staging and laydown area in the eastern end of the proposed project area extend above the alluvial deposits underlying the canyon floor up the sides of the canyon through zones of fill, Temecula Arkose, and old alluvial flood plain deposits. The North Access Road is mostly underlain by old landslide deposits, Temecula Arkose, and gneiss. It is also underlain in parts by young channel deposits

(Qya), basalt of Temecula area, and Holocene landslide deposit. The proposed Pond Access Roads #1 and #2 and the western proposed staging and laydown area and/or concrete batch plant near the entrance to the proposed project area (former horse ranch property) are underlain by young channel and wash deposits.

3.3 Surface Water

According to the GBDR, Vail Lake is a man-made reservoir adjacent to (east of) Vail Dam. Vail Lake impounds 42,680 acre-feet of water within the reservoir at the spillway crest. The reservoir is currently used primarily for water supply and recreation. Vail Dam spans Temecula Creek, a northwesterly draining tributary of the Santa Margarita River that drains the north side of Palomar Mountain. The proposed project area is located within the Santa Margarita Watershed. The major surface water body within the Santa Margarita Watershed is the Santa Margarita River, which drains in a westerly direction from headwaters in Riverside County to the Santa Margarita Estuary and the Pacific Ocean. Major tributaries to the Santa Margarita River include Temecula Creek, Murrieta Creek, De Luz Creek, Sandia Creek, and Rainbow Creek. The watershed for Vail Lake is approximately 318 square miles and the lake is fed by Temecula Creek, Wilson Creek, Kolb Creek, and Arroyo Seco. Water released from Vail Lake flows through the canyon via Temecula Creek to the Santa Margarita River and to the Upper VDC Recharge Basins property, where it is re-stored in the Pauba Valley groundwater basin.

3.4 Groundwater/Hydrology

According to the Regional Water Quality Control Board (RWQCB) Basin Plan, the proposed project area is located within the Pauba Hydrologic Subarea of the Pechanga Hydrologic Area, within the Santa Margarita Hydrologic Unit. From Vail Lake and areas to the east are also within the Santa Margarita Hydrologic Unit but this area falls within the Vail Hydrologic Subarea of the Aguanga Hydrologic Area. Groundwater in both the Pauba and Aguanga Hydrologic Subareas has been designated by the RWQCB as beneficial for use in municipal, agricultural, and industrial supply.

According to the GBDR completed by AECOM for the proposed Vail Dam Seismic and Hydrologic Remediation Project in 2017, the depth to groundwater ranges from between 12 and 21.8 feet below ground surface (bgs) in the vicinity of the dam. In June 2019, the depth to groundwater in the western portion of the proposed project area was measured at approximately 64 feet bgs at USGS well number 333010117003101. This well is located in the wash deposits approximately a quarter-mile south of Pond Access Road #1 (Figure 2). In USGS well 333001117005702, which is approximately one-third of a mile south of the proposed Pond Access Road #2 (Figure 2) within the young channel deposits, the depth to groundwater was measured at approximately 294 feet bgs in June 2020 (USGS 2020). Based on area topography, groundwater beneath the proposed project area is likely to flow in a westerly direction toward the downstream area and west toward De Portola Road.

4. Site and Area History

Historical information for the site and surrounding properties is based on AECOM's review and analysis of the following historical sources:

- Aerial photographs dated 1949, 1953, 1961, 1967, 1971, 1985, 1989, 1996, 2002, 2005, 2009, 2012, and 2016;
- Google Earth aerial images dated 1995, 1996, 2002, 2003, 2005, 2006, 2007, 2009 through 2014, 2016, and 2018;
- Topographic maps dated 1901, 1903, 1939, 1942, 1943, 1947, 1950/1953/1954, 1957, 1968/1971/1973, 1978/1982, 1988, 1997, and 2012; and
- City directories for the years 1971, 1974, 1979, 1986, 1991, 1996, 2001, 2006, 2010, 2014, and 2017.

According to Environmental Data Resources, Inc. (EDR), Sanborn® Fire Insurance Map coverage is not available for the proposed project area. A copy of the historical sources provided by EDR is provided in Appendix B.

4.1 Proposed Project Area

The western area of the proposed project is shown as a wash in the 1901 topographic map with an east/west traversing light duty road shown to the north and south of the wash, in the general vicinity of the proposed Pond Access Roads #1 and #2. The full extent of Pond Access Road #1 and the adjacent Oak Mountain Road to the north is not shown on this map, but the eastern portion of the proposed project area is labeled as Oak Mountain. The North Access Road is not present on this map, and there is no coverage of the eastern portion of the proposed project (in the vicinity of Canyon Access Road) on this map; however, a portion of the Canyon Access Road is shown in the 1903 map. A light-duty road is shown in this area that follows the general path of the current Canyon Access Road. A perennial stream follows the general path of this road. This same section of road is also shown in the 1939 topographic map; however, the former unimproved road that traverses through the canyon is not shown and the stream is shown as an intermittent stream. Several wash areas are shown adjacent to the north and south sides of the stream within the canyon. Coverage of the western end of the proposed project area, west of the canyon, is not provided.

The proposed project area on the 1942 topographic map is largely unchanged; however, the intermittent stream in the eastern area of the proposed project is labeled as Temecula River, and the wide wash area in the western end of the proposed project area includes a wide stream labeled as Temecula Creek that flows through the center of the wash. The light duty roads in the western end of the proposed project area are now shown as unimproved roads. The unimproved road in the vicinity of present-day Pond Access Road #1 and the adjacent Oak Mountain Road to the north terminates at the mouth of the canyon, near the junction of the Temecula Creek and Temecula River.

The proposed project area is essentially unchanged in the 1947 topographic map. The 1949 aerial photograph shows the dam at the eastern end of the proposed project area. A winding, unimproved road that follows the general path of the Canyon Access Road follows the canyon downstream to a large outwash area in the western end of the proposed project and surrounding area.

The 1950/1953/1954 topographic map series shows the unimproved road in the western end of the proposed project area, which previously terminated at the mouth of the canyon in the 1947 map, is now shown to follow the canyon floor all the way east to the dam and terminates at the eastern end of the proposed project. Another road shown as an unpaved, light duty road is shown to exit the proposed project area to the south, just west of the dam, in the vicinity of the current South Access Road. The water

bodies at both ends of the proposed project area are now labeled as Temecula Creek in mapping from this time period; however, the wide stream in the center of the wide wash at the western end of the proposed project is no longer present and the entire area is shown as a large wash, which aligns with what was observed in the 1949 aerial photograph. Approximately ¾ of a mile east of the mouth of the canyon, along the Canyon Access Road, there is a black vertical line marked as 'Top of Dam' in the topographic map series from the early 1950s; however, the actual dam is over a mile downstream in the northwestern corner of Vail Lake.

There are no other roads or development in the western end of the proposed project area until the 1967 aerial photograph, at which time the outline of Oak Mountain Road, between the mouth of the canyon at Canyon Access Road and west to the vicinity of the current now De Portola Road, is visible. The area to the south of Oak Mountain Road and the portion of Pond Access Road #1 that parallels Oak Mountain Road to the south that was previously occupied by an outwash area, appears to be agricultural row crops according to the aerial photographs from this time period. This area is further discussed in Section 4.2.

Unimproved roadways in the vicinity of De Portola Road, adjacent to the western end of the proposed project, and Pauba Road to the south, are visible on the 1971 aerial photograph. The agricultural row crops south of Oak Mountain Road and the adjacent Pond Access Road #1 to the south in the eastern portion of the proposed project area, approximately 2,000 feet downstream of the canyon, are no longer present. The area to the south of Oak Mountain Road and Pond Access Road #1, between approximately 2,000 feet downstream of the canyon and west to De Portola Road, remain as agricultural row crops in this photograph. The row crops are present in the area of the proposed Pond Access Road #2. An unimproved path in the vicinity of the Pond Access Road #1 entrance adjacent to (east of) De Portola Road is also visible on this photograph.

The North Access Road is not visible on the topographic maps or aerial photographs reviewed until the 1985 photograph, at which time a portion of an unimproved roadway exiting the dam to the north is present; however, at approximately 2,500 feet northwest of the dam, this path continues to the north, away from the current North Access Road route. The North Access Road is not shown in the topographic map from this time period, or on any of the maps reviewed. The Canyon Access Road remains essentially unchanged in the 1985 aerial photograph and is shown in its approximate current configuration on this and all future photographs. Oak Mountain Road and Pond Access Road #1, from Canyon Access Road and west to its terminus with De Portola Road, northwest of the proposed project area, is also present in its approximate current configuration. The agricultural row crops in the area to the south of Oak Mountain Road and the adjacent Pond Access Road #1, and in the vicinity of the former horse ranch property and the proposed Pond Access Roads #1 and #2 entrances adjacent to (east of) De Portola Road, appears to be unmaintained, open space. Topographic mapping from 1988 also reflects the absence of orchards and/or vineyards in the area to the south of the proposed project (further discussed in Section 4.2). There is an approximate 300-foot by 175-foot, roughly rectangular clearing adjacent to (southeast of) De Portola Road, in the vicinity of the adjacent RCWD Los Caballos Pump Station on the 1985 aerial photograph. The Pond Access Road #1 entrance adjacent to (east of) De Portola Road is faintly visible on this photograph. A large rectangular clearing with a second linear clearing adjacent to the rectangular area is present adjacent on a portion of the former horse ranch property.

The western portion of the proposed project area, west of the mouth of the canyon, as well as Canyon Access Road, is largely unchanged on the 1989 photograph. There are several paths traversing the adjacent RCWD Upper VDC Recharge Basins property. The large rectangular clearing on the former horse ranch property is no longer present, but rather a roughly rectangular mowed area that is oriented 90 degrees different than the previous rectangular area is present in this area. The full extent of the North Access Road is also visible on this photograph, though the central portion of this road is very faint.

The project area roads are essentially unchanged through the 1990s, and there were no other notable changes observed within the proposed project area on any aerial photographs or topographic maps reviewed until the 1997 map, which shows a total of eight structures in the area adjacent to (southeast of)

De Portola Road. Some of these structures may be within the project area boundary in the western end of the proposed project area; however, it is unclear which are actually within the project area boundary based a review of the topographic map. There are no structures on the former horse ranch property in the 1996 aerial photograph. The 2002 aerial photograph shows the former horse ranch property has been developed to its approximate current configuration. The three buildings on this property are visible, and the round and rectangular riding and gated areas throughout this property are present. There are three small white structures along the eastern end of this property, in the vicinity of the proposed Pond Access Road #2. According to the previous Phase I ESA conducted for this property, these structures are mobile homes that were present at that time. A small residence is also present on the portion of the property to the southwest of the junction of the proposed Pond Access Roads #1 and #2 on APN 927-150-038. This residence is in an off-site area and was not included as part of this Phase I ESA.

Other than variations in vegetation and the configuration of the fields on the former horse ranch property, the roads within project area remain largely unchanged on aerial photographs and topographic mapping reviewed through the mid-2000s until approximately 2012 when portions of the three mobile homes on the eastern end of the former horse ranch property appear to be demolished and several piles of construction debris are present to the east and south of the current equipment storage building, south of the proposed Pond Access Road #2.

Based on aerial photography, the debris piles in the vicinity of the former mobile homes remained in these areas until late 2016 when the mobiles homes and all structures associated with the mobile homes are no longer present. One pile of scrap steel beams remains in the southern area of this property, near one of the RCWD Upper VDC Recharge Basins property entrances to the south of the proposed project area, outside of the current project area boundary.

City directories reviewed for De Portola Road between 1971 through 2017 are largely residential, with several vineyards/wineries and ranch properties listed in the area.

4.2 Off-site Properties

The surrounding area is primarily vacant land according to the topographic maps reviewed from 1901 and 1903. There are a few residences to the north and an unimproved road in the vicinity of De Portola Road in 1901; however, this road is incomplete and does not follow the same path as the current De Portola Road. An unimproved road continues to the east in the vicinity of present-day Vail Lake, beyond the location of the dam. Two water features consistent with a river or creek are shown to traverse the area currently occupied by Vail Lake.

The surrounding area to the south and southeast of the proposed project area is essentially unchanged in the 1939 topographic map, and the surrounding areas to the north and south of Temecula Creek and to the south of Temecula River are shown as woodland areas. There are several streams and wide riverwash areas shown to the west of the dam, in the vicinity of Vail Lake, in topographic mapping from this time period.

The former woodland areas to the north and south of the western end of the proposed project area are shown as vineyards in the 1943 topographic map. The surrounding area to the south of Temecula River and Temecula Creek is shown as a vineyard, and the area to the north of Temecula Creek, north of the western portion of the proposed project area, is also shown as a vineyard. The area to the north of Canyon Access Road and the North Access Road remains vacant. The surrounding area between the approximate location of De Portola Road and east to the Vail Lake area is essentially unchanged in the topographic maps from 1939 through 1947.

Vail Dam and Vail Lake are first shown in the 1950 through 1954 topographic map series; however, other surrounding area features are largely unchanged in the available topographic mapping reviewed between 1950 and 1988. The primary notable changes in the surrounding area during this time period are that the

surrounding area vineyards to the northwest and southeast are shown as orchards, the former vineyard area to the southwest of the proposed project area is no longer shown as a vineyard, and the area to the northeast of the canyon is shown as orchards in these maps. The area immediately adjacent to the south side of the Temecula Creek, from the mouth of the canyon to approximately ¾ of a mile to the east, is shown as a woodland area in the maps from this time period. The full extent of De Portola Road, west of the proposed project area, is first shown as an improved road in the 1968 through 1973 map series. Row crops and open space are visible in the area beyond (west of) the present-day De Portola Road in the 1967 aerial photograph. De Portola Road to the west and Pauba Road to the south are visible in the 1971 aerial photograph.

The surrounding area is essentially unchanged through the late 1980s, when one structure is shown to the south of the proposed project area in the vicinity of the dead-end street called Winners Circle in the 1989 aerial photograph, and the vineyards across De Portola Road to the west is visible in this area.

By 1996, the RCWD Upper VDC property adjacent to the south of Oak Mountain Road is developed to its approximate current configuration, based on the aerial photograph reviewed for this year. This property includes an approximate 500-foot-long paved area that as and currently is utilized by the public as a remote-control airplane field. There are three vineyard properties visible across De Portola Road to the west of the proposed project area, and an off-site ranch property to the north and east of the Los Caballos Pump Station is present. Further development is also visible along Pauba Road, south, southwest the Upper VDC Recharge Basins property.

By 2002, additional development is visible on the property to the north and east of the RCWD Los Caballos Pump Station. Row crops are visible in the rear of (northern end) this property. Some additional development is also visible in the surrounding areas to the north and south along De Portola Road in the 2002 aerial photograph and in photographs reviewed through the 2000s and 2010s; however, the development in these areas are minimal and mostly appear to occur within the boundaries of the surrounding area properties that were already developed. The areas to the north and south of North Access Road and Canyon Access Road remain undeveloped, open space on the historical aerial photographs and topographic maps reviewed. The 2012 topographic map shows the full extent of what is now called Oak Mountain Road, north of Pond Access Road #1, as an unpaved, light duty road that follows the canyon all the way to the dam. In 2012, Oak Mountain Road was called Pulgas Creek Road according to the topographic map for this area.

No historical off-site sources of environmental concern were identified.

4.3 Previously Prepared Environmental Reports

AECOM reviewed a previous Phase I and Phase II ESA provided by Ms. Nicole West of LSA that was completed for the former horse ranch property at 37115 De Portola Road in September and October 2015 (respectively) by Phase One, Inc. (Phase One). The Phase I ESA indicated that a horse ranch operated on this property between approximately 2002 through 2015, and there were previously three additional mobile home structures present in the eastern end of APN 927-150-048. The Phase I ESA identified the following as RECs associated with this property: historical agricultural use at the property during at least the mid-1940s through the late 1960s or early 1970s; on-site soil piles that originated from adjacent properties that were also used for agricultural purposes; potential releases to the soil surrounding the concrete bermed enclosure that was used to store 55-gallon drums of diesel fuel; and accumulated organics in soil due to the presence of a horse farm may have led to methane production in soil. AECOM notes that the soil piles identified during the previous Phase I ESA were not the same soil piles observed by AECOM during the 2020 site visit, and these soil piles were actually located in the southern portion of APN 927-150-048, which is considered an off-site area in the scope of this Phase I ESA. AECOM did not inspect the area of these soil piles during the 2020 site reconnaissance, and did not verify the presence or absence of these soil piles. No other RECs were identified in connection with the former horse ranch

property or historical or current site operations. Based on the RECs identified, a Phase II ESA was recommended and subsequently conducted by Phase One.

During the Phase II ESA, 69 soil borings were completed to depths ranging from 2 to 15 feet bgs, depending on the potential source of impacts. Nine of these borings were also used as soil vapor sampling points to evaluate the potential presence of methane in soils. Soil vapor samples were collected from five and 15 feet bgs. Concentrations of organochlorine pesticides and select California Administrative Manual 17 metals were detected in soil at low concentrations, below regulatory action levels. No total petroleum hydrocarbons (TPH) or volatile organic compounds (VOCs) were detected above the laboratory detection limits in the soil samples analyzed. In addition, methane was not detected in the soil vapor samples analyzed. The Phase II ESA report concluded that, based on the results of the subsurface investigation, minimal impacts resulting from historical operations on the former horse ranch property had occurred. The Phase II report also concluded that, if percolation ponds were to be installed during future site redevelopment of this property, surface grading for these ponds would substantially reduce the presence of residual pesticide impacts present in this area, and it was recommended that, once grading is complete, the bottom of the ponds should be resampled to ensure very low or non-detect concentrations of pesticides exist. AECOM concurs with the previous conclusion and considers the presence of impacts resulting from historical agricultural use to present a DMC to the proposed project area.

5. Database and Records Review

5.1 User Provided Information

Section 6 of the ASTM Standard states that certain tasks, which will help to determine the possibility of RECs associated with the proposed project area, are generally conducted by the report user. These tasks include the following: reviewing title records for environmental liens or activity and land use limitations and considering awareness of any specialized knowledge (e.g., information about previous ownership or environmental litigation); experience related to RECs at the proposed project area; or significant reduction in the purchase price of the proposed project area. Typically, information related to these items should be provided by the report user. To assist the user in gathering information that may be material to identifying RECs, AECOM has provided the RCWD (the property owner) with the User Questionnaire from the ASTM Standard. Mr. Jacob Wiley of the RCWD completed the User Questionnaire on September 23, 2020. Mr Wiley was not aware of any environmental liens or AULs having been placed anywhere within the proposed project area boundary. Mr. Wiley also indicated that he did not have specialized knowledge or experience that is material to RECs in connection with the proposed project area. A copy of the completed ASTM E1527-13 User Questionnaire is included in Appendix C.

AECOM was unable to interview persons with knowledge regarding title records, environmental liens, activity and use limitations, specialized information, and/or real estate value reduction issues associated with the proposed project area. Follow-up questions were presented to the property owner (RCWD) and have been discussed throughout the relevant sections of this report. All other information for this report was obtained from the EDR report, online agency database searches, and historical reports prepared by others.

5.2 Title Records/Environmental Liens

Per the agreed upon scope of work, a chain-of-title and an environmental lien search were not performed as part of this assessment. According to County of Riverside Tax Assessor’s Records, the parent parcels within the proposed project area boundary are owned by the RCWD.

5.3 Database Information

In accordance with the scope of work and ASTM E1527-13, a search of various governmental databases was conducted by EDR. The site-specific environmental database report was reviewed to evaluate if soil and or groundwater from on-site and/or off-site sources of concern has the potential to impact the proposed project area. The database abbreviations are provided in the site-specific environmental database report.

The database report includes various reports detailing database information for each of the sites identified/geocoded within the specified radius. Additional sites were identified within the database report; however, EDR was not able to map them to specific locations due to insufficient/ contradicting address information. These sites were included in the database report as "orphan" sites. Based upon AECOM's review, no significant concerns appear associated with the orphan sites. A summary of AECOM’s review and analysis of the site-specific environmental database report is presented below. A copy of the database report is provided in Appendix D.

Based on AECOM’s research, the site is not located on or within a 1-mile radius of tribal lands.

5.3.1 Proposed Project Area

The proposed project area was not identified in the site-specific environmental database report.

5.3.2 Surrounding Sites

According to the environmental database report, there is only one property listed within the respective ASTM E1527-13 and/or EDR search distances from the proposed project area. The property listed is the adjacent RCWD Los Caballos Pump Station at 37205 De Portola Road. The listing for this property is plotted at the target property; however, this property is actually located off-site. The database listings are listed under the names RCWD VDC Chloramination, LH Woods & Sons, Inc. field office, and Vail Lake Transmissions. RCWD VDC Chloramination is listed in the Facility Index System (FINDS) database and Vail Lake Transmission Main & Pump Station is listed in the California Integrated Water Quality System (CIWQS) database. Both of these listings are associated with the RCWD Vail Lake Los Caballos Station. The listing for LH Woods & Sons appears to be associated with a field office for a project where hazardous materials were disposed of from this location in 2011. This business is listed in the HAZNET (related to disposal of hazardous waste), California Environmental Reporting System (CERS), and California Hazardous Waste Tracking System databases. These database listings are compliance-related and not indicative of a release. Based on the nature of the listings (i.e., compliance, non-contamination related), it is AECOM's opinion that this property does not present a REC to the proposed project area.

Additionally, there are a FINDS listing for the Vail Lake Transmission Main & Pump Station at Pulgas Creek Road and a FINDS listing for a RCWD VCD Well registered at the 37100 block of De Portola Road in the orphans listing of the EDR report. As discussed in Section 4.1, Oak Mountain Road is also known as Pulgas Creek Road. These database listings are compliance in nature and do not represent a REC in connection with the proposed project area. No other sites were listed in the EDR database report.

5.4 Vapor Encroachment Screening

AECOM conducted a Tier 1 VES as part of this assessment. This screening was conducted in general accordance with ASTM E2600-15. The objective of the VES was to determine if a VEC exists.

5.4.1 Proposed Project Area

No on-site sources of vapor encroachment (e.g. UST, contaminated soil, groundwater plume, etc.) were identified during this assessment. There have been no documented releases within the proposed project area boundary. Based on the available information, it is AECOM's opinion that a VEC due to an on-site source does not appear to exist.

5.4.2 Off-site

To conduct the VES of the nearby area, AECOM conducted a detailed review and analysis of the site-specific environmental database report with particular focus on the following two types of sites:

1. Off-site properties that are impacted by chlorinated volatile organic compounds (CVOCs) and/or semi-volatile-organic compounds (SVOCs) and are located within approximately 1,750 feet of the proposed project area, and
2. Off-site properties that are impacted by petroleum hydrocarbons and are located within approximately 525 feet of the proposed project area.

A review of the site-specific environmental database indicates there are no CVOC/SVOC- or petroleum hydrocarbon-impacted sites located within the above-described radii of the site. Therefore, based on the available information, it is AECOM's opinion that a VEC at the proposed project area due to an off-site source does not appear to exist.

5.5 Agency File Review

5.5.1 City and County

AECOM searched the Riverside County online Tax Assessor's Records for information on the parent parcels associated with the proposed project area. Information obtained from this online database for the proposed project area has been incorporated throughout this report where appropriate.

AECOM submitted a public records request to the County of Riverside DEH HMMD for records pertaining to the proposed project area on April 1, 2020, and a follow up request was submitted on June 19, 2020. Several records were identified for the former horse ranch property at 37115 De Portola Road and the adjacent Los Caballos Pump Station property at 37205 De Portola Road, which are discussed below.

Several County of Riverside DEH Community Health Agency Certified Unified Program Agency (CUPA) Hazardous Materials Management permits were on file for the property at 37115 De Portola Road between December 2004 through December 2007, which were registered to Blackridge RJH, Inc., and the same permit was issued for Rock Walker Stables in December 2003. A Hazardous Materials Business Emergency Plan and Inventory Certification Form was on file for Blackridge RJH, Inc. and dated January 2005 and 2006.

Several CUPA Riverside County Community Health Agency DEH HMMD Supplemental Report forms were reviewed for various occupants of the former horse ranch property at 37115 De Portola Road between 2002 and 2008. A December 2002 Supplemental Report form for Rock Walker Stables indicated that several 55-gallon drums were present in the concrete bermed containment area, and that some were open and lacking labels. A June 2006 Supplemental Report form indicated the occupant (Blackridge RJH, Inc.) had a hazardous waste permit that would no longer be needed. The occupant indicated that no vehicle maintenance or other waste generating activities were conducted on-site. The supplemental report form indicated that six 55-gallon drums were observed in the bermed area, next to a diesel and unleaded fuel AST. Two 5-gallon cans of used oil were also observed elsewhere on the property. The report indicated that the facility did not have an evacuation and emergency response procedure available, and they were given a blank business Emergency Plan package to correct this violation. The report form also indicated that the facility does not have an Environmental Protection Agency (EPA) ID number so they had not been getting rid of their waste. They were given info on how to obtain a temporary EPA ID, and that once the waste was removed from the property, they could have their hazardous waste generator permit removed. In July 2007, a Supplemental Report form indicates that the occupant (Blackridge RJH, Inc.) wanted to know if they could get out of their County permits. The Riverside County CUPA indicated that they still have "several ASTs and 55-gallon drums of waste" (number and contents of each type of vessel not specified), and that in order to terminate their County permits, all waste materials and ASTs needed to be removed and disposed of properly, with proper disposal documentation. The occupant indicated that they do not fill up fuel or repair farm equipment on-site, and that all such activities are conducted off-site, including refueling at an off-site service station.

A May 2008 Supplemental Report form indicated that the facility had removed the two fuel ASTs from their site but that there were still six 55-gallon drums containing hazardous materials and/or hazardous wastes, and two used batteries that needed to be disposed of before their County permits could be discontinued. No other Supplemental Report forms were provided for review; however, a County of Riverside Community Health Agency DEH HMMD Change of Status form from April 2008 indicated that the former occupant (Blackridge RJH, Inc.) was out of business and that the facility did not have any hazardous materials on-site at that time.

Additional Change of Status forms were reviewed from the County of Riverside Community Health Agency DEH HMMD were reviewed, including a December 2002 new permit form changing the site operator from Nexstar Ranch to Rock Walker Stables (same facility, just a change of address and new

owner and name), and a February 2004 new permit form indicating a change in operations from Rock Walker Stables to Blackridge RJH, Inc.

Although the previous site occupant(s) at 37115 De Portola Road generated hazardous wastes and used and stored petroleum products and hazardous materials on-site, all such materials have been removed from the property and these operations appear to have ceased since approximately 2008. A Phase II subsurface investigation was conducted on this property in 2015, no VOC or TPH impacts were detected in the soil samples collected at the property. Therefore, these historical operations do not present a REC in connection with this portion of the proposed project area. Copies of relevant County of Riverside DEH HMMD records are provided in Appendix E.

Additional County of Riverside DEH HMMD records were provided for the adjacent Los Caballos Pump Station property at 37205 De Portola Road. Records provided include hazardous materials management permits, inspection forms, and a Risk Management Plan due to the presence of a large quantity of ammonia (over 500 pounds). Violations cited by the DEH HMMD are generally regulatory in nature (i.e., faded labels on facility piping, worn or tattered windsocks, etc.) and have historically been resolved shortly after issuance by the RCWD. Given that most violations reviewed for this property are generally administrative or compliance-related and no releases of petroleum products or hazardous materials have been identified, the presence of this property adjacent to the proposed project area does not present a REC to the proposed project area.

AECOM submitted a public records request to the Riverside County Fire Department/CalFire for records pertaining to the proposed project area on April 1, 2020, and a follow up request was submitted on June 19, 2020. Upon submittal of both requests, a response was received indicating that the Riverside County Fire Department does not maintain the type of records requested, and referred AECOM to the County of Riverside DEH HMMD.

5.5.2 State

AECOM submitted a public records request to the Office of Environmental Health Hazard Assessment (OEHHA) on April 1, 2020, and a follow up request was submitted on June 19, 2020 for information pertaining to the proposed project area. A response was received from Monet Vela on June 19, 2020 indicating that the OEHHA did not have records associated with this proposed project area.

AECOM searched Department of Toxic Substance Control's (DTSC's) online EnviroStor database for California Cleanup Sites involving the DTSC. The EnviroStor database consists of federal National Priorities List (NPL) sites, state response sites, voluntary cleanup sites, and school cleanup sites. There were no records in the vicinity of the proposed project area or surrounding properties identified in the online EnviroStor database.

AECOM searched the California EPA's (CalEPA's) State Water Resources Control Board online GeoTracker database. The GeoTracker database consists of Leaking Underground Storage Tank Cleanup Sites, (non-petroleum) Cleanup Program Sites (CPS), Military Cleanup Sites, and Permitted UST Sites located throughout California. There were no records in the vicinity of the proposed project area or surrounding properties identified in the online GeoTracker database.

AECOM searched the online CalEPA Regulated Site Portal database. The database combines information from the CERS, EnviroStor, GeoTracker, CIWQS, and the federal Toxics Release Inventory database. No sites were listed in the vicinity of the proposed project area in these databases.

AECOM searched the California Department of Conservation online Division of Oil, Gas, and Geothermal Resources (DOGGR) Well Finder database. No oil/gas wells were depicted within or adjacent to the proposed project area boundary in the online DOGGR database. The proposed project area boundary is not located within an oil/gas field.

5.5.3 Federal

AECOM performed a review of online records available on the National Pipeline Mapping System (NPMS) public map viewer maintained by the United States Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA), for gas transmission or hazardous liquid pipelines on or adjacent to the proposed project area. No hazardous liquid petroleum pipelines were identified on or adjacent to the proposed project area that are within the PHMSA's jurisdiction.

AECOM searched the EPA Enforcement & Compliance History Online (ECHO) and the EPA Envirofacts and Superfund Enterprise Management System (SEMS) online databases. The SEMS database replaced the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) which has since been retired. SEMS includes the same data fields and content as CERCLIS. The Envirofacts database retrieves information obtained from 17 national systems, including the CERCLIS, Superfund program (NPL sites), hazardous waste sites, and potential hazardous waste sites. The address associated with the proposed project area (37115 De Portola Road) or adjacent properties were not listed in the Envirofacts or SEMS databases.

6. Findings and Opinions

AECOM performed a Phase I ESA of the proposed project area in conformance with the scope and limitations of ASTM E1527-13, which meets the requirements of Title 40, Code of Federal Regulations Part 312 and is intended to constitute *all appropriate inquiry* for purposes of the landowner liability protections. Any exceptions to, or deletions from, this practice are described in Sections 1.3 through 1.5 of this report.

The following sections summarize the findings and opinions of this Phase I ESA of the proposed project area.

6.1 Recognized Environmental Conditions

Based on the above-described activities, no RECs were identified in connection with the proposed project area.

6.2 Controlled Recognized Environmental Conditions

Based on the above-described activities, no CRECs were identified in connection with the proposed project area.

6.3 Historical Recognized Environmental Conditions

Based on the above-described activities, no HRECs were identified in connection with the proposed project area.

6.4 Vapor Encroachment Conditions

Based on the above-described activities, no VECs were identified in connection with the proposed project area.

6.5 De Minimis Conditions

Based on the above-described activities, the following DMCs were identified in connection with the site:

- Low concentrations of select metals and organochlorine pesticides were detected in soil samples collected during the Phase II investigation conducted in October 2015. Concentrations of these COCs were detected below their respective regulatory action levels. The previous report concluded that if percolation ponds were to be installed during future site redevelopment, surface grading for these ponds would substantially reduce the presence of residual pesticide impacts at the site and recommended that once grading is complete, the bottom of the ponds should be resampled to ensure very low or non-detect concentrations of pesticides exist. AECOM concurs with the previous conclusion and considers the presence of pesticides soil on this property a DMC in connection with the proposed project area.
- Based on the date of construction of the dam and associated ancillary structures (circa 1949), PCB-containing dielectric fluids associated with on-site electrical equipment may be present, and PCBs may be present in paint and/or caulk (if present) on the stream release valve building.

6.6 Non-ASTM Scope Considerations

Based on the above described activities, the following non-ASTM scope considerations were identified in connection with the proposed project area:

- Based on the date of construction of the dam and associated ancillary structures (circa 1949), ACMs and LBP may be present in materials used during the original construction of the dam and associated ancillary structures. No asbestos or lead paint surveys were provided for review as part of this ESA, and ACM and LBP surveys were not included within the scope of this ESA. Based on the age of the buildings on the former horse ranch property (early 2000s), ACM and LBP is not expected to be present in these buildings.

7. Conclusions and Recommendations

AECOM has performed a Phase I ESA in conformance with the scope and limitations of ASTM E1527-13 of the Vail Dam Seismic and Hydrologic Remediation Project property located in Temecula, California. Any exception to, or deletions from, this practice are described in Sections 1.3 through 1.5 of this report. This assessment has revealed no evidence of RECs, CRECs, or HRECs in connection with the proposed project area.

The DMCs identified do not warrant further action at this time, in AECOM's opinion. Should the former horse ranch property be redeveloped for use as an extension of the adjacent Upper VDC Recharge Basins property, the bottom of the recharge basins should be resampled once grading is complete to ensure very low or non-detect concentrations of pesticides exist. In addition, the on-site septic system may need to be located, excavated, and disposed of off-site in accordance with local and state regulations. In addition, the presence or absence of ACM and/or LBP within any of the original dam structures that will be demolished during the proposed project, as well as the PCB content of any electrical equipment or building materials that will be demolished during the proposed project, should be determined prior to demolition, and if identified, such materials will need to be handled and disposed of in accordance with state and federal regulations.

8. Environmental Professional Statement

Ms. Jessica Himebauch was the Environmental Professional (EP) for this project. Ms. Himebauch's EP statement is below and her resume is provided in Appendix F.

I declare that, to the best of my professional knowledge and belief, I meet the definition of an EP as defined in §312.10 of 40 Code of Federal Regulations (CFR) and that I have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the site. I have developed and performed all the appropriate inquiries in conformance with the standards and practices set forth in 40 CFR Part 312.

Signature:  Date: September 24, 2020

9. References

9.1 Persons Interviewed

Mr. Randy Neff of the Rancho California Water District, 42135 Winchester Road, Temecula, California 92590, (951) 296-6988, neffr@ranchowater.com.

Ms. Nicole West of LSA Associates, Inc., 703 Palomar Airport Road, Suite 280, Carlsbad, California 92011, (760) 931-5471, Nicole.west@lsa.com. Ms. West provided copies of previous reports conducted for the former horse ranch property on June 24, 2020.

Mr. Jacob Wiley of the Rancho California Water District, 42135 Winchester Road, Temecula, California 92590, wileyj@ranchowater.com. Mr. Wiley completed the ASTM E1527-13 User Questionnaire on September 23, 2020.

9.2 Agencies Contacted

Assessor – County Clerk – Recorder parcel information, reviewed for Riverside County, California at https://www.asrclkrec.com/property-and-recent-sales-viewer. This information was reviewed online by Ms. Perhala of AECOM on April 1, 2020.

Riverside County Fire Department/CalFire
http://www.calfire.ca.gov/about/about_contact_us_recordsandrequests. Request emailed to RRURecords@fire.ca.gov on April 1 and June 19 of 2020.

California Regional Water Quality Control Board (RWQCB) San Diego Region (9) San Diego Hydrologic Basin Planning Area Mapping. April 1995.
https://www.waterboards.ca.gov/sandiego/water_issues/programs/basin_plan/docs/sdrwqcb_basinplanmap.pdf.

California Regional Water Quality Control Board (RWQCB) San Diego Region (9) San Diego Water Quality Control Plan. September 8, 1994, amended May 17 2016.
https://www.waterboards.ca.gov/sandiego/water_issues/programs/basin_plan/docs/R9_Basin_Plan.pdf

Environmental Protection Agency Envirofacts database - http://www.epa.gov/enviro/. Online database search conducted by Ms. Perhala of AECOM on April 1, 2020.

Environmental Protection Agency Superfund Enterprise Management System (SEMS) database, https://cumulis.epa.gov/supercpad/cursites/srchsites.cfm. Online database search conducted by Ms. Perhala of AECOM on April 1, 2020.

Public Records Request submitted to State of California Office of Environmental Health Hazard Assessment (OEHHA) at http://oehha.ca.gov/public_info/oehhapra.html. Monet Vela, Public Records Act Coordinator, 1001 I Street, PO Box 4010, MS 23B (#58c), Sacramento, California 95812, (916) 323-2517, monet.vela@oehha.ca.gov. Requests submitted via email on April 1 and June 19, 2020.

Public Records Request submitted to Riverside County Department of Environment Health – Hazardous Materials Management Division. Requests emailed to DEHRecordsMgmt@rivco.org on April 1 and June 19, 2020.

State, California Department of Conservation, Division of Oil, Gas, and Geothermal Resources (DOGGR) Well Finder, http://www.conservation.ca.gov/dog/Pages/wellfinder.aspx. Online database search conducted by Ms. Perhala of AECOM on April 1, 2020.

State Department of Toxic Substances Control (DTSC). EnviroStor database, https://www.envirostor.dtsc.ca.gov/public/map/. Online database search conducted by Ms. Perhala of AECOM on April 1, 2020.

State, California Environmental Protection Agency (CalEPA), Site Portal online database, https://siteportal.calepa.ca.gov. Online database search conducted by Ms. Perhala of AECOM on April 1, 2020.

State Water Resources Control Board GeoTracker online database, http://geotracker.waterboards.ca.gov/. Online database search conducted by Ms. Perhala of AECOM on April 1 and June 19, 2020.

United States Environmental Protection Agency (EPA). Enforcement & Compliance History Online (ECHO), https://echo.epa.gov/facilities/facility-search/results. Online database search conducted by Ms. Perhala of AECOM on April 1, 2020.

United States Department of Transportation, Pipeline and Hazardous Materials Safety Administration (PHMSA), National Pipeline Mapping System (NPMS) public map viewer, https://pvnpms.phmsa.dot.gov/PublicViewer/. Online database search conducted by Ms. Perhala of AECOM on June 19, 2020.

United States Environmental Protection Agency (EPA), Envirofacts Multisystem online search, https://www3.epa.gov/enviro/facts/multisystem.html. Online database search conducted by Ms. Perhala of AECOM on April 1, 2020.

United States EPA, Superfund Enterprise Management System (SEMS) online search, https://www.epa.gov/enviro/sems-search. Online database search conducted by Ms. Perhala of AECOM on April 1, 2020.

United States Geological Survey (USGS), National Water Information System: Mapper. https://maps.waterdata.usgs.gov/mapper/index.html, 2020. Reviewed by Ms. Perhala of AECOM on July 14, 2020.

9.3 Documents Reviewed

AECOM Technologies, Inc., Geotechnical Basis of Design – Vail Dam Seismic and Hydrologic Remediation Project, Temecula, California 92592. November 29, 2017.

AECOM Technologies, Inc., DRAFT Hydrology Study – Vail Dam Seismic and Hydrologic Remediation Project, Temecula, California 92592. May 2020.

ASTM E1527-13, Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process, dated November 2013. www.astm.org.

ASTM E2600-15, Standard Guide for Vapor Encroachment Screening on Property Involved in Real Estate Transactions, dated October 2015. www.astm.org.

California Department of Conservation, Division of Mines and Geology, A General Location Guide for Ultramafic Rocks in California – Areas More Likely to Contain Naturally Occurring Asbestos, ftp://ftp.consrv.ca.gov/pub/dmg/pubs/ofr/ofr_2000-019.pdf

EDR 7.5 Minute Topographic Maps, prepared for Vail Dam Phase I ESA, Temecula, California 92592, dated April 1, 2020. Inquiry number 6025303.5. Topographic Maps 1901, 1903, 1939, 1942, 1943, 1947, 1950, 1953, 1954, 1957, 1968, 1971, 1973, 1978, 1982, 1988, 1997, and 2012. Report prepared by Environmental Data Resources Inc., 6 Armstrong Road, Shelton, Connecticut 06484, (800) 352-0050, www.edrnet.com.

EDR Aerial Photographs Decade Package prepared for Vail Dam Phase I ESA, Temecula, California 92592, dated April 1, 2020. Inquiry number 6025303.8. Aerial photographs dated 1949, 1953, 1961, 1967, 1971, 1985, 1989, 1996, 2002, 2005, 2009, 2012, and 2016. Report prepared by Environmental Data Resources Inc., 6 Armstrong Road, Shelton, Connecticut 06484, (800) 352-0050, www.edrnet.com.

EDR City Directory Abstract prepared for Vail Dam Phase I ESA, Temecula, California 92592, dated April 3, 2020. Inquiry number 6025303.9. City directories reviewed included 1971, 1974, 1979, 1986, 1991, 1996, 2001, 2006, 2010, 2014, and 2017. Report prepared by Environmental Data Resources Inc., 6 Armstrong Road, Shelton, Connecticut 06484, (800) 352-0050, www.edrnet.com.

EDR Radius Map with GeoCheck®, prepared for Vail Dam Phase I ESA, Temecula, California 92592, dated April 1, 2020. Inquiry number 6025303.10s. Report prepared by Environmental Data Resources Inc., 6 Armstrong Road, Shelton, Connecticut 06484, (800) 352-0050, www.edrnet.com.

EDR Sanborn Map Report, prepared for Vail Dam Phase I ESA, Temecula, California 92592, dated April 1, 2020. Inquiry number 6025303.6. Report prepared by Environmental Data Resources Inc., 6 Armstrong Road, Shelton, Connecticut 06484, (800) 352-0050, www.edrnet.com.

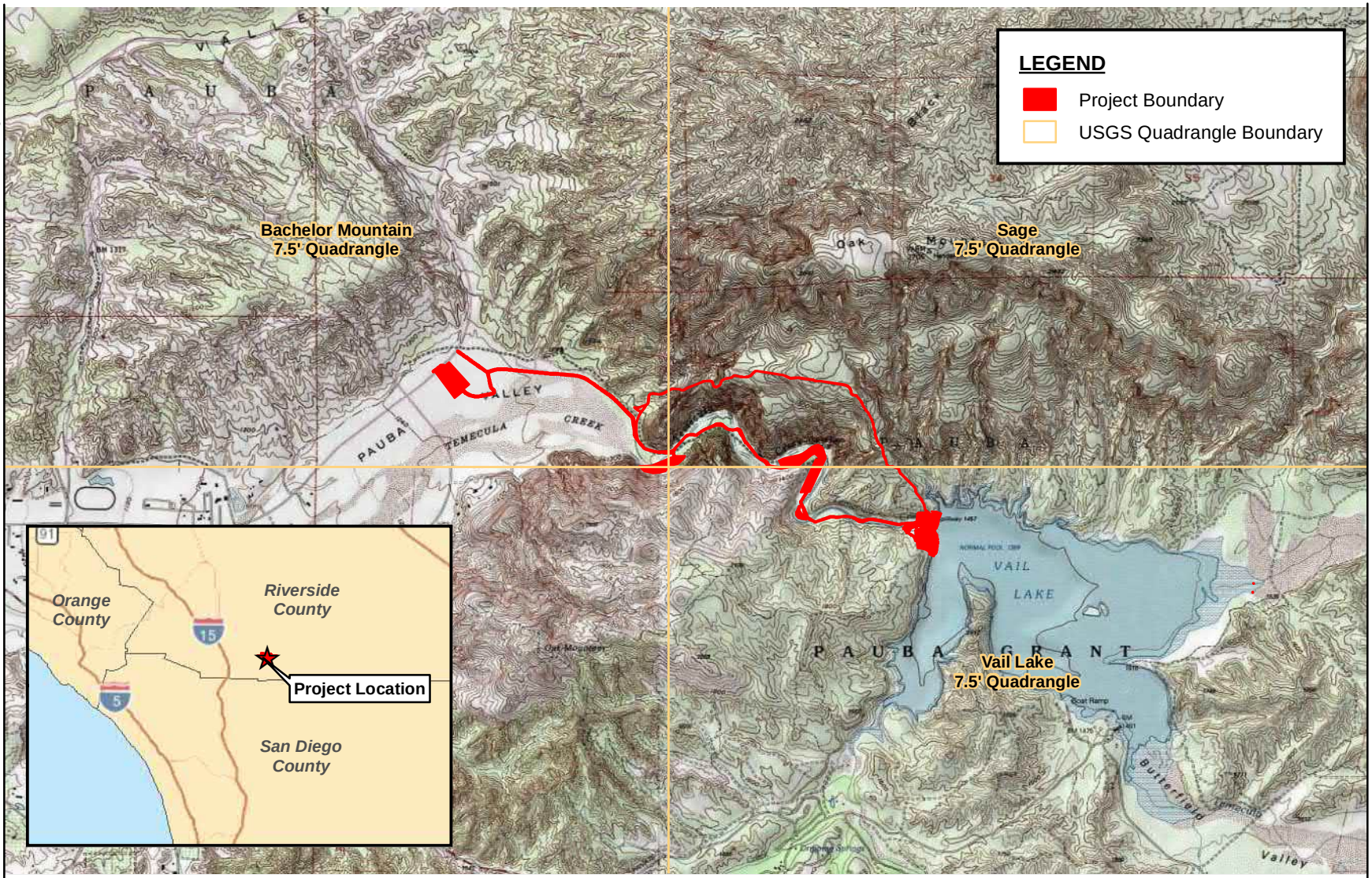
Google Earth website, www.google.earth.com. This information was reviewed online by Ms. Perhala with AECOM on July 14, 2020.

Phase One, Inc., Limited Phase II Environmental Site Assessment for 37115 De Portola Road, Temecula, California 92592. September 2015.

Phase One, Inc., Phase I Environmental Site Assessment for 37115 De Portola Road, Temecula, California 92592. October 2015.

Figures

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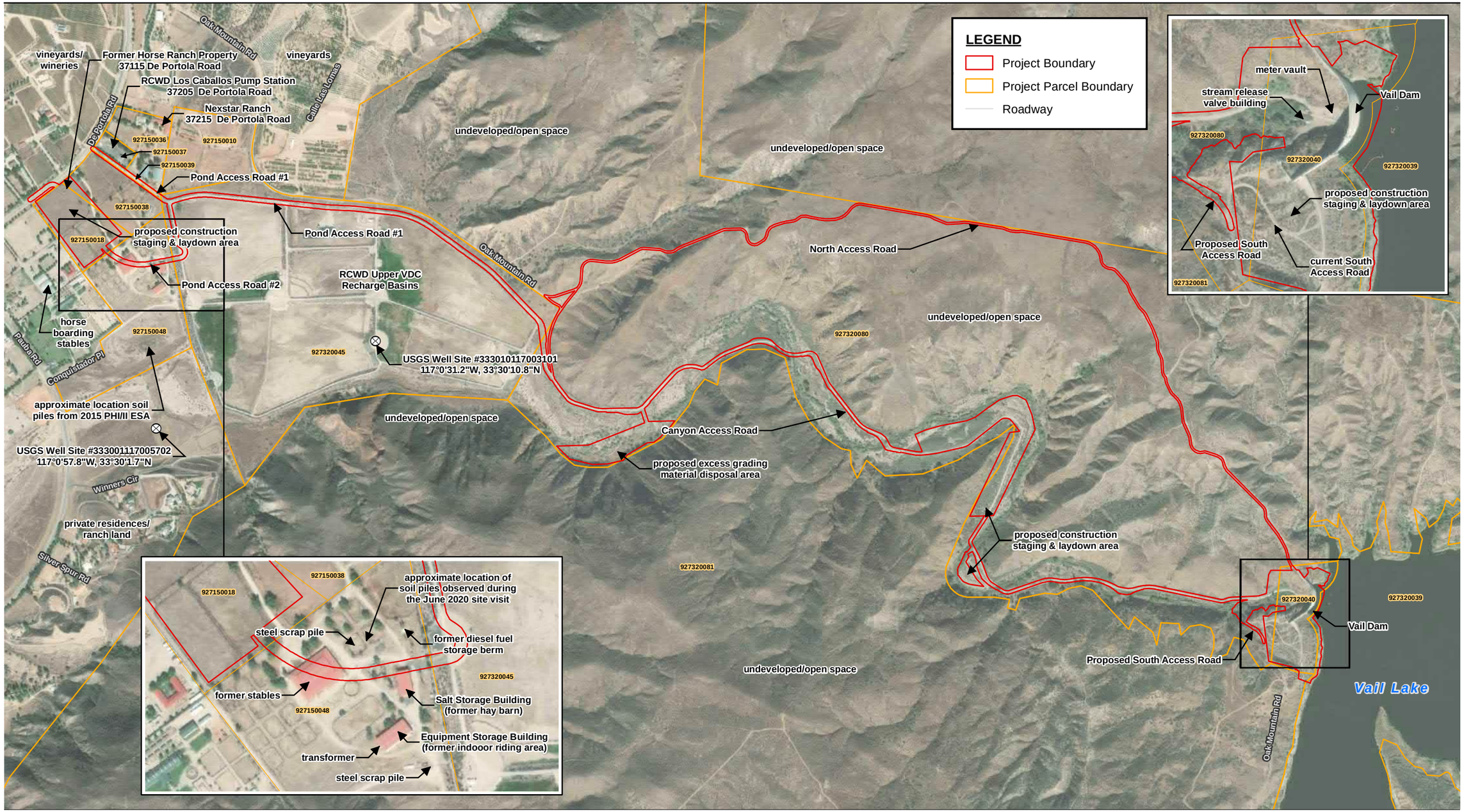
Source: USGS 7.5' Quadrangle Bachelor Mtn (1976); Sage (1960); Pechanga (1984); Vail Lake (1984).

4,000 0 4,000 Feet

Scale: 1:48,000; 1 inch = 4,000 feet

Figure 1
Site Location
37115 De Portola Road, Temecula, California

Path: \\Orange.na.aecomnet.com\Orange\DCS\Projects\WTR\60623135_VAILENVSVS900_CAD_GIS\920 GIS\map_docs\mxd\ESA\Fig1_SiteLocation.mxd, 9/3/2020, daniel.arellano



Source: Vivid Maxar 2018; Riverside County Assessor 2019; AECOM 2020; Esri 2015; National Hydrography Dataset 2015.

1,000 500 0 1,000 Feet

Scale: 1:12,000; 1 inch = 1,000 feet

Figure 2
Site Plan
37115 De Portola Road, Temecula, California

Path: \\Orange.na.aecomnet.com\Orange\DCS\Projects\WTR\60623135_VAILENVSVS\900_CAD_GIS\920 GIS\map_docs\mxd\ESA\Fig2_SitePlan_Parcels.mxd, 9/25/2020, daniel.arellano

Appendix A

Representative Site Photographs

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AECOM

PHOTOGRAPH LOG

Facility Name:	**Site Location:**	**Project No.**
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photograph No. 1	**Date:** 06/22/20

Direction Photograph Taken:

Southeast

Description:

View of gated entrance at 37115 De Portola Road located on the western portion of the proposed project area.



Photograph No. 2	**Date:** 06/22/20

Direction Photograph Taken:

Southeast

Description:

View southeast, just inside the gate at 37115 De Portola Road.



AECOM

PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photograph No.	Date:
3	06/22/20

Direction Photograph Taken:

South

Description:

View of the former horse ranch area in the western end of the proposed project area, in the vicinity of the proposed construction staging and laydown area.



Photograph No.	Date:
4	06/22/20

Direction Photograph Taken:

Southwest

Description:

View of the proposed construction staging and laydown area adjacent to the south of De Portola Road, on the northwestern side of the former horse ranch property.



AECOM

PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photograph No.	Date:
5	06/22/20

Direction Photograph Taken:

South

Description:

View of the northern side of the former horse stable building.



Photograph No.	Date:
6	06/22/20

Direction Photograph Taken:

Northeast

Description:

View of the interior of the former horse stable building. Photograph taken from northern side of building. Standing water is visible on the left-center of the photograph.



AECOM

PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photograph No.	Date:
7	06/22/20

Direction Photograph Taken:

South

Description:

View of the former building slab in the western end of the former horse stable building. A horse corral is visible in the center of the photograph, as shown by the arrow. Plumbing presumably associated with a former restroom is visible in the foreground, and the toilet at each end of this slab are circled.



Photograph No.	Date:
8	06/22/20

Direction Photograph Taken:

East

Description:

View of the northern portion of the building slab show in the previous photograph. A floor drain is visible in the foreground. The exterior of the bar/lounge area is visible in the top right corner of the photograph.



PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photograph No.	Date:
9	06/22/20

Direction Photograph Taken:

East

Description:

View looking east from the southern corner of the former stable building. A toilet still stands from a former restroom in this area. An area of standing water is circled in the upper left quadrant of the photograph, and an arrow points to the other concrete slab area within this structure in the upper right corner of the photograph.



Photograph No.	Date:
10	06/22/20

Direction Photograph Taken:

North

Description:

Standing water in the southern end of the building, adjacent to the bar/lounge area.



AECOM

PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photograph No.	Date:
11	06/22/20

Direction Photograph Taken:

Southwest

Description:

View southwest from the northeastern corner of the former stable building. Standing water is visible in the foreground, and the area of standing water from Photographs No. 6, 9, and 10 is circled on the left side of the photograph.



Photograph No.	Date:
12	06/22/20

Direction Photograph Taken:

East

Description:

View of the eastern corner of the former stable building. The concrete slab that was identified in Photograph No. 9 is visible here.



AECOM

PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photograph No. 13	Date: 06/22/20

Direction Photograph Taken:

South

Description:

View of interior bar/lounge area.



Photograph No. 14	Date: 06/22/20

Direction Photograph Taken:

North

Description:

View of the southern exterior of the former stable building.



AECOM

PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photograph No. 15	Date: 06/22/20

Direction Photograph Taken:

North

Description:

Small pile of scrap metal located to the east of the former stable building and north of the former hay barn, currently known as the salt storage building.



Photograph No. 16	Date: 06/22/20

Direction Photograph Taken:

North

Description:

View of the soil piles outside of the eastern side of the former stable building and north of the former hay barn, currently known as the salt storage building by the RCWD.



AECOM

PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photograph No. 17	Date: 06/22/20

Direction Photograph Taken:

West

Description:

View of the soil piles from Photograph No. 16.



Photograph No. 18	Date: 06/22/20

Direction Photograph Taken:

North

Description:

View of the bermed enclosure previously utilized to store 55-gallon drums of diesel fuel and two fuel ASTs.



AECOM

PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photograph No.	Date:
19	06/22/20

Direction Photograph Taken:

South

Description:

View south of the former hay barn structure. Two 1,000-gallon capacity, out-of-service diesel generators and a smaller out-of-service generator (size unknown) were stored beneath the canopy. Portions of Pond Access Road No. 2 pass through this photograph.



Photograph No.	Date:
20	09/01/20

Direction Photograph Taken:

Northwest

Description:

The RCWD provided this photograph to AECOM on September 2, 2020, which was taken on September 1, 2020. The smaller generator of an unknown capacity has been removed from the site and replaced with an additional 1,000-gallon out-of-service generator. A secondary containment tarp is present beneath all three generators.



AECOM

PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photograph No.	Date:
21	06/22/20

Direction Photograph Taken:

South

Description:

Salt hopper in the southern end of the former hay barn, current salt storage building.



Photograph No.	Date:
22	06/22/20

Direction Photograph Taken:

Southwest

Description:

Northeastern side of the former indoor riding arena, currently utilized as an equipment storage building by the RCWD. An empty water silo is present on the south side of the building. Based on the information provided, this portion of the former horse ranch property is considered off-site for the purposes of this assessment.



PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photograph No.	Date:
23	06/22/20

Direction Photograph Taken:

Northeast

Description:

Transformer (center) and SCE electrical panel (left) adjacent to south side of the equipment storage building. No activity is anticipated in this area during the proposed project, and this area is considered off-site.



Photograph No.	Date:
24	06/22/20

Direction Photograph Taken:

South

Description:

View of a steel beam scrap metal pile adjacent to (south of) one of the gated entrances to the off-site Upper VDC Retention Basin property. This area is not included within the proposed project area.



AECOM

PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photograph No. 25	Date: 06/22/20

Direction Photograph Taken:

Northwest

Description:

View from inside (east of) the gate near the Pond Access Road No. 1 entrance. A short portion of the road is paved in this area.



Photograph No. 26	Date: 06/22/20

Direction Photograph Taken:

Southeast

Description:

View of Pond Access Road No. 1 from the northern side of the gate, outside of the entrance.



AECOM

PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photograph No. 27	Date: 06/22/20

Direction Photograph Taken:

Southeast

Description:

View of Pond Access Road No. 1 from De Portola Road



Photograph No. 28	Date: 06/22/20

Direction Photograph Taken:

East

Description:

View of Pond Access Road#1, driving toward the canyon entrance.



AECOM

PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photograph No. 29	Date: 06/22/20

Direction Photograph Taken:

East

Description:

An additional view, farther down Pond Access Road #1 toward the canyon entrance. A portion of the North Access Road is visible in the distance, as shown by the arrow.



Photograph No. 30	Date: 06/22/20

Direction Photograph Taken:

South

Description:

View of the off-site RCWD Upper VDC Retention Basin property, south of Pond Access Road #1.



AECOM

PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photograph No. 31	Date: 06/22/20

Direction Photograph Taken:

South

Description:

View of another off-site RCWD Upper VDC Retention Basin, this one was receiving water at the time of AECOM's site visit. Water can be seen coming out of the pipe in the center of the basin, in the center of the photograph.



Photograph No. 32	Date: 06/22/20

Direction Photograph Taken:

East

Description:

View east of the gated entrance to the canyon on the western end of Canyon Access Road. The North Access Road runs along the top of the ridge pictured in this photograph.



AECOM

PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photograph No.	Date:
33	06/22/20

Direction Photograph Taken:

South

Description:

Blow off valve associated with the Vail Lake Transmission Line pipeline, adjacent to (south of) Canyon Access Road.



Photograph No.	Date:
34	06/22/20

Direction Photograph Taken:

East

Description:

Area of water released from Vail Dam present in Canyon Access Road.



AECOM

PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photograph No. 35	Date: 06/22/20

Direction Photograph Taken:

East

Description:

First view of dam while driving east of Canyon Access Road.



Photograph No. 36	Date: 06/22/20

Direction Photograph Taken:

East

Description:

View of dam from the base of the dam. An at-grade meter vault is visible in foreground.



AECOM

PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photograph No.	Date:
37	06/22/20

Direction Photograph Taken:

West

Description:

Close-up view of the at-grade meter vault from the previous photograph, approximately 100 feet downstream (west of) the dam.



Photograph No.	Date:
38	06/22/20

Direction Photograph Taken:

North

Description:

Stream release valve building approximately 200 feet downstream (west of) the dam.



AECOM

PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photograph No.	Date:
39	06/22/20

Direction Photograph Taken:

North

Description:

Close up of the northern side of the dam from the dam base.



Photograph No.	Date:
40	06/22/20

Direction Photograph Taken:

Northwest

Description:

View from the top of the southern end of the dam.



AECOM

PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photograph No.	Date:
41	06/22/20

Direction Photograph Taken:

Northeast

Description:

View of the lake-side of the dam, Vail Lake visible on the right side of photograph.



Photograph No.	Date:
42	06/22/20

Direction Photograph Taken:

North

Description:

View north of the weirs at the top of the spillway on the south side of the dam. A portion of the North Access Road is visible in the vicinity of the arrow.



AECOM

PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photograph No. 43	Date: 06/22/20

Direction Photograph Taken:

South

Description:

View of the southern-most spillway at the top of the dam.



Photograph No. 44	Date: 06/22/20

Direction Photograph Taken:

Northeast

Description:

View from the top of the dam. The spillway on the northern side of the dam is visible, as shown by the arrow.



AECOM

PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photograph No.	Date:
45	06/22/20

Direction Photograph Taken:

West

Description:

View from the same position as the previous photograph. This area will be graded and the gully filled for relocation of the South Access Road, and such that this area may be used for a construction staging and laydown area.



Photograph No.	Date:
46	06/22/20

Direction Photograph Taken:

Northeast

Description:

View from the top of the dam, driving north toward the bottom. The stream release valve building can be seen in the bottom right quadrant of the photograph, and the spillway at the top of the dam on the northern side is visible in the top left quadrant.



AECOM

PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photograph No.	Date:
47	06/22/20

Direction Photograph Taken:

West

Description:

Area on the southwest side of Canyon Access Road that is proposed for use as a construction staging and laydown area



Photograph No.	Date:
48	06/22/20

Direction Photograph Taken:

West

Description:

View west, exiting the canyon on Canyon Access Road. The white well vault and bollards on the left side of the photograph are a cathode station associated with the Vail Lake Transmission Line pipeline.



AECOM

PHOTOGRAPH LOG

Facility Name:	Site Location:	Project No.
Vail Dam Seismic and Hydrologic Remediation Project	37115 De Portola Road, Temecula, CA	60623135

Photograph No. 49	Date: 06/22/20

Direction Photograph Taken:

East

Description:

View of the entrance to the adjacent RCWD Los Caballos Pump Station at 37205 De Portola Road, north of Pond Access Road No. 1 .



Photograph No. 50	Date: 06/22/20

Direction Photograph Taken:

Northwest

Description:

View of the vineyard across the street from the proposed project area entrance on De Portola Road.



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Appendix B

EDR Historical Resources

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Vail Dam Phase I ESA

Vail Dam Phase I ESA

Temecula, CA 92592

Inquiry Number: 6025303.8

April 02, 2020

The EDR Aerial Photo Decade Package

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

EDR Aerial Photo Decade Package

04/02/20

Site Name:

Vail Dam Phase I ESA
Vail Dam Phase I ESA
Temecula, CA 92592
EDR Inquiry # 6025303.8

Client Name:

AECOM
401 West A Street, Suite 1200
San Diego, CA 92101
Contact: Sarah Perhala

Environmental Data Resources, Inc. (EDR) Aerial Photo Decade Package is a screening tool designed to assist environmental professionals in evaluating potential liability on a target property resulting from past activities. EDR's professional researchers provide digitally reproduced historical aerial photographs, and when available, provide one photo per decade.

Search Results:

Year	Scale	Details	Source
2016	1"=1000'	Flight Year: 2016	USDA/NAIP
2012	1"=1000'	Flight Year: 2012	USDA/NAIP
2009	1"=1000'	Flight Year: 2009	USDA/NAIP
2005	1"=1000'	Flight Year: 2005	USDA/NAIP
2002	1"=1000'	Flight Date: January 01, 2002	USGS
1996	1"=1000'	Acquisition Date: January 01, 1996	USGS/DOQQ
1989	1"=1000'	Flight Date: January 01, 1989	USDA
1985	1"=1000'	Flight Date: January 01, 1985	USDA
1971	1"=1000'	Flight Date: January 01, 1971	USGS
1967	1"=1000'	Flight Date: January 01, 1967	USDA
1961	1"=1000'	Flight Date: January 01, 1961	USDA
1953	1"=1000'	Flight Date: January 01, 1953	USDA
1949	1"=1000'	Flight Date: January 01, 1949	USDA

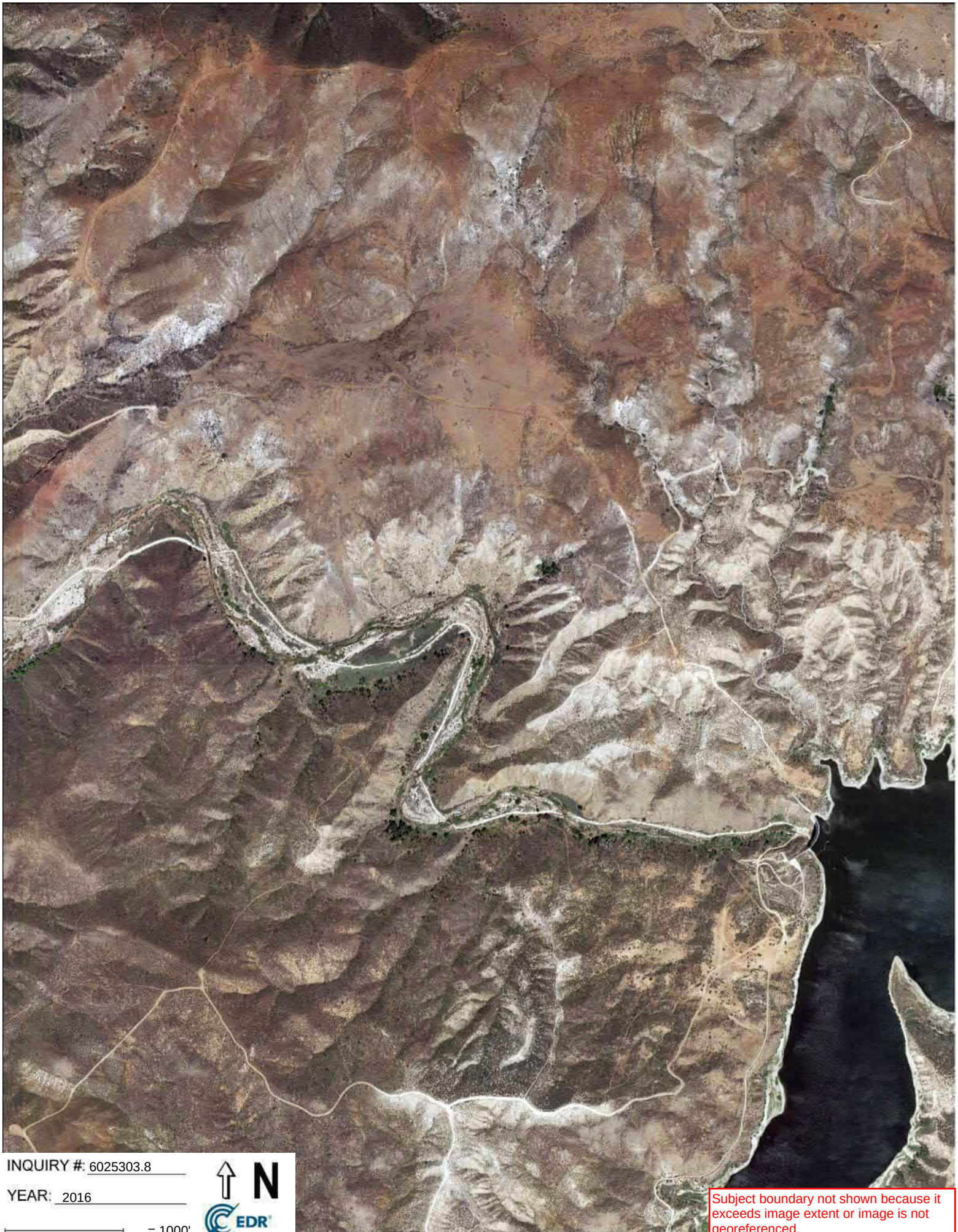
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INQUIRY #: 6025303.8

YEAR: 2016

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EDR

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INQUIRY #: 6025303.8

YEAR: 2016

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INQUIRY #: 6025303.8

YEAR: 2012

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INQUIRY #: 6025303.8

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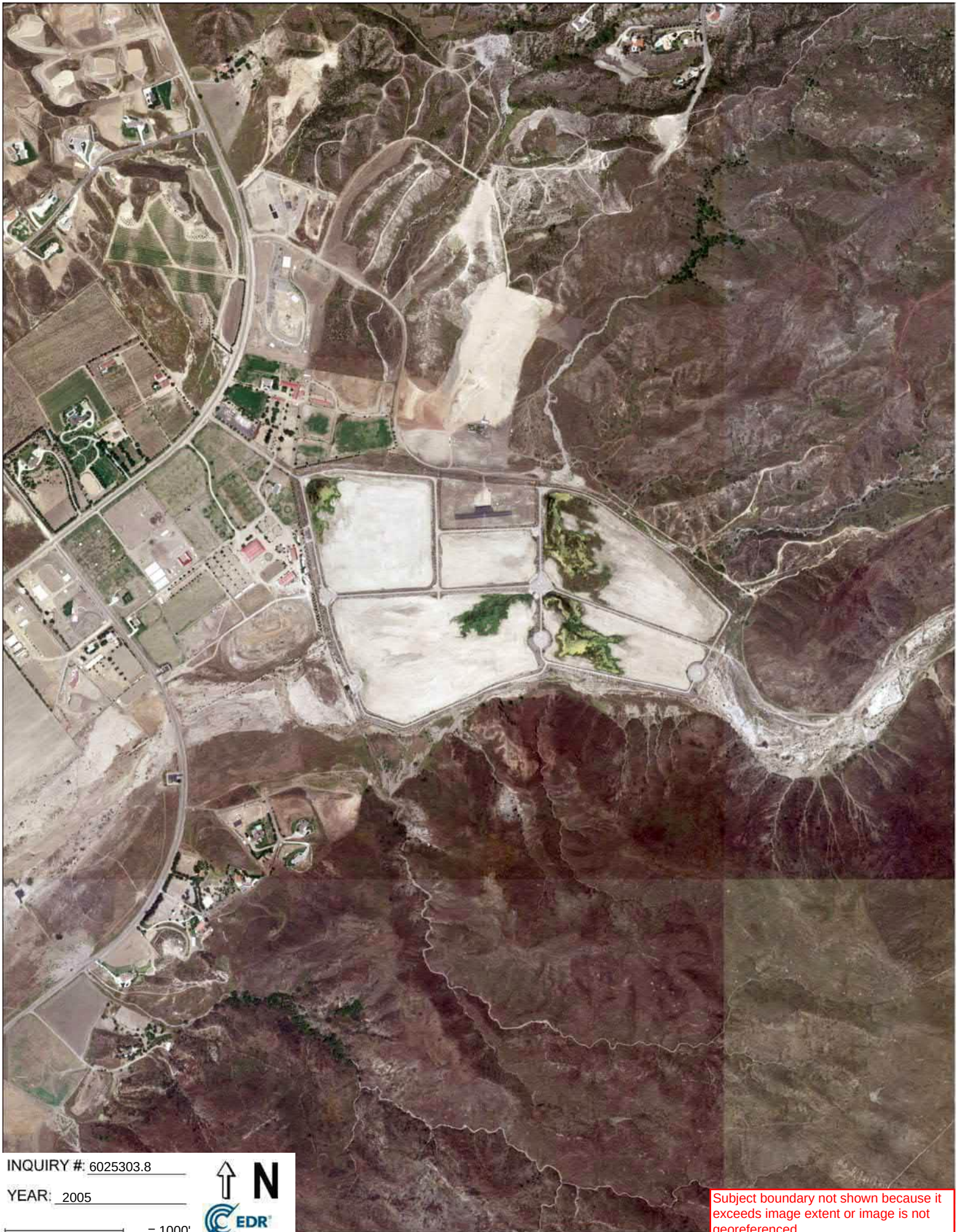
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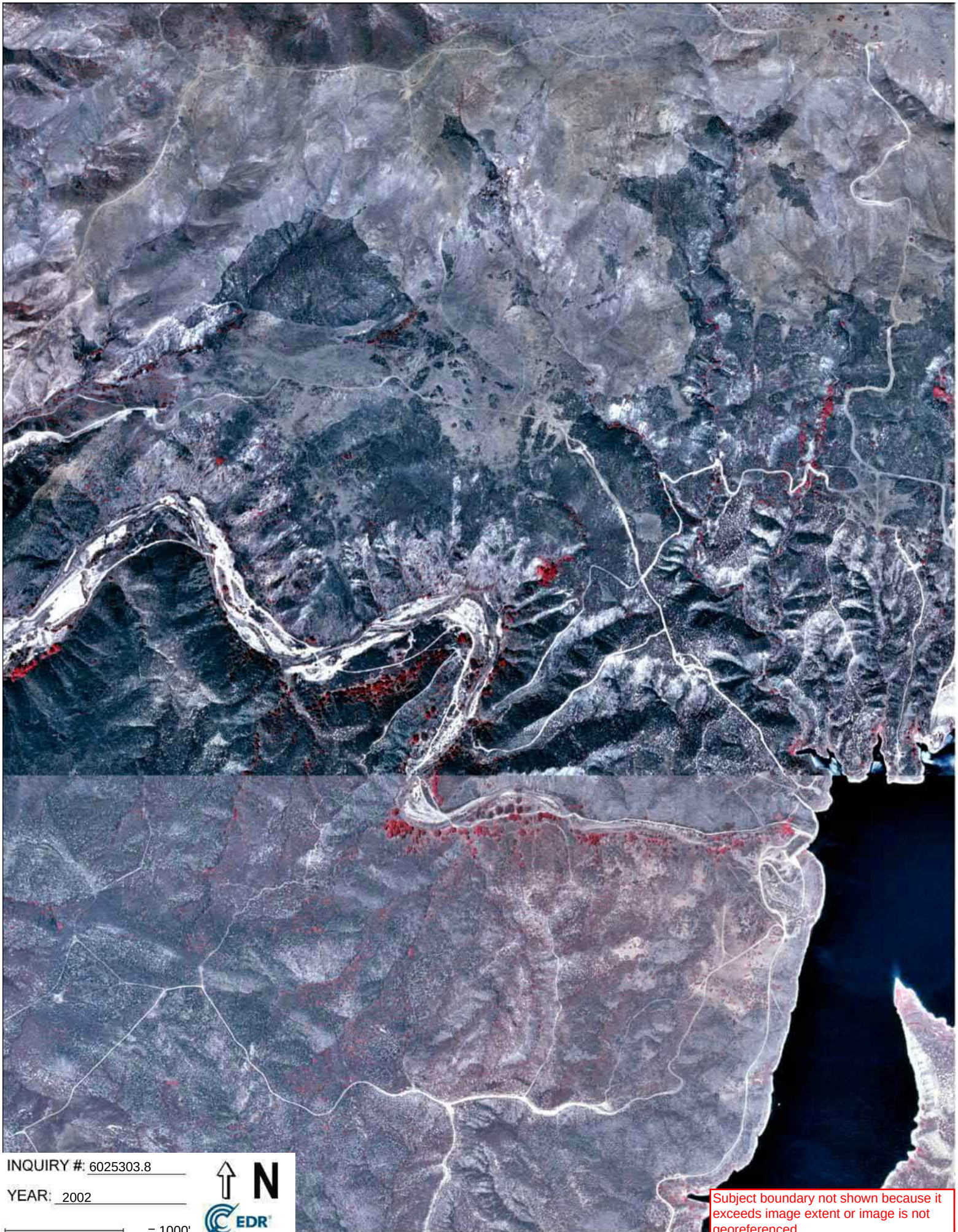
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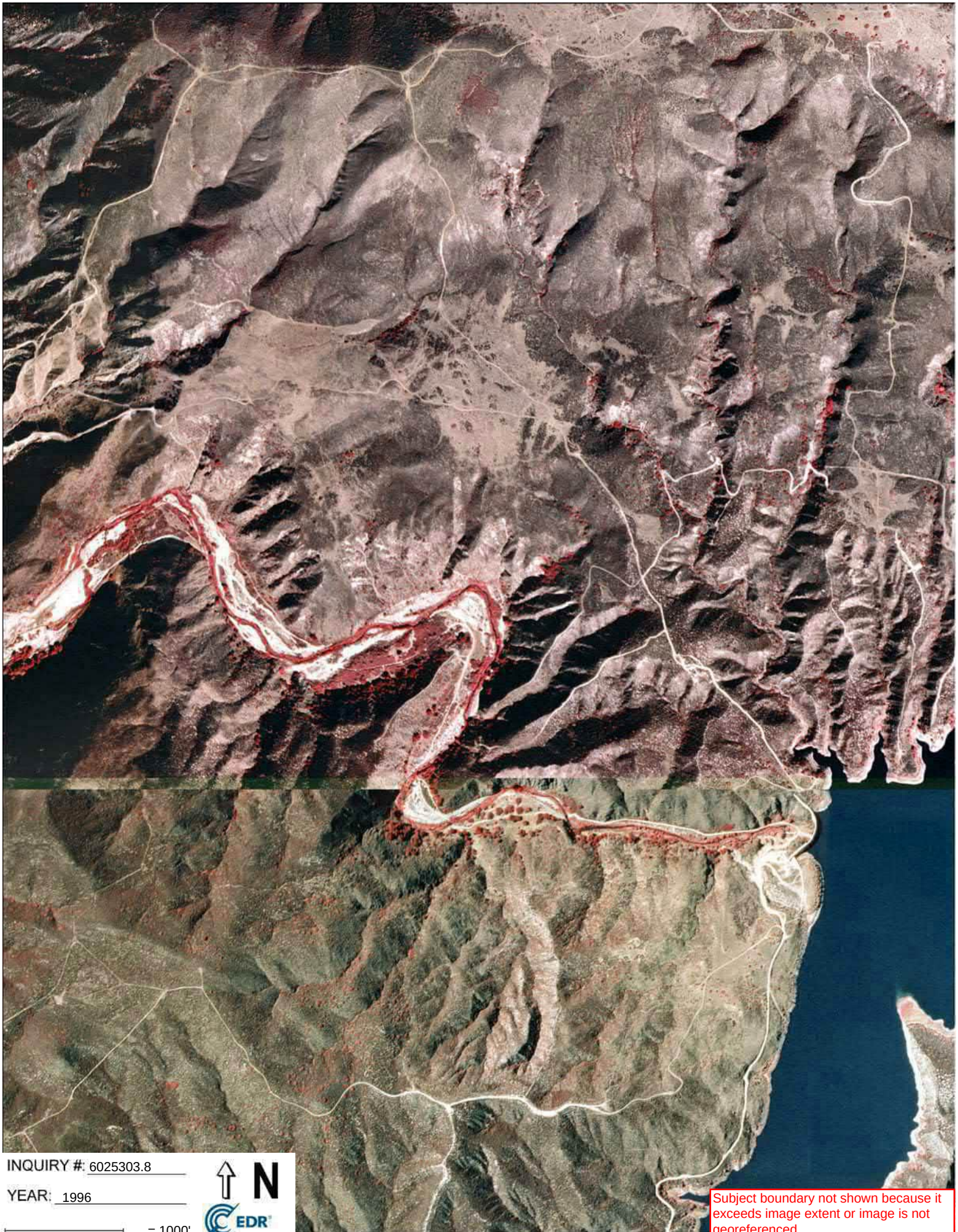
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INQUIRY #: 6025303.8

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YEAR: 1989

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YEAR: 1967

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INQUIRY #: 6025303.8

YEAR: 1967

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YEAR: 1961

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INQUIRY #: 6025303.8

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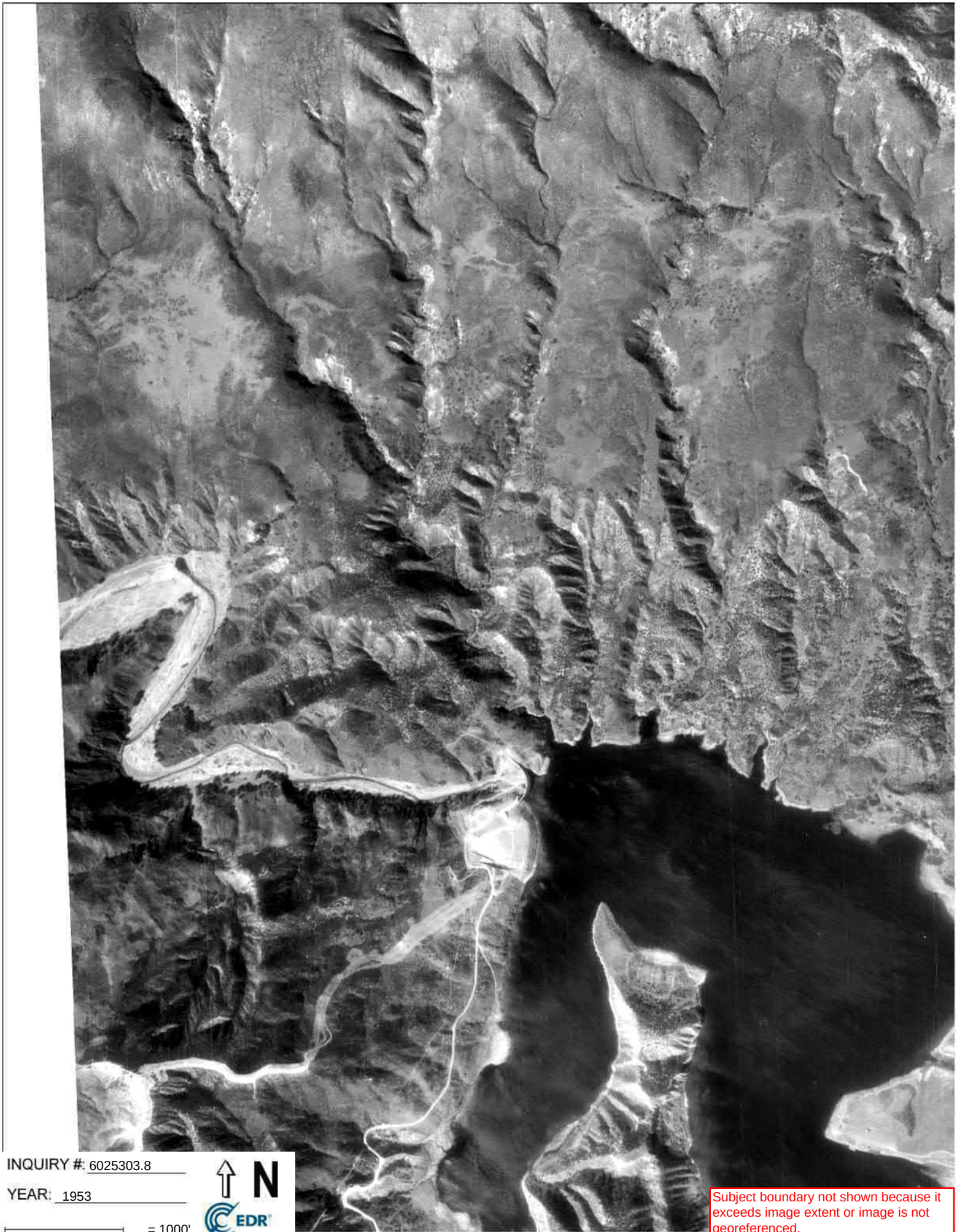
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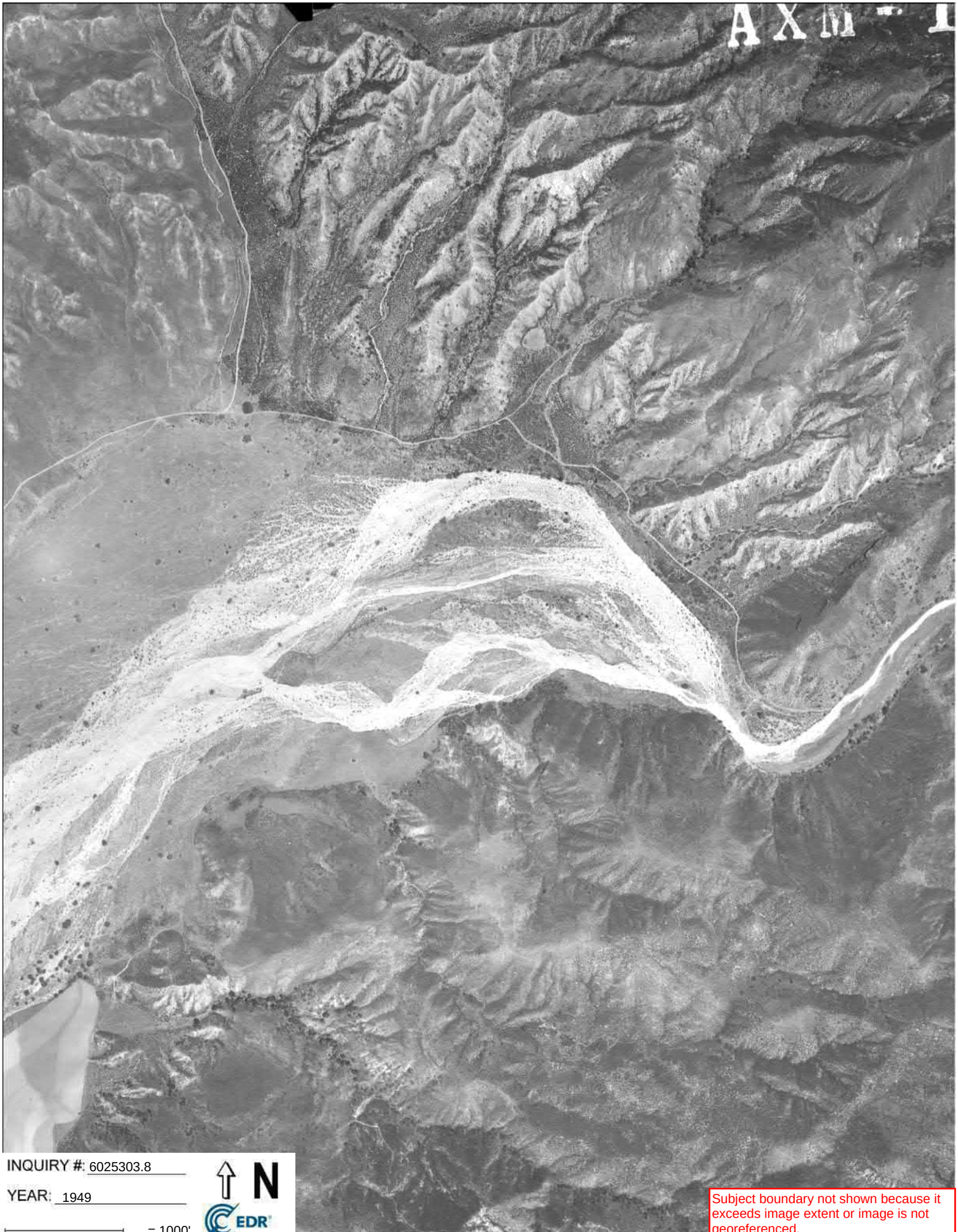
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INQUIRY #: 6025303.8

YEAR: 1949

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EDR

Subject boundary not shown because it exceeds image extent or image is not georeferenced.

Vail Dam Phase I ESA

Vail Dam Phase I ESA

Temecula, CA 92592

Inquiry Number: 6025303.5

April 01, 2020

EDR Historical Topo Map Report

with QuadMatch™

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

EDR Historical Topo Map Report

04/01/20

Site Name:	Client Name:
Vail Dam Phase I ESA	AECOM
Vail Dam Phase I ESA	401 West A Street, Suite 1200
Temecula, CA 92592	San Diego, CA 92101
EDR Inquiry # 6025303.5	Contact: Sarah Perhala

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Search Results:

P.O.# NA

Project: 60623135 task 007

Coordinates:

Latitude:	33.5036 33° 30' 13" North
Longitude:	-117.0031 -117° 0' 11" West
UTM Zone:	Zone 11 North
UTM X Meters:	499712.07
UTM Y Meters:	3707118.35
Elevation:	1279.54' above sea level

Maps Provided:

2012	1943
1997	1942
1988	1939
1978, 1982	1903
1968, 1971, 1973	1901
1957	
1950, 1953, 1954	
1947	

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Topo Sheet Key

This EDR Topo Map Report is based upon the following USGS topographic map sheets.

2012 Source Sheets



Bachelor Mountain
2012
7.5-minute, 24000



Pechanga
2012
7.5-minute, 24000



Sage
2012
7.5-minute, 24000



Vail Lake
2012
7.5-minute, 24000

1997 Source Sheets



Pechanga
1997
7.5-minute, 24000
Aerial Photo Revised 1994



Vail Lake
1997
7.5-minute, 24000
Aerial Photo Revised 1994

1988 Source Sheets



Vail Lake
1988
7.5-minute, 24000
Aerial Photo Revised 1985



Pechanga
1988
7.5-minute, 24000
Aerial Photo Revised 1985

1978, 1982 Source Sheets



Bachelor Mtn
1978
7.5-minute, 24000
Aerial Photo Revised 1973



Vail Lake
1982
7.5-minute, 24000
Aerial Photo Revised 1980



Pechanga
1982
7.5-minute, 24000
Aerial Photo Revised 1980

Topo Sheet Key

This EDR Topo Map Report is based upon the following USGS topographic map sheets.

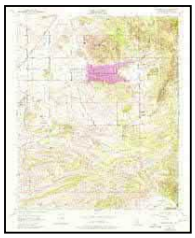
1968, 1971, 1973 Source Sheets



Pechanga
1968
7.5-minute, 24000
Aerial Photo Revised 1967



Vail Lake
1971
7.5-minute, 24000
Aerial Photo Revised 1971



Bachelor Mtn.
1973
7.5-minute, 24000
Aerial Photo Revised 1973



Bachelor Mtn
1973
7.5-minute, 24000
Aerial Photo Revised 1973

1957 Source Sheets



Hemet
1957
15-minute, 62500
Aerial Photo Revised 1951

1950, 1953, 1954 Source Sheets



Pechanga
1950
7.5-minute, 24000
Aerial Photo Revised 1947



Vail Lake
1953
7.5-minute, 24000
Aerial Photo Revised 1949

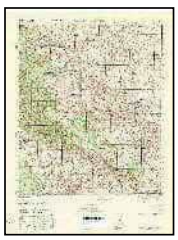


Bachelor Mtn.
1953
7.5-minute, 24000
Aerial Photo Revised 1951



Sage
1954
7.5-minute, 24000
Aerial Photo Revised 1949

1947 Source Sheets



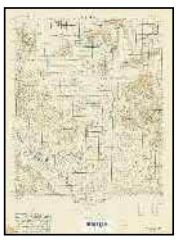
PALOMA MOUNTAIN
1947
15-minute, 50000



HEMET
1947
15-minute, 50000



TEMECULA
1947
15-minute, 50000



MURRIETA
1947
15-minute, 50000

Topo Sheet Key

This EDR Topo Map Report is based upon the following USGS topographic map sheets.

1943 Source Sheets



Murrieta
1943
15-minute, 62500
Aerial Photo Revised 1939

1942 Source Sheets



PALOMAR MOUNTAIN
1942
15-minute, 62500



Murrieta
1942
15-minute, 62500
Aerial Photo Revised 1939



Hemet
1942
15-minute, 62500
Aerial Photo Revised 1941

1939 Source Sheets



Palomar Mountain
1939
15-minute, 62500
Aerial Photo Revised 1939

1903 Source Sheets



Ramona
1903
30-minute, 125000

Topo Sheet Key

This EDR Topo Map Report is based upon the following USGS topographic map sheets.

1901 Source Sheets



Elsinore
1901
30-minute, 125000



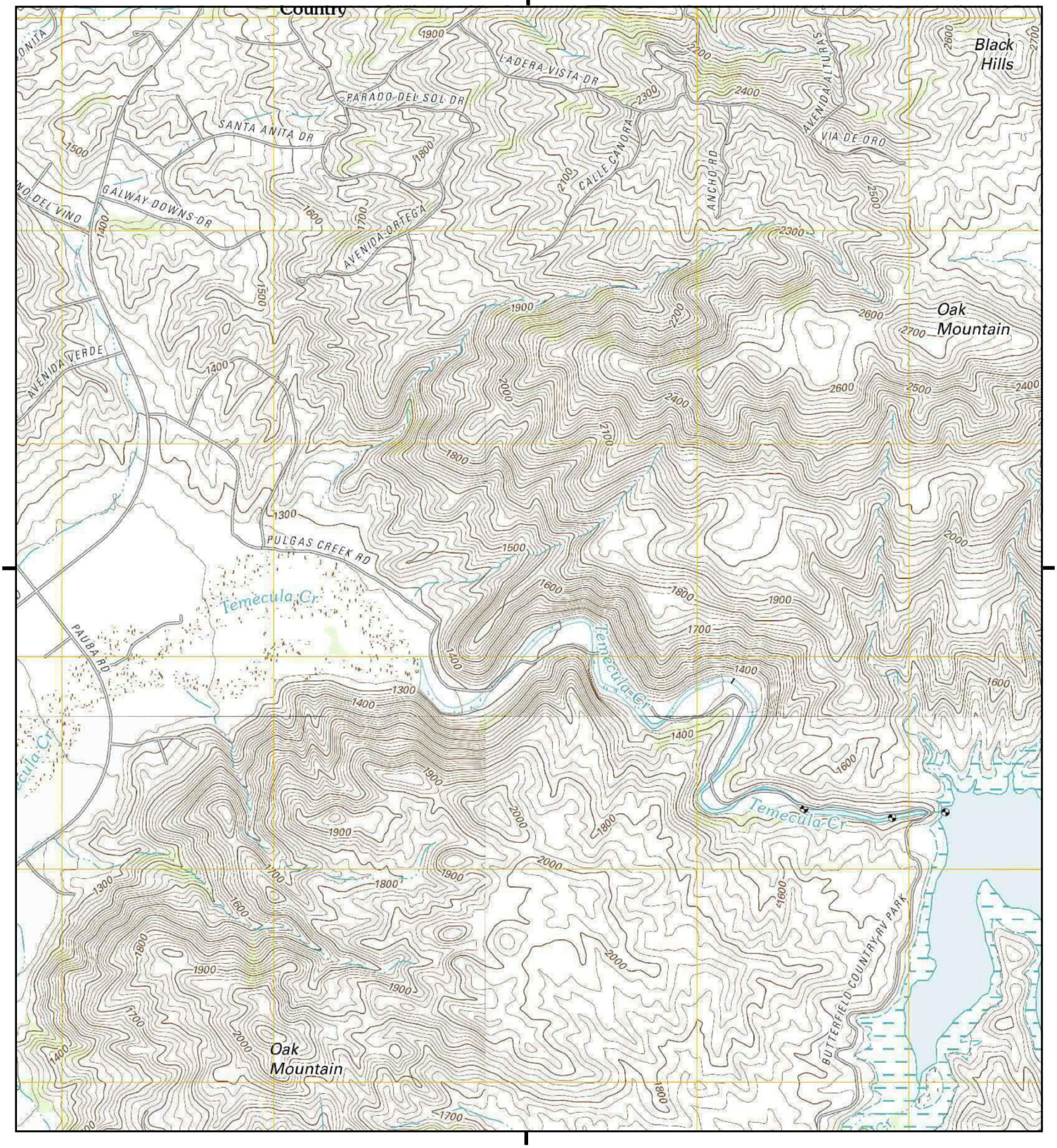
San Luis Rey
1901
30-minute, 125000



San Jacinto
1901
30-minute, 125000

Historical Topo Map

2012



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

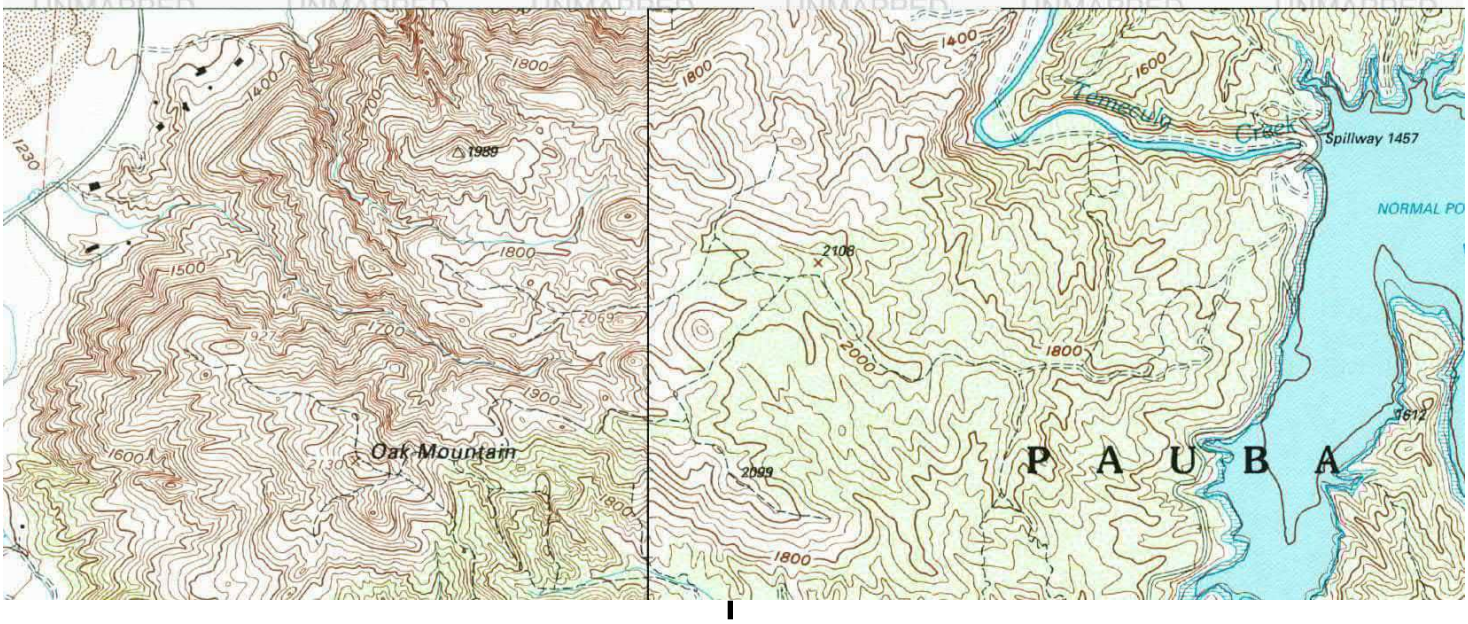
NW N NE
W E
SW S SE

TP, Sage, 2012, 7.5-minute
S, Vail Lake, 2012, 7.5-minute
SW, Pechanga, 2012, 7.5-minute
NW, Bachelor Mountain, 2012, 7.5-minute

SITE NAME: Vail Dam Phase I ESA
ADDRESS: Vail Dam Phase I ESA
Temecula, CA 92592
CLIENT: AECOM

N

UNMAPPED



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

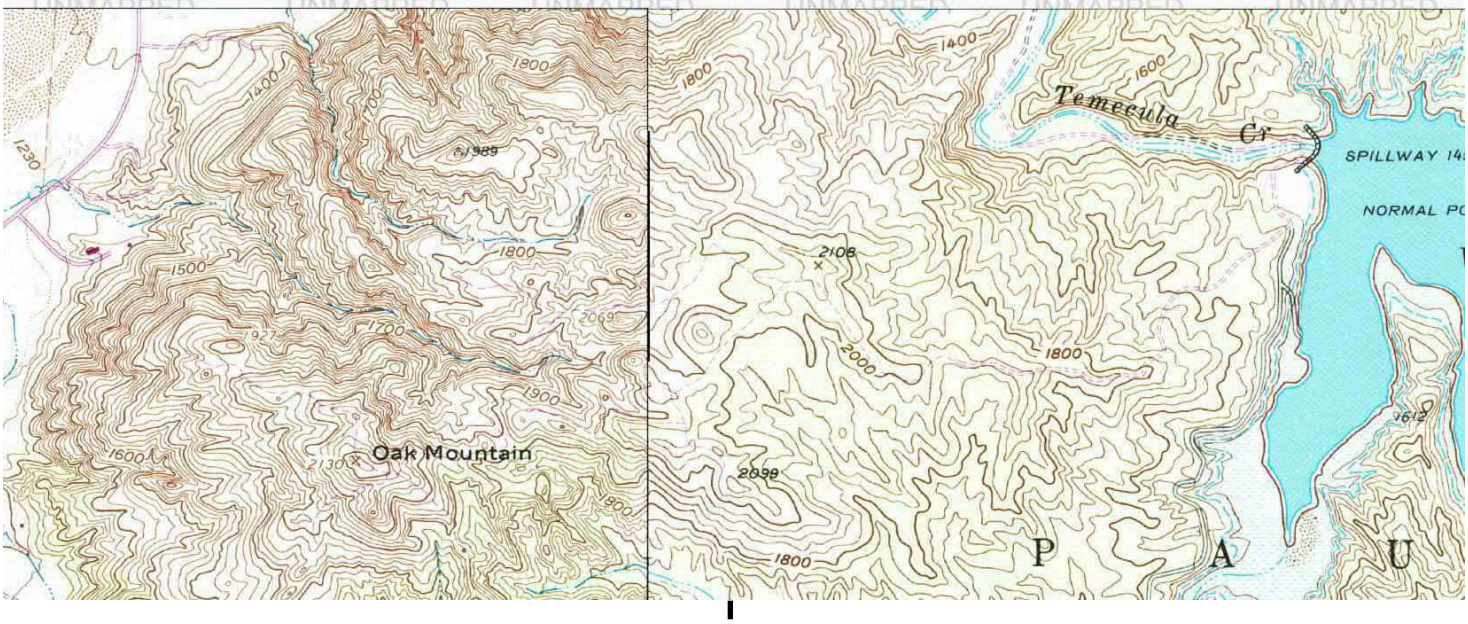
NW N NE
W E
SW S SE

SE, Vail Lake, 1997, 7.5-minute
SW, Pechanga, 1997, 7.5-minute

SITE NAME: Vail Dam Phase I ESA
ADDRESS: Vail Dam Phase I ESA
Temecula, CA 92592
CLIENT: AECOM

N

UNMAPPED



This report includes information from the following map sheet(s).

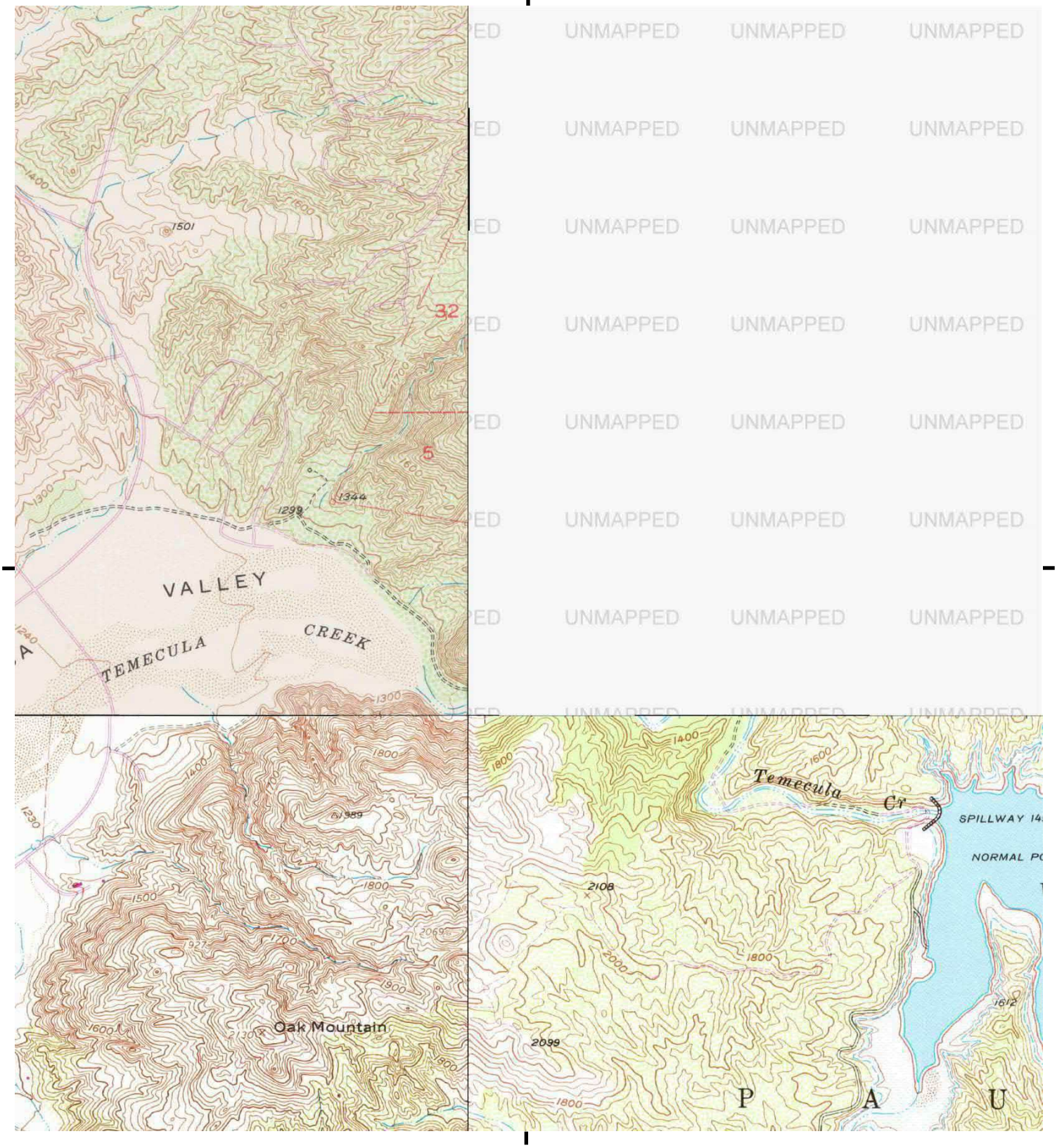
0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

SE, Vail Lake, 1988, 7.5-minute
SW, Pechanga, 1988, 7.5-minute

SITE NAME: Vail Dam Phase I ESA
ADDRESS: Vail Dam Phase I ESA
Temecula, CA 92592
CLIENT: AECOM

N



This report includes information from the following map sheet(s).

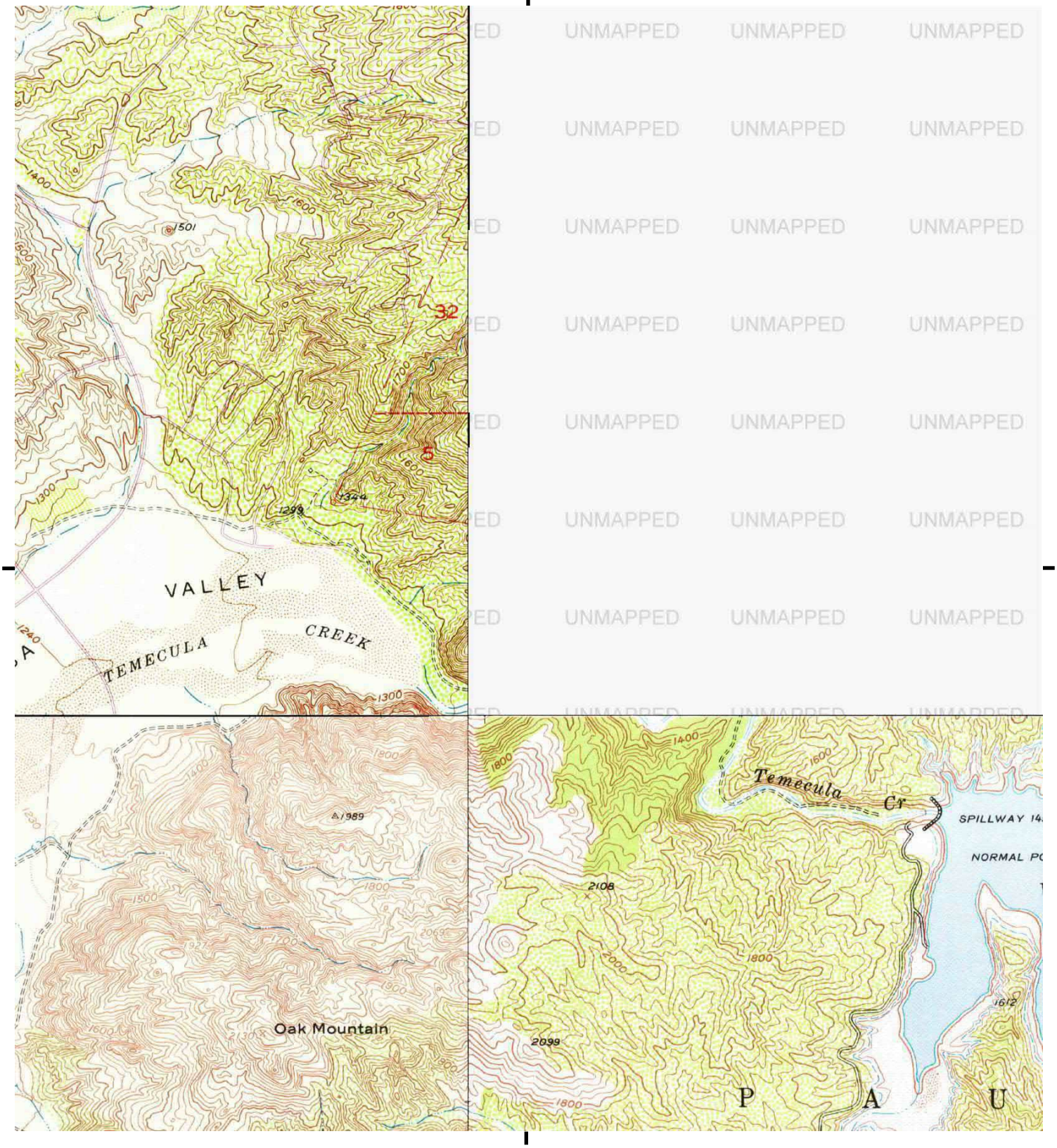
0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

SE, Vail Lake, 1982, 7.5-minute
SW, Pechanga, 1982, 7.5-minute
NW, Bachelor Mtn, 1978, 7.5-minute

SITE NAME: Vail Dam Phase I ESA
ADDRESS: Vail Dam Phase I ESA
Temecula, CA 92592
CLIENT: AECOM

N



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

N, Bachelor Mtn, 1973, 7.5-minute
SE, Vail Lake, 1971, 7.5-minute
SW, Pechanga, 1968, 7.5-minute
NW, Bachelor Mtn., 1973, 7.5-minute

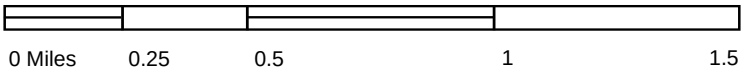
SITE NAME: Vail Dam Phase I ESA
ADDRESS: Vail Dam Phase I ESA
Temecula, CA 92592
CLIENT: AECOM

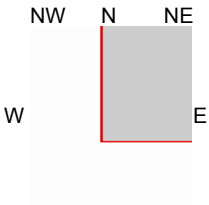
N

UNMAPPED



This report includes information from the following map sheet(s).

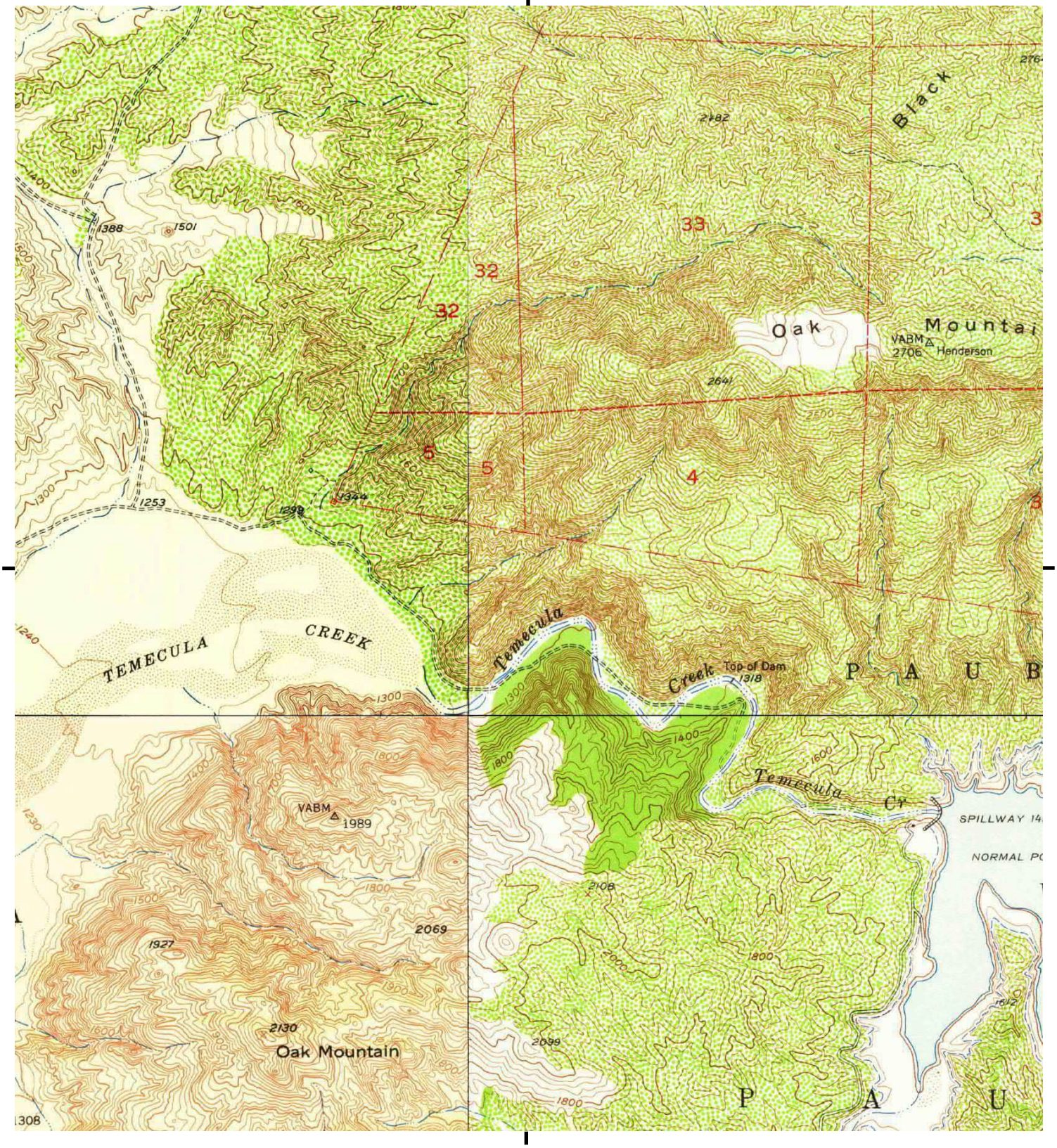




TP, Hemet, 1957, 15-minute

SITE NAME: Vail Dam Phase I ESA
ADDRESS: Vail Dam Phase I ESA
Temecula, CA 92592
CLIENT: AECOM





This report includes information from the following map sheet(s).

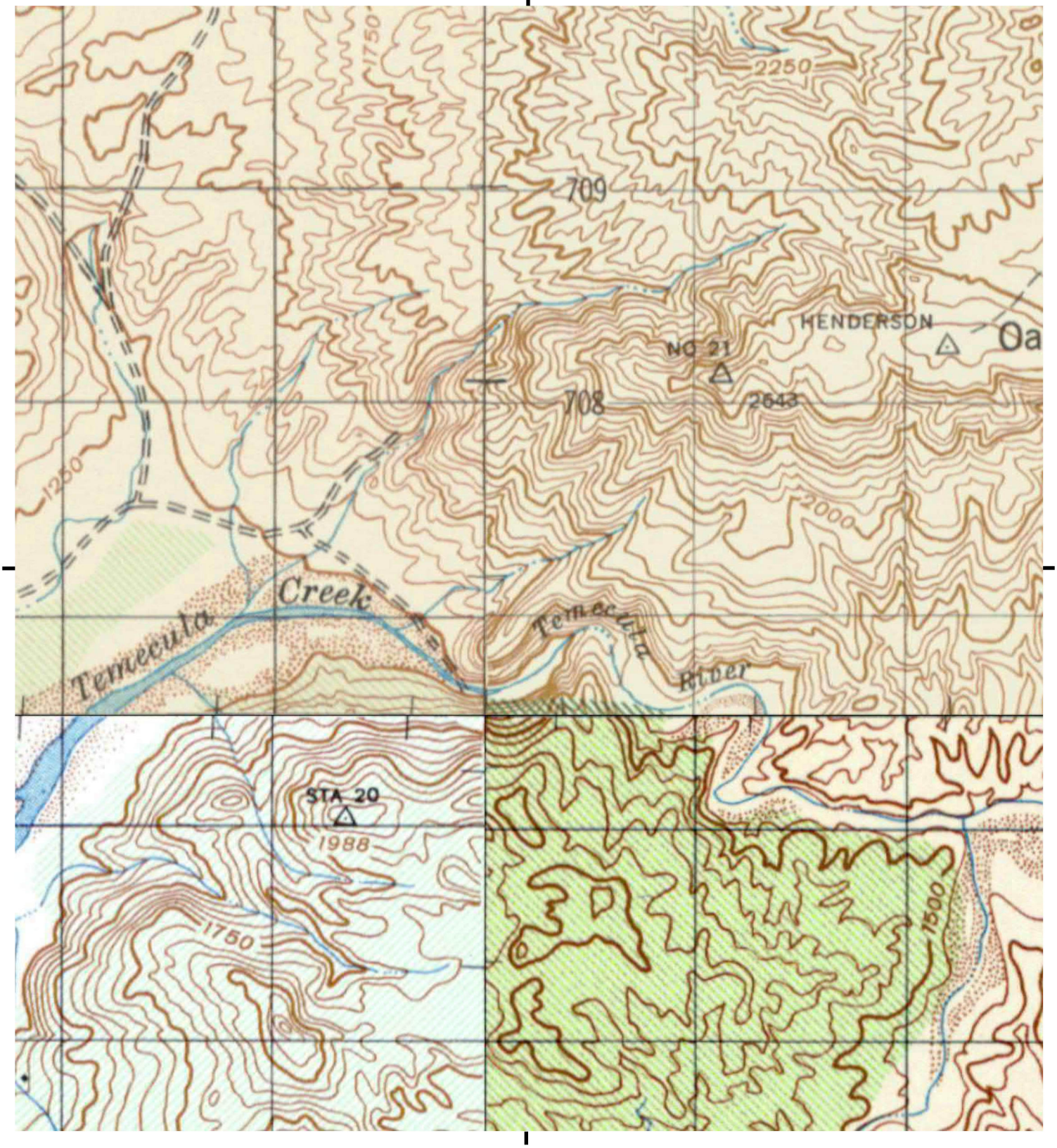
0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

SE, Vail Lake, 1953, 7.5-minute
SW, Pechanga, 1950, 7.5-minute
NW, Bachelor Mtn., 1953, 7.5-minute
T, Sage, 1954, 7.5-minute

SITE NAME: Vail Dam Phase I ESA
ADDRESS: Vail Dam Phase I ESA
Temecula, CA 92592
CLIENT: AECOM

N



This report includes information from the following map sheet(s).

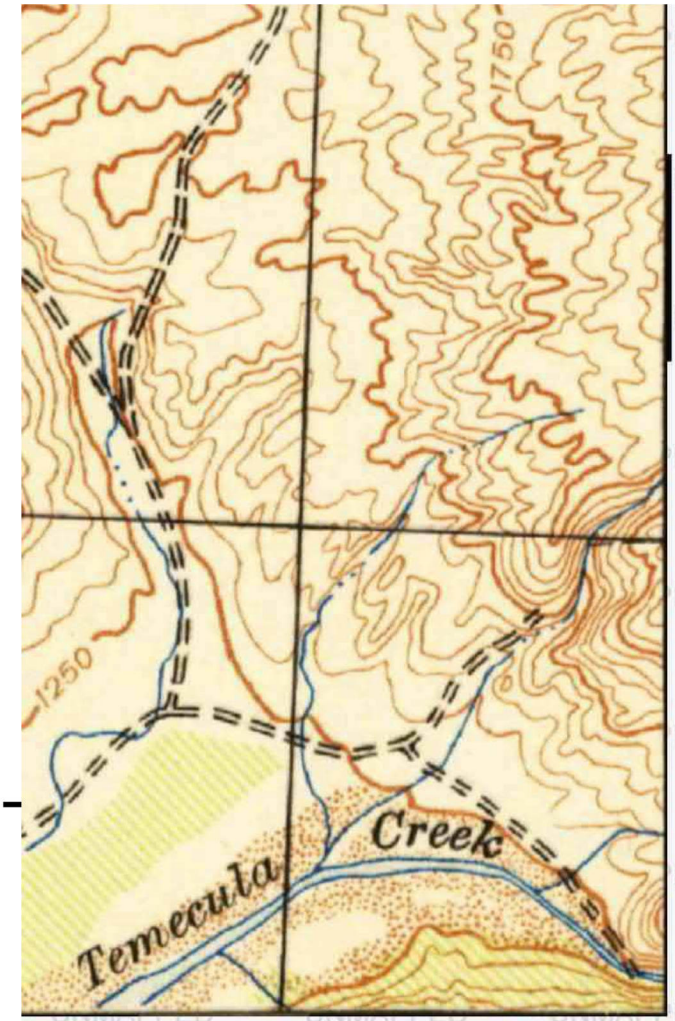
0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, HEMET, 1947, 15-minute
N, MURRIETA, 1947, 15-minute
SE, PALOMA MOUNTAIN, 1947, 15-minute
SW, TEMECULA, 1947, 15-minute

SITE NAME: Vail Dam Phase I ESA
ADDRESS: Vail Dam Phase I ESA
Temecula, CA 92592
CLIENT: AECOM

N



UNMAPPED

This report includes information from the following map sheet(s).

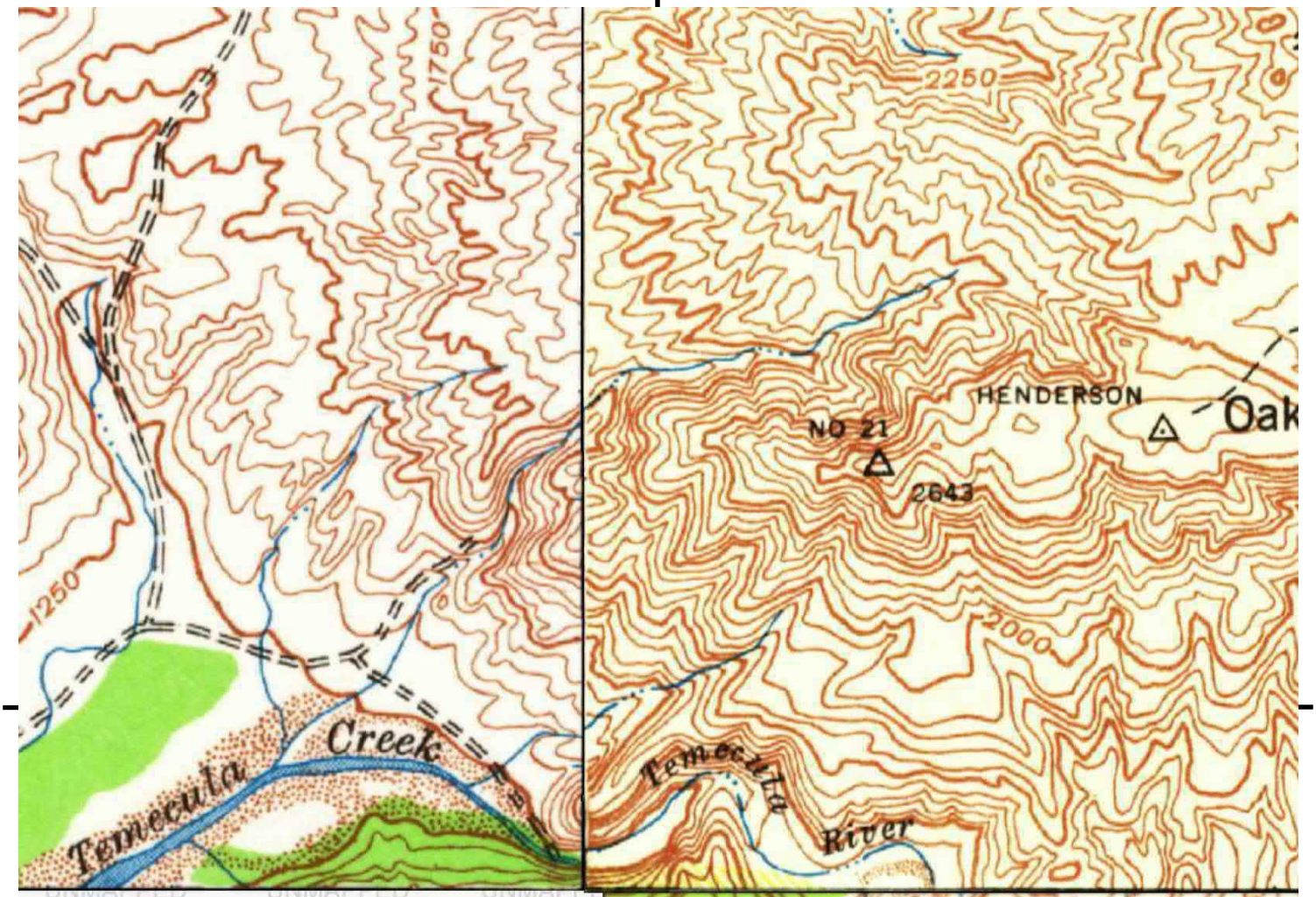
0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

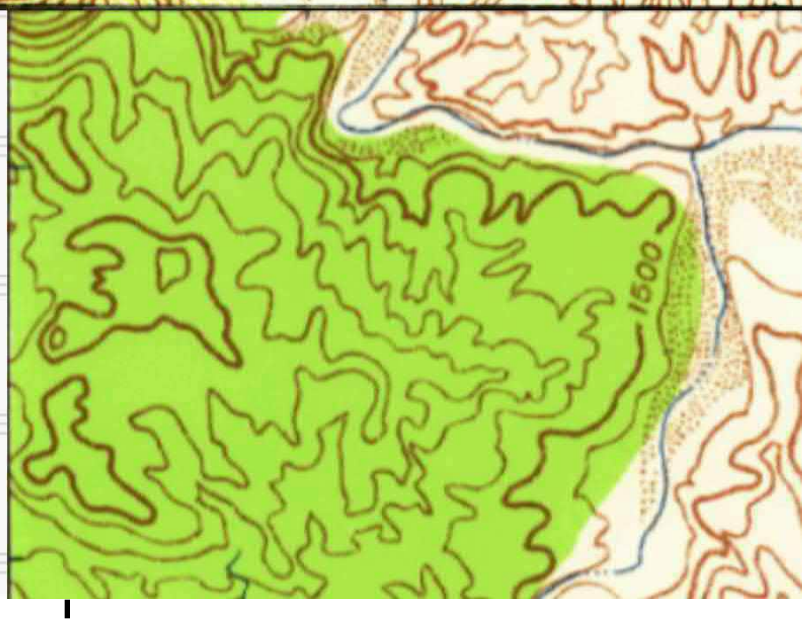
NW, Murrieta, 1943, 15-minute

SITE NAME: Vail Dam Phase I ESA
ADDRESS: Vail Dam Phase I ESA
Temecula, CA 92592
CLIENT: AECOM

N



UNMAPPED UNMAPPED UNMAPPED
UNMAPPED UNMAPPED UNMAPPED
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UNMAPPED UNMAPPED UNMAPPED



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

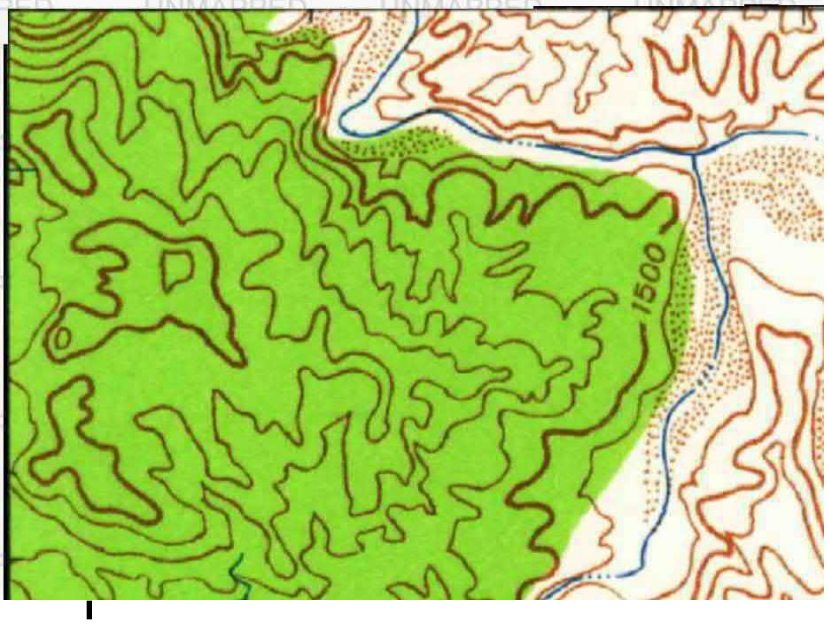
NW N NE
W E
SW S SE

TP, Hemet, 1942, 15-minute
SE, PALOMAR MOUNTAIN, 1942, 15-minute
NW, Murrieta, 1942, 15-minute

SITE NAME: Vail Dam Phase I ESA
ADDRESS: Vail Dam Phase I ESA
Temecula, CA 92592
CLIENT: AECOM

N

UNMAPPED



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

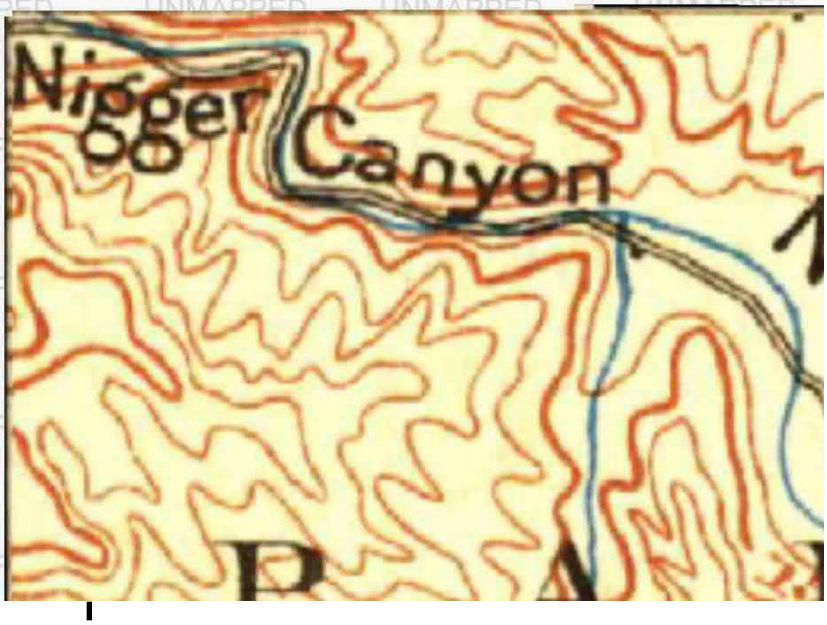
NW N NE
W E
SW S SE

SE, Palomar Mountain, 1939, 15-minute

SITE NAME: Vail Dam Phase I ESA
ADDRESS: Vail Dam Phase I ESA
Temecula, CA 92592
CLIENT: AECOM

N

UNMAPPED



This report includes information from the following map sheet(s).

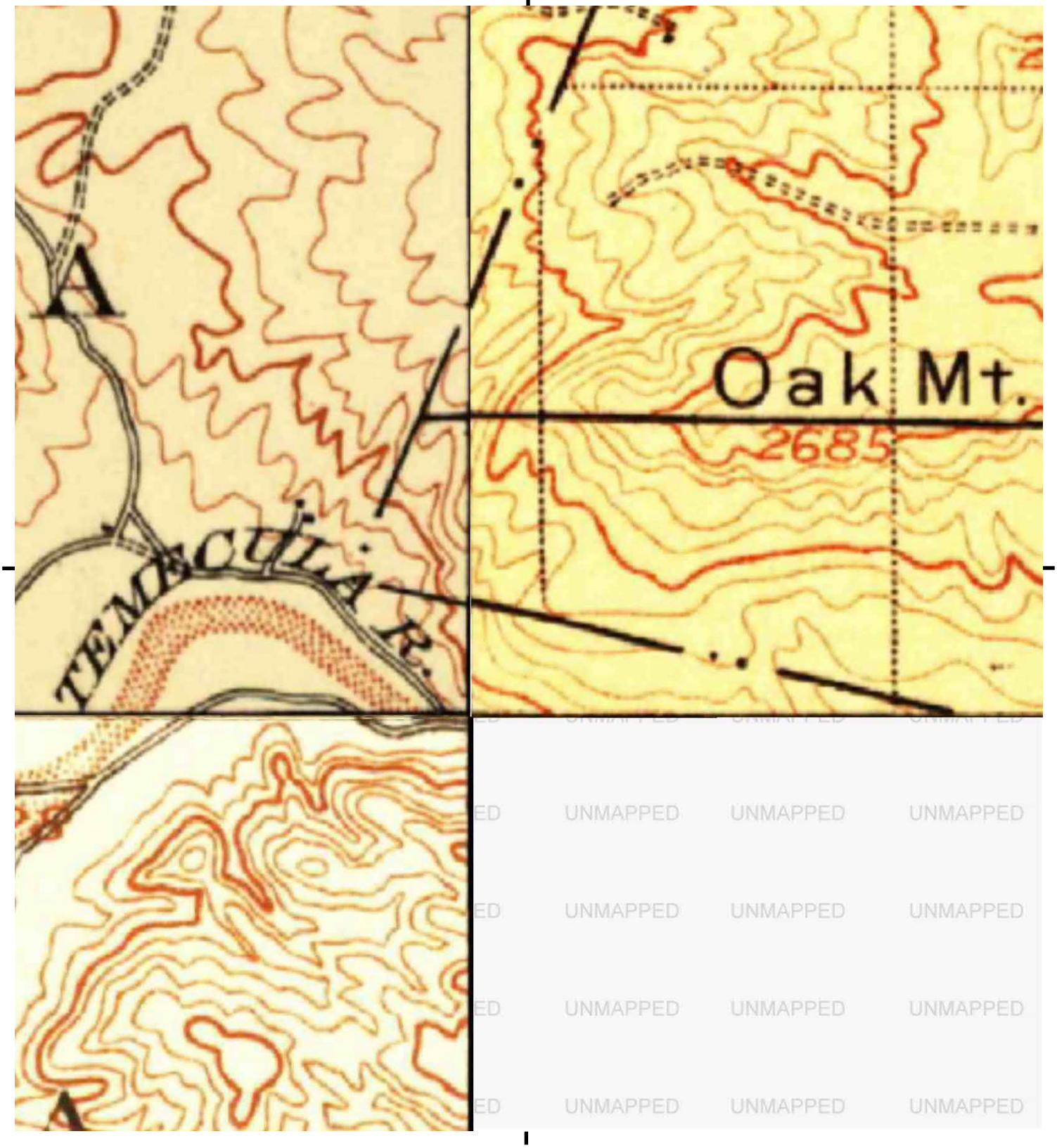
0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

SE, Ramona, 1903, 30-minute

SITE NAME: Vail Dam Phase I ESA
ADDRESS: Vail Dam Phase I ESA
Temecula, CA 92592
CLIENT: AECOM

N



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, San Jacinto, 1901, 30-minute
SW, San Luis Rey, 1901, 30-minute
NW, Elsinore, 1901, 30-minute

SITE NAME: Vail Dam Phase I ESA
ADDRESS: Vail Dam Phase I ESA
Temecula, CA 92592
CLIENT: AECOM

N

Vail Dam Phase I ESA

Vail Dam Phase I ESA

Temecula, CA 92592

Inquiry Number: 6129361.1

July 28, 2020

EDR Historical Topo Map Report

with QuadMatch™

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

EDR Historical Topo Map Report

07/28/20

Site Name:	Client Name:
Vail Dam Phase I ESA	AECOM
Vail Dam Phase I ESA	401 West A Street, Suite 1200
Temecula, CA 92592	San Diego, CA 92101
EDR Inquiry # 6129361.1	Contact: Sarah Perhala

EDR Topographic Map Library has been searched by EDR and maps covering the target property location as provided by AECOM were identified for the years listed below. EDR's Historical Topo Map Report is designed to assist professionals in evaluating potential liability on a target property resulting from past activities. EDRs Historical Topo Map Report includes a search of a collection of public and private color historical topographic maps, dating back to the late 1800s.

Search Results:

P.O.# NA

Project: 60623135 task 007

Coordinates:

Latitude:	33.5036 33° 30' 13" North
Longitude:	-117.0031 -117° 0' 11" West
UTM Zone:	Zone 11 North
UTM X Meters:	499712.07
UTM Y Meters:	3707118.35
Elevation:	1279.54' above sea level

Maps Provided:

2012	1942
1997	1939
1988	1903
1978, 1982	1901
1968, 1971, 1973	
1957	
1950, 1953, 1954	
1947	

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Topo Sheet Key

This EDR Topo Map Report is based upon the following USGS topographic map sheets.

2012 Source Sheets



Bachelor Mountain
2012
7.5-minute, 24000



Pechanga
2012
7.5-minute, 24000



Sage
2012
7.5-minute, 24000



Vail Lake
2012
7.5-minute, 24000

1997 Source Sheets



Pechanga
1997
7.5-minute, 24000
Aerial Photo Revised 1994



Vail Lake
1997
7.5-minute, 24000
Aerial Photo Revised 1994

1988 Source Sheets



Vail Lake
1988
7.5-minute, 24000
Aerial Photo Revised 1985



Pechanga
1988
7.5-minute, 24000
Aerial Photo Revised 1985

1978, 1982 Source Sheets



Bachelor Mtn
1978
7.5-minute, 24000
Aerial Photo Revised 1973



Vail Lake
1982
7.5-minute, 24000
Aerial Photo Revised 1980



Pechanga
1982
7.5-minute, 24000
Aerial Photo Revised 1980

Topo Sheet Key

This EDR Topo Map Report is based upon the following USGS topographic map sheets.

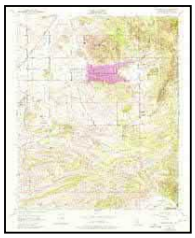
1968, 1971, 1973 Source Sheets



Pechanga
1968
7.5-minute, 24000
Aerial Photo Revised 1967



Vail Lake
1971
7.5-minute, 24000
Aerial Photo Revised 1971



Bachelor Mtn.
1973
7.5-minute, 24000
Aerial Photo Revised 1973



Bachelor Mtn
1973
7.5-minute, 24000
Aerial Photo Revised 1973

1957 Source Sheets



Hemet
1957
15-minute, 62500
Aerial Photo Revised 1951

1950, 1953, 1954 Source Sheets



Pechanga
1950
7.5-minute, 24000
Aerial Photo Revised 1947



Vail Lake
1953
7.5-minute, 24000
Aerial Photo Revised 1949



Bachelor Mtn.
1953
7.5-minute, 24000
Aerial Photo Revised 1951



Sage
1954
7.5-minute, 24000
Aerial Photo Revised 1949

1947 Source Sheets



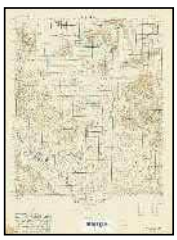
PALOMA MOUNTAIN
1947
15-minute, 50000



HEMET
1947
15-minute, 50000



TEMECULA
1947
15-minute, 50000



MURRIETA
1947
15-minute, 50000

Topo Sheet Key

This EDR Topo Map Report is based upon the following USGS topographic map sheets.

1942 Source Sheets



PALOMAR MOUNTAIN
1942
15-minute, 62500



Murrieta
1942
15-minute, 62500
Aerial Photo Revised 1939



Hemet
1942
15-minute, 62500
Aerial Photo Revised 1941

1939 Source Sheets



Palomar Mountain
1939
15-minute, 62500
Aerial Photo Revised 1939

1903 Source Sheets



Ramona
1903
30-minute, 125000

1901 Source Sheets



Elsinore
1901
30-minute, 125000



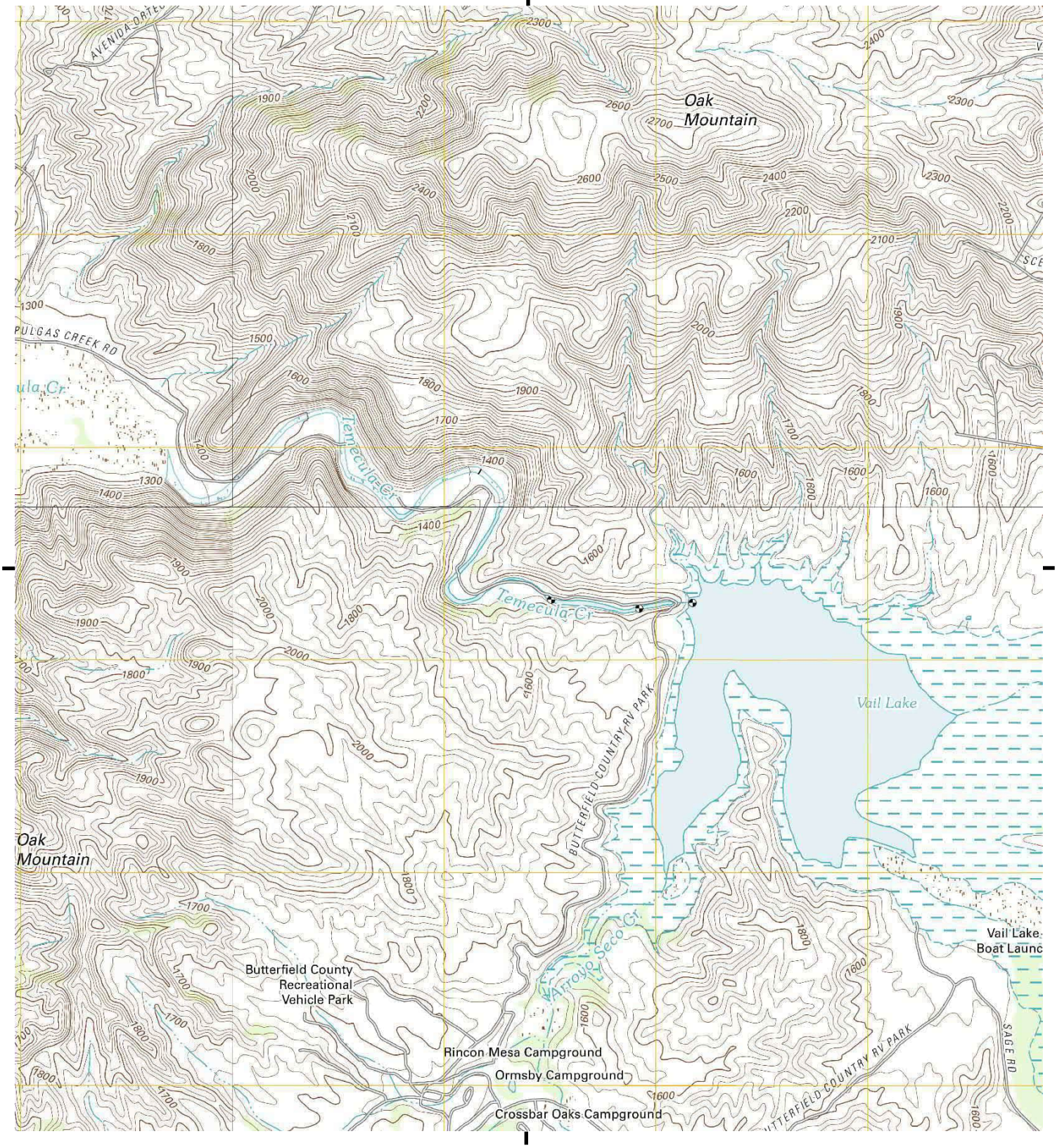
San Luis Rey
1901
30-minute, 125000



San Jacinto
1901
30-minute, 125000

Historical Topo Map

2012



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

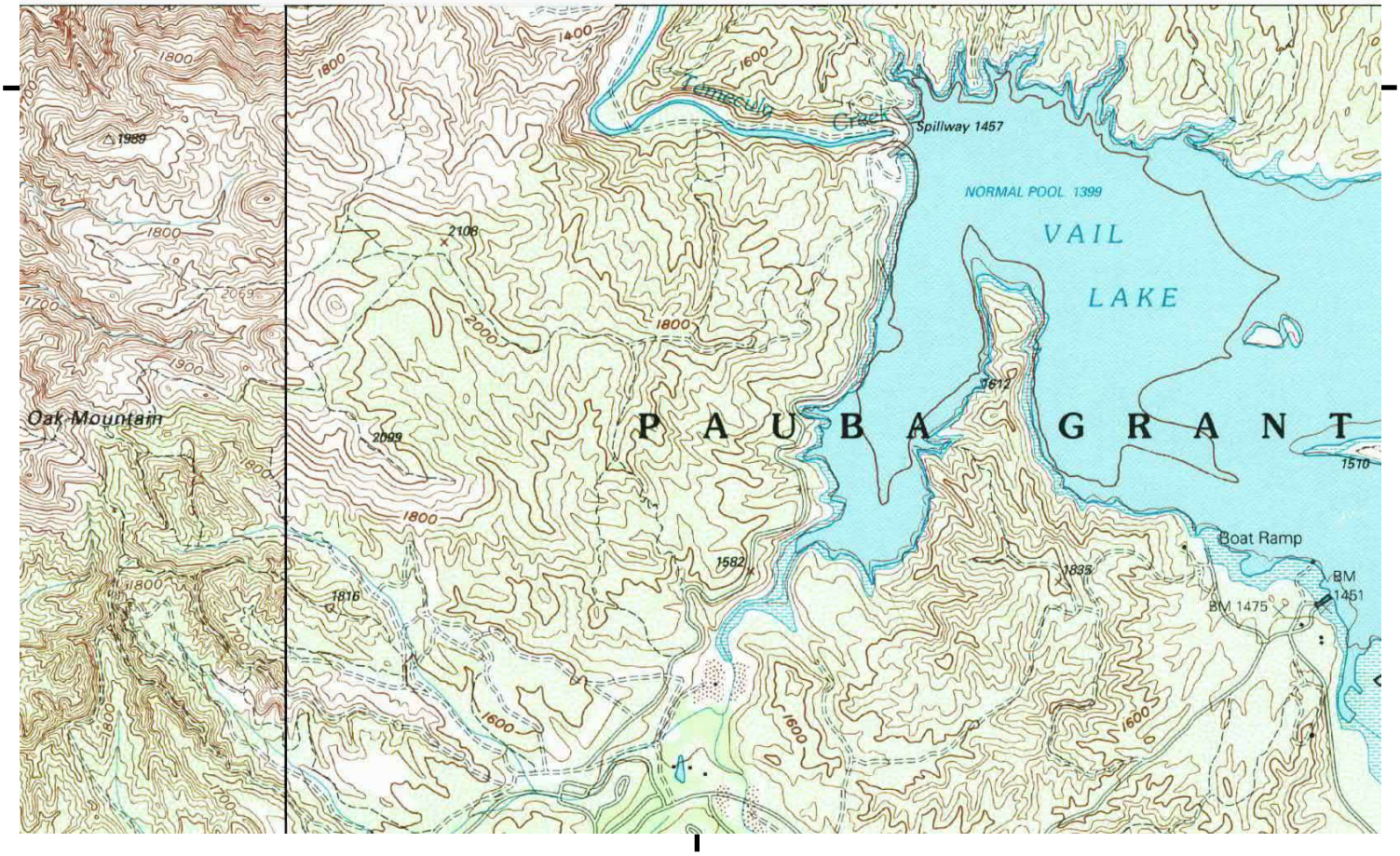
NW N NE
W E
SW S SE

NE, Sage, 2012, 7.5-minute
SW, Pechanga, 2012, 7.5-minute
NW, Bachelor Mountain, 2012, 7.5-minute
T, Vail Lake, 2012, 7.5-minute

SITE NAME: Vail Dam Phase I ESA
ADDRESS: Vail Dam Phase I ESA
Temecula, CA 92592
CLIENT: AECOM

N

UNMAPPED UNMAPPED UNMAPPED UNMAPPED UNMAPPED UNMAPPED
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This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

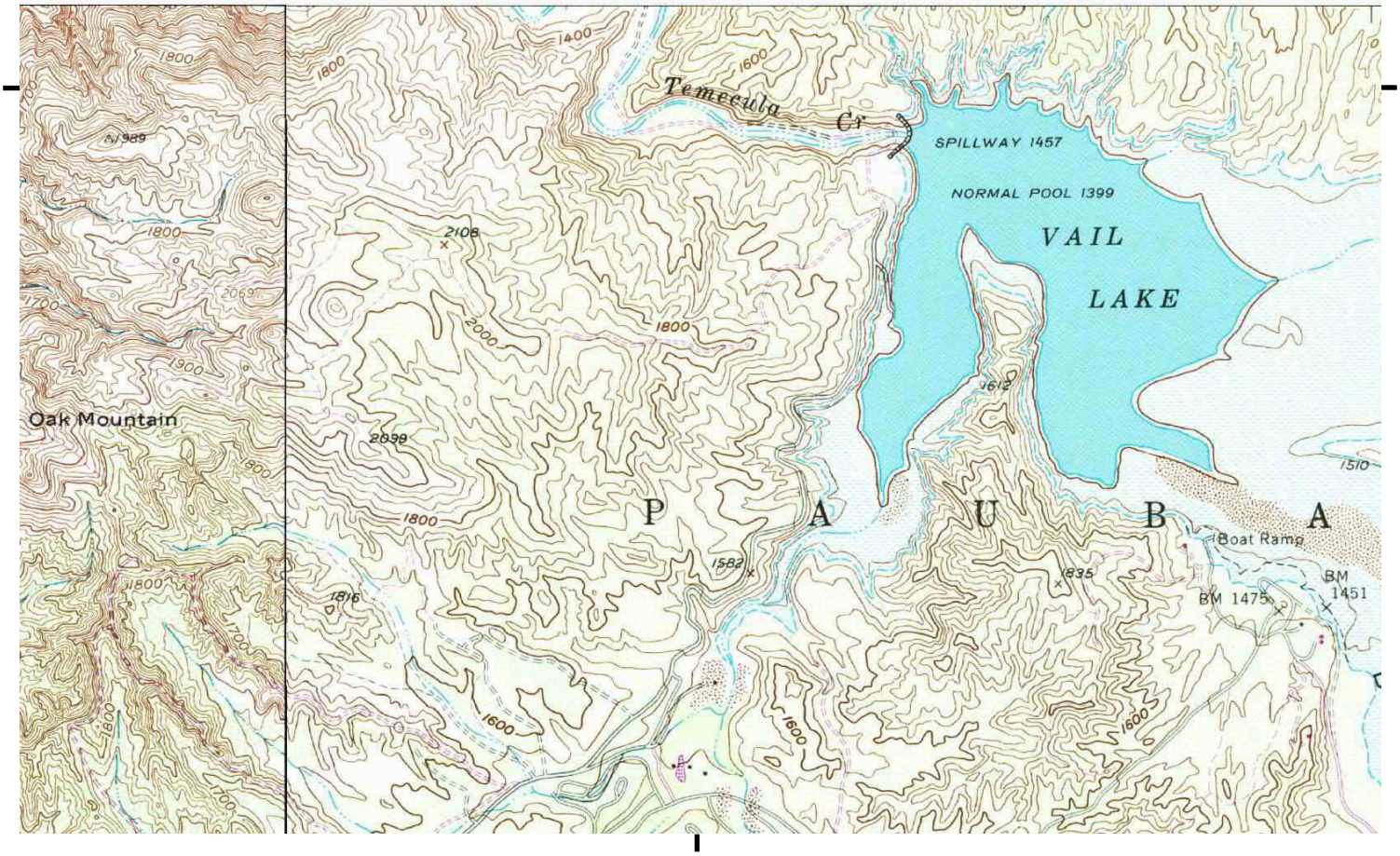
NW N NE
W E
SW S SE

TP, Vail Lake, 1997, 7.5-minute
SW, Pechanga, 1997, 7.5-minute

SITE NAME: Vail Dam Phase I ESA
ADDRESS: Vail Dam Phase I ESA
Temecula, CA 92592
CLIENT: AECOM

N

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This report includes information from the following map sheet(s).

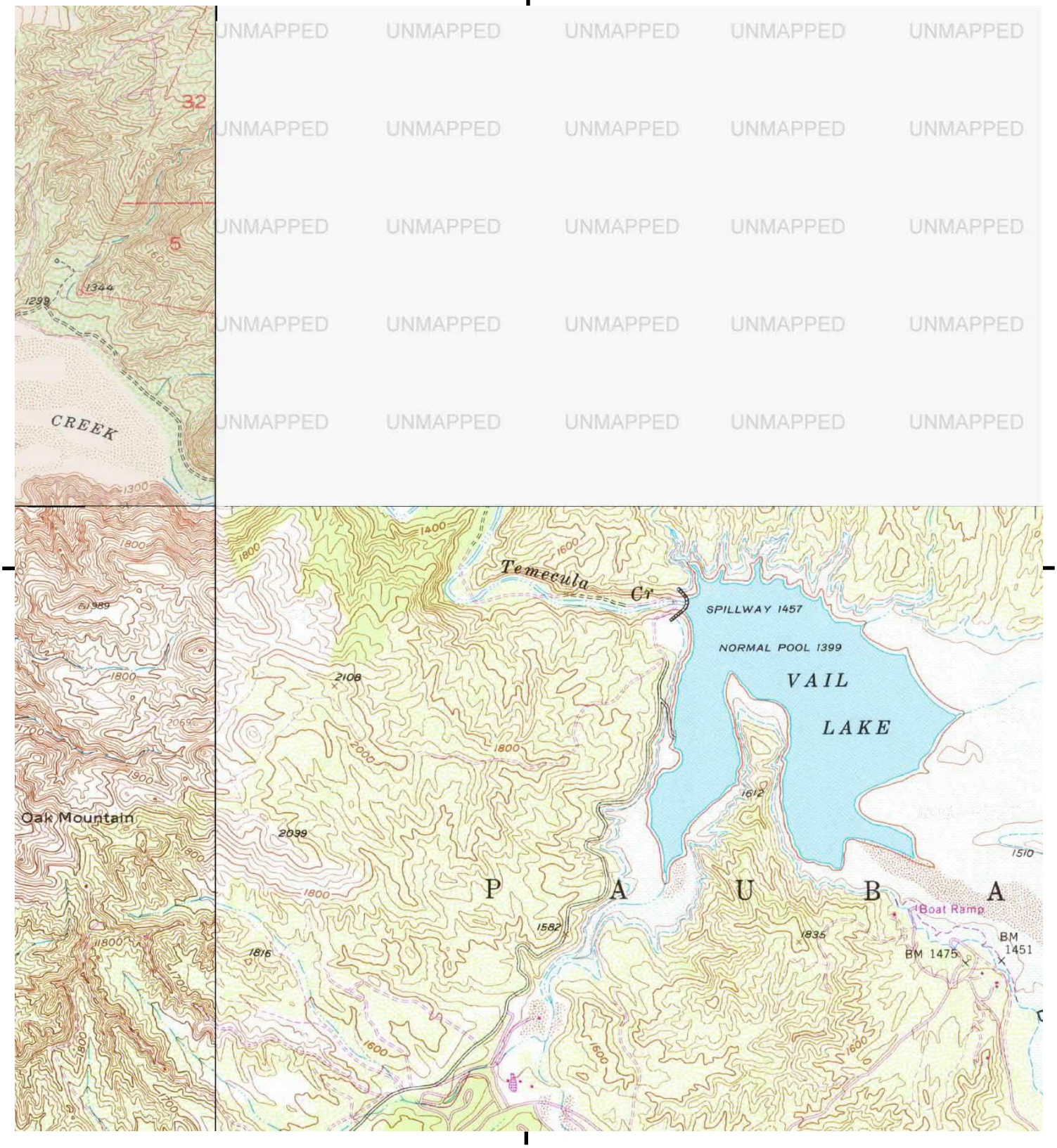
0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, Vail Lake, 1988, 7.5-minute
SW, Pechanga, 1988, 7.5-minute

SITE NAME: Vail Dam Phase I ESA
ADDRESS: Vail Dam Phase I ESA
Temecula, CA 92592
CLIENT: AECOM

N



This report includes information from the following map sheet(s).

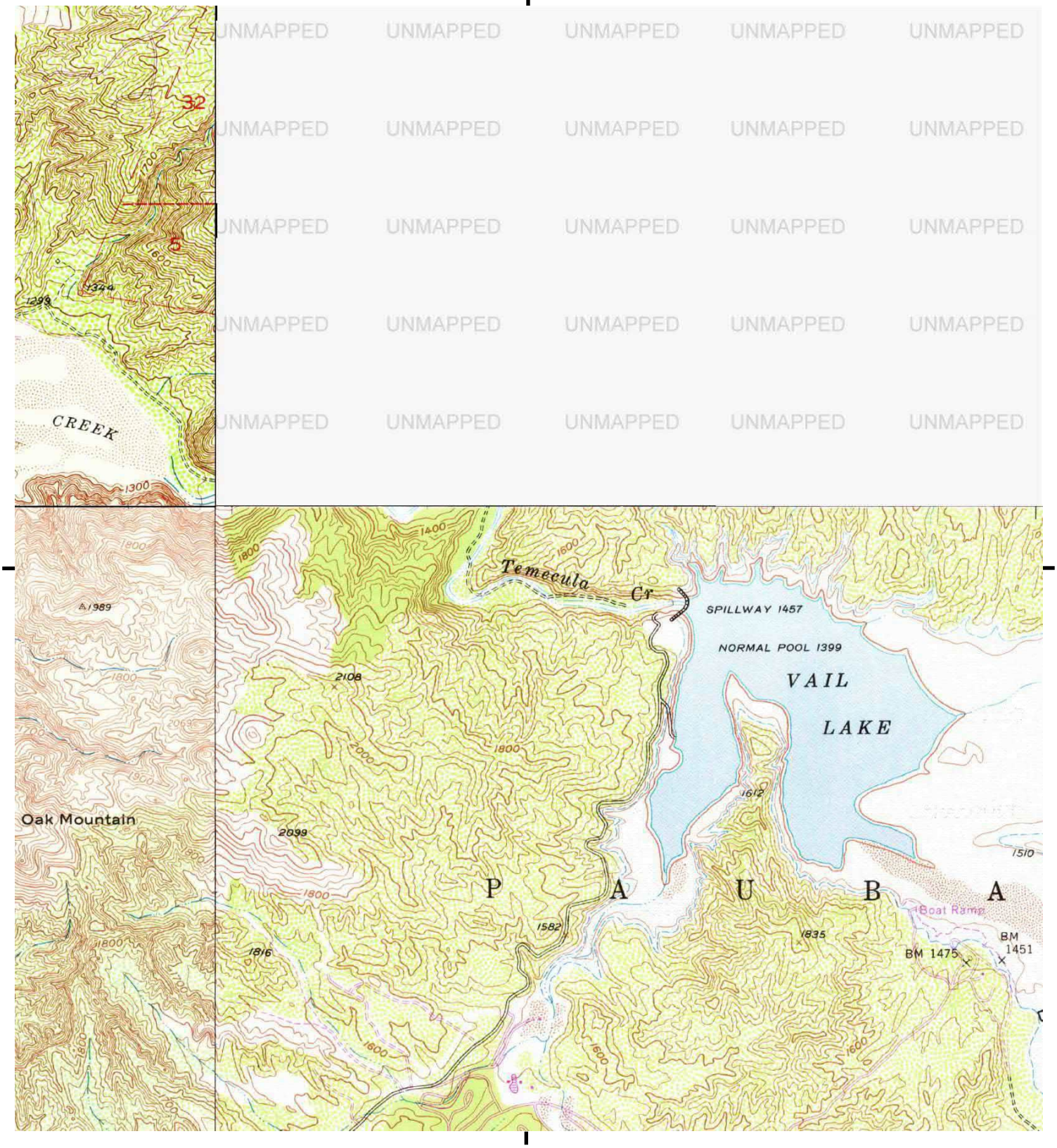
0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, Vail Lake, 1982, 7.5-minute
SW, Pechanga, 1982, 7.5-minute
NW, Bachelor Mtn, 1978, 7.5-minute

SITE NAME: Vail Dam Phase I ESA
ADDRESS: Vail Dam Phase I ESA
Temecula, CA 92592
CLIENT: AECOM

N



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, Vail Lake, 1971, 7.5-minute
N, Bachelor Mtn, 1973, 7.5-minute
SW, Pechanga, 1968, 7.5-minute
NW, Bachelor Mtn., 1973, 7.5-minute

SITE NAME: Vail Dam Phase I ESA
ADDRESS: Vail Dam Phase I ESA
Temecula, CA 92592
CLIENT: AECOM

N



UNMAPPED

This report includes information from the following map sheet(s).

NW N NE
W E
SW S SE

NE, Hemet, 1957, 15-minute

0 Miles 0.25 0.5 1 1.5

SITE NAME: Vail Dam Phase I ESA
ADDRESS: Vail Dam Phase I ESA
Temecula, CA 92592
CLIENT: AECOM

N



This report includes information from the following map sheet(s).

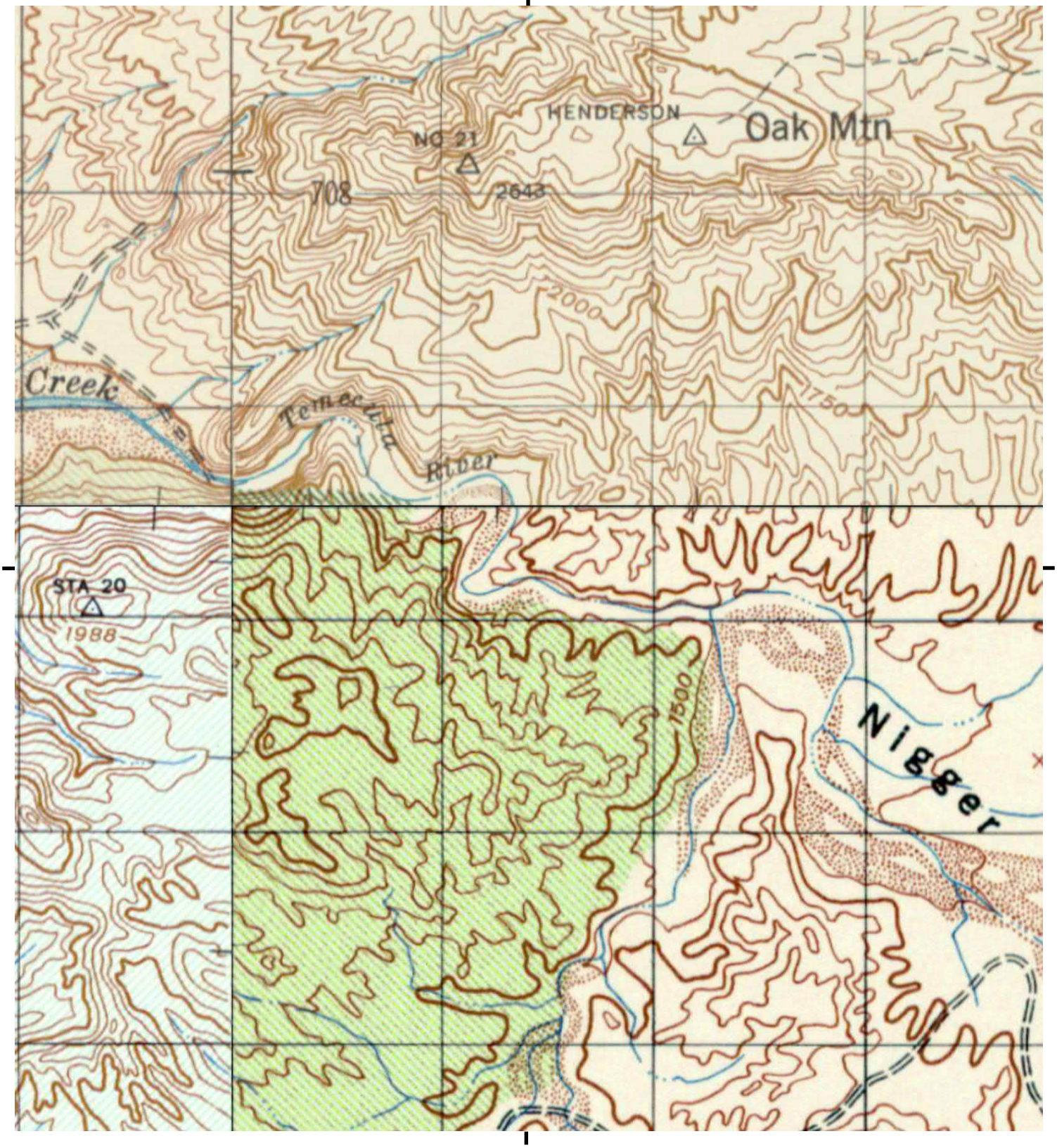
0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, Vail Lake, 1953, 7.5-minute
N, Sage, 1954, 7.5-minute
SW, Pechanga, 1950, 7.5-minute
NW, Bachelor Mtn., 1953, 7.5-minute

SITE NAME: Vail Dam Phase I ESA
ADDRESS: Vail Dam Phase I ESA
Temecula, CA 92592
CLIENT: AECOM

N



This report includes information from the following map sheet(s).

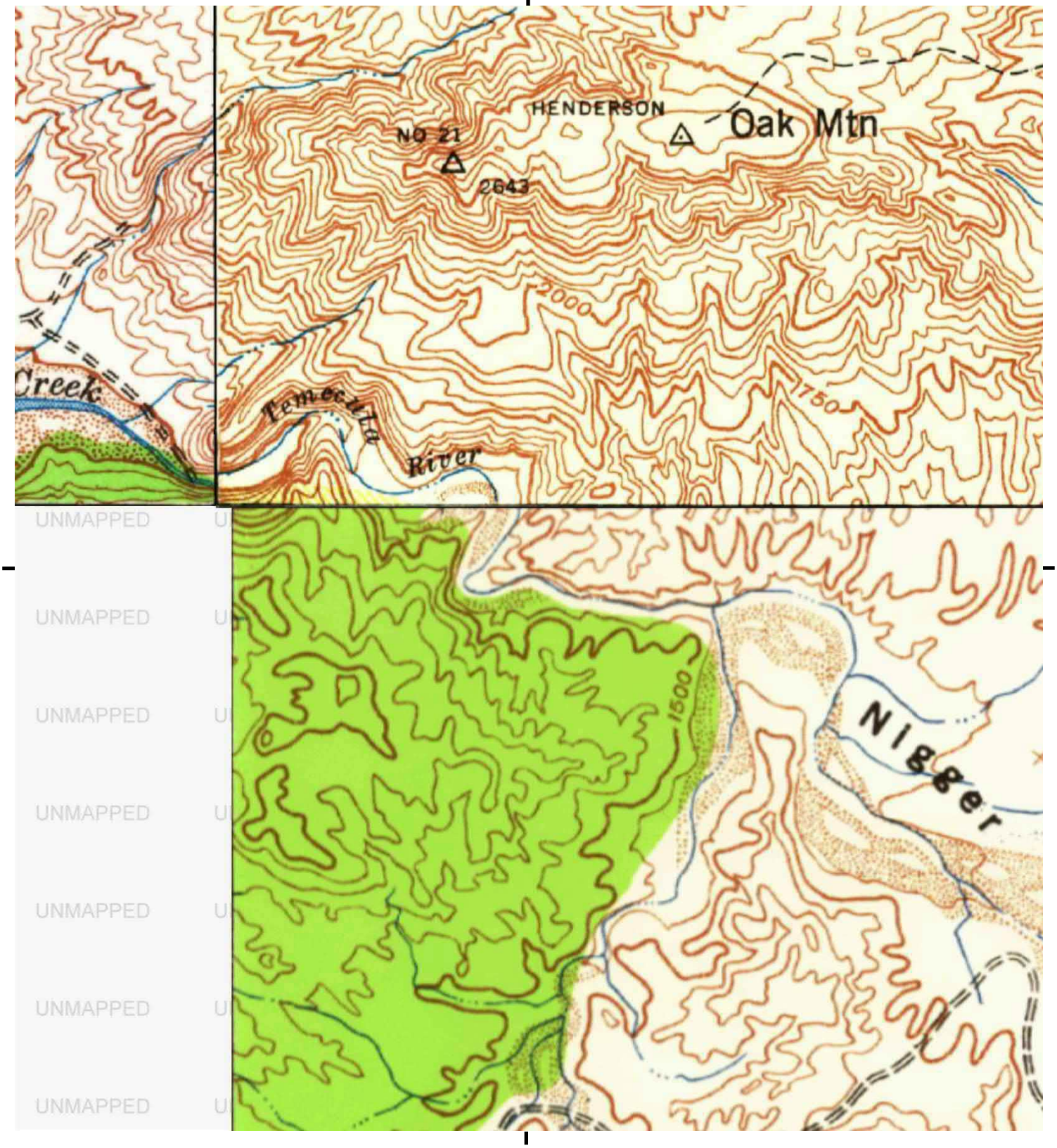
0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, PALOMA MOUNTAIN, 1947, 15-minute
N, MURRIETA, 1947, 15-minute
NE, HEMET, 1947, 15-minute
SW, TEMECULA, 1947, 15-minute

SITE NAME: Vail Dam Phase I ESA
ADDRESS: Vail Dam Phase I ESA
Temecula, CA 92592
CLIENT: AECOM

N



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

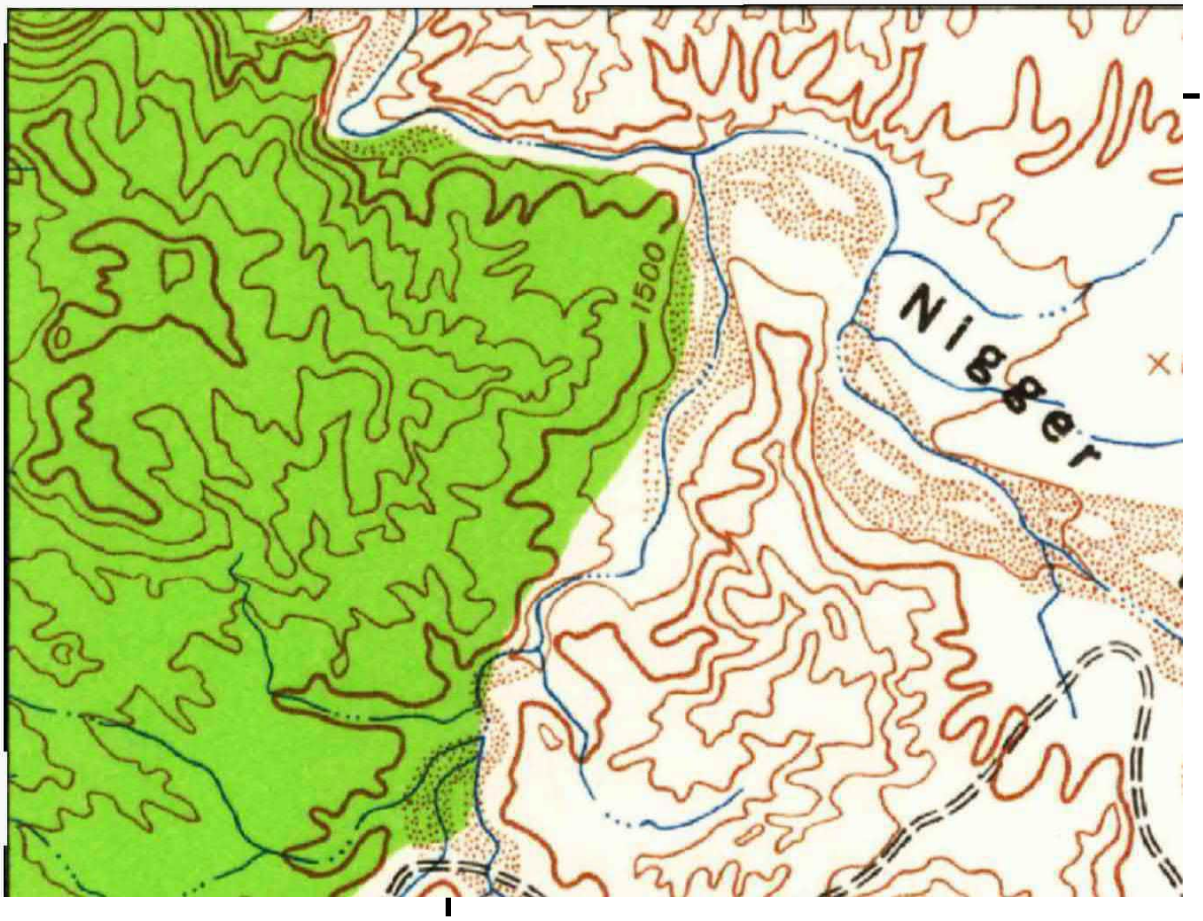
NW N NE
W E
SW S SE

TP, PALOMAR MOUNTAIN, 1942, 15-minute
NE, Hemet, 1942, 15-minute
NW, Murrieta, 1942, 15-minute

SITE NAME: Vail Dam Phase I ESA
ADDRESS: Vail Dam Phase I ESA
Temecula, CA 92592
CLIENT: AECOM

N

UNMAPPED



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

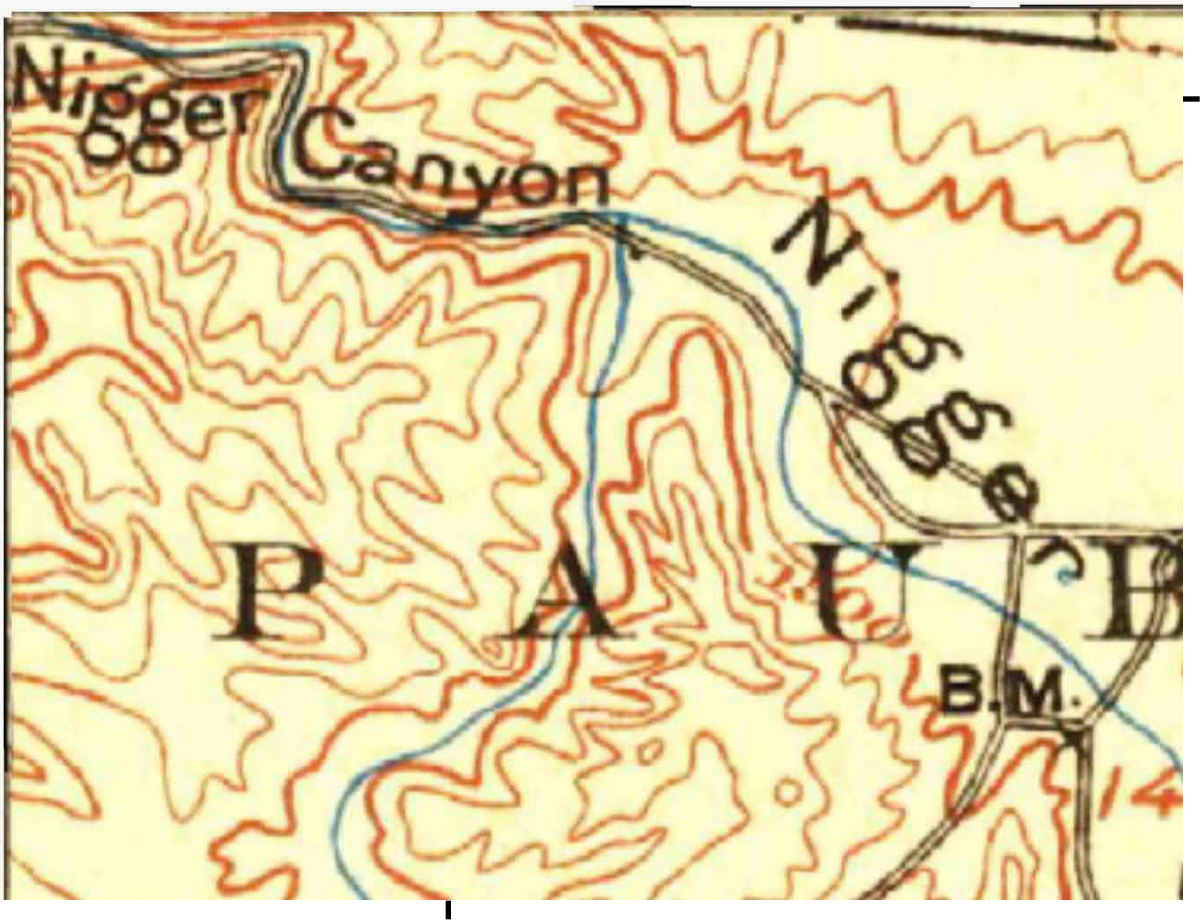
NW N NE
W E
SW S SE

TP, Palomar Mountain, 1939, 15-minute

SITE NAME: Vail Dam Phase I ESA
ADDRESS: Vail Dam Phase I ESA
Temecula, CA 92592
CLIENT: AECOM

N

UNMAPPED



This report includes information from the following map sheet(s).

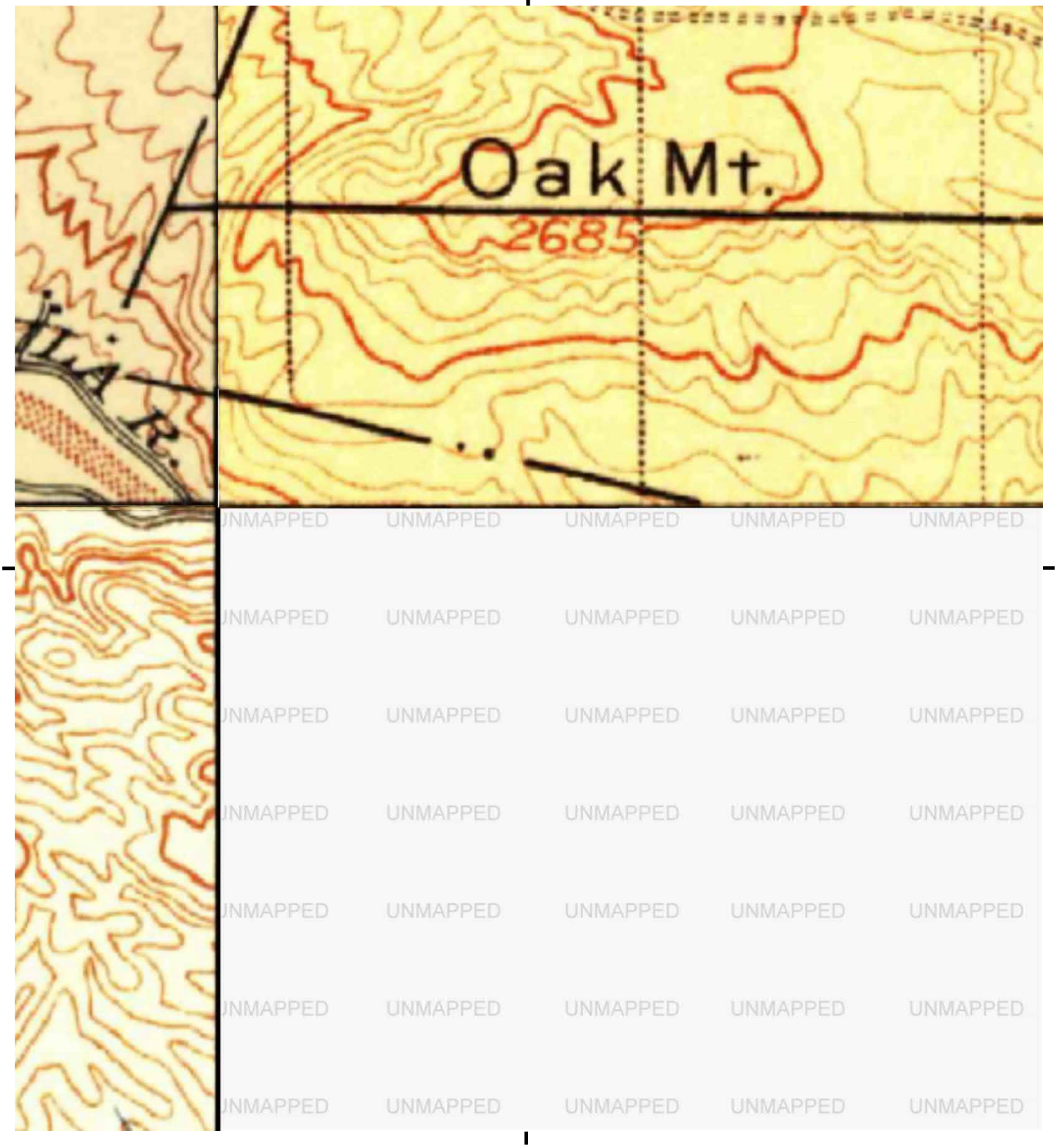
0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, Ramona, 1903, 30-minute

SITE NAME: Vail Dam Phase I ESA
ADDRESS: Vail Dam Phase I ESA
Temecula, CA 92592
CLIENT: AECOM

N



UNMAPPED

This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

NE, San Jacinto, 1901, 30-minute
SW, San Luis Rey, 1901, 30-minute
NW, Elsinore, 1901, 30-minute

SITE NAME: Vail Dam Phase I ESA
ADDRESS: Vail Dam Phase I ESA
Temecula, CA 92592
CLIENT: AECOM

N

Vail Dam Phase I ESA
Vail Dam Phase I ESA
Temecula, CA 92592

Inquiry Number: 6025303.9
April 03, 2020

The EDR-City Directory Image Report

Environmental Data Resources Inc

6 Armstrong Road
Shelton, CT 06484
800.352.0050
www.edrnet.com

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Executive Summary

Findings

City Directory Images

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

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EXECUTIVE SUMMARY

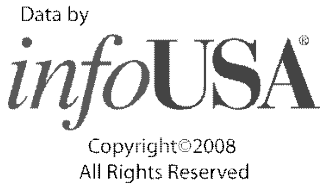
DESCRIPTION

Environmental Data Resources, Inc.'s (EDR) City Directory Report is a screening tool designed to assist environmental professionals in evaluating potential liability on a target property resulting from past activities. EDR's City Directory Report includes a search of available city directory data at 5 year intervals.

RECORD SOURCES

EDR's Digital Archive combines historical directory listings from sources such as Cole Information and Dun & Bradstreet. These standard sources of property information complement and enhance each other to provide a more comprehensive report.

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RESEARCH SUMMARY

The following research sources were consulted in the preparation of this report. A check mark indicates where information was identified in the source and provided in this report.

Year	Target Street	Cross Street	Source
2017	☐	☑	EDR Digital Archive
2014	☐	☑	EDR Digital Archive
2010	☐	☑	EDR Digital Archive
2006	☐	☑	Haines Criss-Cross Directory
2001	☐	☑	Haines Criss-Cross Directory
1996	☐	☑	Haines Criss-Cross Directory
1991	☐	☑	Haines Criss-Cross Directory
1986	☐	☐	Haines Criss-Cross Directory
1979	☐	☑	Haines Criss-Cross Directory
1974	☐	☑	Haines Criss-Cross Directory
1971	☐	☐	Haines Criss-Cross Directory

FINDINGS

TARGET PROPERTY STREET

Vail Dam Phase I ESA
Temecula, CA 92592

No Addresses Found

FINDINGS

CROSS STREETS

Year	*CD Image*	*Source*	
DE PORTOLA RD			
2017	pg. A2	EDR Digital Archive	
2014	pg. A6	EDR Digital Archive	
2010	pg. A11	EDR Digital Archive	
2006	pg. A16	Haines Criss-Cross Directory	
2006	pg. A17	Haines Criss-Cross Directory	
2001	pg. A18	Haines Criss-Cross Directory	
2001	pg. A19	Haines Criss-Cross Directory	
1996	pg. A20	Haines Criss-Cross Directory	
1996	pg. A21	Haines Criss-Cross Directory	
1991	pg. A22	Haines Criss-Cross Directory	
1991	pg. A23	Haines Criss-Cross Directory	
1986	-	Haines Criss-Cross Directory	Street not listed in Source
1979	pg. A24	Haines Criss-Cross Directory	
1974	pg. A25	Haines Criss-Cross Directory	
1971	-	Haines Criss-Cross Directory	Target and Adjoining not listed in Source
OAK MOUNTAIN RD			
2017	pg. A5	EDR Digital Archive	
2014	pg. A10	EDR Digital Archive	
2010	pg. A15	EDR Digital Archive	
2006	-	Haines Criss-Cross Directory	Street not listed in Source
2001	-	Haines Criss-Cross Directory	Street not listed in Source
1996	-	Haines Criss-Cross Directory	Street not listed in Source
1991	-	Haines Criss-Cross Directory	Street not listed in Source
1986	-	Haines Criss-Cross Directory	Street not listed in Source
1979	-	Haines Criss-Cross Directory	Street not listed in Source
1974	-	Haines Criss-Cross Directory	Street not listed in Source
1971	-	Haines Criss-Cross Directory	Street not listed in Source

City Directory Images

Target Street	Cross Street	Source
-	✓	EDR Digital Archive

DE PORTOLA RD 2017

30110	TODD, LOUIS A
30160	FINLEY, CAMERON R
30175	RODRIGUEZ, LENA M
30300	MADIGAL, EUGENE
30355	GUTIERREZ, MARIA A
30370	BROOKS, ROBERT W
30375	LI, JIERUI
30390	ZHAO, ZIZHANG
30405	ALLENSWORTH, SACHA
30430	MOREAU, DONALD J
30435	FAIRCHILD, GEORGE R
30450	GOLEC, TIMOTHY R
30451	ROSU, LIVIU
30600	RAWSON, RICHARD H
30605	VANDOREN, JAMES L
30655	CANALES, RUDY O
30787	IMPERATO, MARIO
30851	DEPAUW, JAMIE L
30895	YANGA, JOEVY J
30955	ECHEVERRIA, RICARDO N
31450	SHUFFLEBARGER, JOHN R
31625	RHODES, DONALD L
31775	DAVIS, ROBERT
34121	AFFOLTER, BARBARA G
34174	RODRIGUEZ, JUAN A
34215	RINEER, RANDY J
34265	STUCKY, GREG J
34355	REDDING, SEAN N
34383	HASTINGS, PAUL M
34395	GIBSON, OLIVER E
34520	ARLLENTAR, JANIC
	BRADFIELD, LENNA
	PAXTON, PAULA
	SCANE, COOKIE E
34731	STAAT, PAUL H
34741	DAVIS, LISA
34915	HORSEMANS NEWS
	NIETO, MARCUS A
35270	RODRIGUEZ, ALEJANDRO
35325	RADEN, TOM
	SPECIAL T THOROUGHBREDS INC
35394	ROGERS, LARRY K
35438	SOTO, PAMELA
	XIE, HONGBINT
35480	SAXBY, PETER E
35550	BURR, EDWARD C
35560	BURR, COLE
35675	LAMBERT, RENE J
	REN MAR THOROUGHBREDS
35750	GREEN ACRES RANCH INC

Target Street	Cross Street	Source
-	✓	EDR Digital Archive

DE PORTOLA RD 2017 (Cont'd)

35750 RICH, ROY
36400 HICKMAN, MICHAEL P
36420 ROLOFF INTERNATIONAL
ROLOFF RANCH
ROLOFF, BONNIE D
36500 DAVIS, JAMES S
SOUTHERN CALIFORNIA ADDICTIO
36540 ZHU, HONG
36835 JENKINS TANYA PERFORMANCE HORSES
MCMICHAEL, HEATH A
37028 WELLS, BOB G
37104 RIVERA, SAUL
37320 CELLARS WINE
37338 KEYWAYS VINEYARD & WINERY
37350 ROBERT RENZONI VINEYARDS
37750 FALIK, KENNETH H
37850 BRADY, BRIAN J
37975 HALLETT, JON G
38200 VINCER, JAMES P
38280 MAGANA, MARIA I
38311 LEONESSE CELLARS
38325 HARGETT, LEILANI K
38330 KARALIAN, ROBERT
38405 AFFOLTER, ALEXANDER D
38440 LAPOINTE, RAYMOND W
38660 GRANUND, DAVID J
38685 FITZPATRICK, RANDY L
38811 KUTSCHER, THOMAS K
38901 NICKELSON, ROSALYN M
38925 JOHANSSON, PER A
39050 DANZA DEL SOL WINERY
39110 CUSI, KELLY C
39300 VINA DE LESTONNAC RETREAT
39500 MENDEZ, DALE K
39590 HENDREN, MARK J
39750 FRANGIPANI ESTATE WINERY
39815 CARTAYA, EDWARD S
39855 SUSTER, DICK
39870 COUGAR VINEYARD & WINERY
39950 REED, ROBERT T
40050 FISHER, MICHELLE D
SWYERS SMART INC
40125 AYERS, LAUREN N
40520 BROWN, NANCY J
40880 LIU, HONG E
40930 LACY, TONI M
41280 BRANT, STEVEN
41370 RICHARDSON, DOUGLAS E
41380 MAHAFFEY, BRENDAN K
41430 BAKER, GARY L

DE PORTOLA RD 2017 (Cont'd)

41460 STREICHER, JAMES M
41700 TAYLES, HELEN F
41900 GREENBERG, JONATHAN L
41975 BLACK, GEORGE A
41979 HOYOS, FRANCISCO J
41983 HOFFMAN, KEITH A
42345 HOLLAND, STEPHEN A
42381 PHAY, KATIE L
42451 PATTON, DAVID B
42525 FOLEY, CHARLES J
42550 BYAS, LOUISE M
42594 WEBB, GREGORY D
42595 JONES, WAYNE C
42596 CHAVEZ, RICHARD
42597 REED, MICHAEL A
43559 SILVA, LILIANA M
44050 COUCH AMP
DIPIETRO, DANIEL
44098 HASTIE, DAVID
44155 KIMPEL, WILLIAM R
44545 WILSEY, PATRICIA A
45020 LUPIN, MICHELLE W
45075 MARTINEZ, BRENDA
45101 KNAPP, PATSY J
45131 BRAWNER, JAMES
45155 MELLO, WAYNE F
45200 SQUIRES, SEWARD W
45205 CULBERTSON, ARLINE C
45300 EMMERSON, GARY W
46000 UMIPIG, CESAR D
46505 BACH, CHRISTOPHER J
46520 WHITING, ERIN K
46525 BEDARD, JOHN A
47050 FRITZINGER, GARY L
47200 TEMECULA HILLS WINERY
VIGEANT, DOLORES V

Target Street	Cross Street	Source
-	✓	EDR Digital Archive

OAK MOUNTAIN RD 2017

37100 SORCE, MILA

Target Street	Cross Street	Source
-	✓	EDR Digital Archive

DE PORTOLA RD 2014

30033 VERKADE, DANIEL B
30065 GIBBONS, LACY
30110 TODD, LOUIS A
30160 KAMASHIAN, KEN J
30175 RODRIGUEZ, LENA M
30230 OCCUPANT UNKNOWN,
30300 MADRIGAL, EUGENE R
30355 HERRERO, JAVIER
30370 BROOKS, ROBERT W
30375 CAMPINI, DONALD R
30390 REED, STEVE
30405 ALLENSWORTH, JAMES
30430 MOREAU, DONALD J
30435 FAIRCHILD, GEORGE R
30450 GOLEC, TIMOTHY R
30451 OCCUPANT UNKNOWN,
30600 WORKMAN, DAVID L
30605 OBRIEN, JASON E
30655 CANALES, JULIAN J
30753 OCCUPANT UNKNOWN,
30787 IMPERATO, MARIO
30850 OCCUPANT UNKNOWN,
30851 JEFFERS, JAMIE D
30895 PINTOR, JOEVY J
30925 LARA, THEODORE
30955 ECHEVERRIA, RICARDO N
31411 OCCUPANT UNKNOWN,
31415 OCCUPANT UNKNOWN,
31450 SHUFFLEBARGER, JOHN R
31625 RHODES, DONALD L
31775 DAVIS, ROBERT
34121 AFFOLTER, BARBARA G
34174 RODRIGUEZ, JUAN A
34215 OCCUPANT UNKNOWN,
34265 SIDERIS, JT
34311 DAVIS, RONALD A
34355 REDDING, SEAN N
34383 ALDRETE, PEGGE
34395 OSHAUGHNESSY, LAURA L
34520 BRADFIELD, LENNA
CATALANO, CHRIS
SCANE, COOKIE
34729 OCCUPANT UNKNOWN,
34731 TICE, GARY
34741 ASPINALL, GLEN
34915 HORSEMANS NEWS
NIETO, MARCUS
PACIFIC COAST JOURNAL
35270 SMITH, TIMOTHY E
35310 CASSINI, RON

Target Street	Cross Street	Source
-	✓	EDR Digital Archive

DE PORTOLA RD 2014 (Cont'd)

35325 LEIMGRUBER, SETH
SPECIAL T THOROUGHBREDS INC
35338 OCCUPANT UNKNOWN,
35394 ROGERS, LARRY K
35438 DIGELLO, DANA M
RACINELLI, ENNIO V
SOTO, PAMELA
35480 SAXBY, PETER E
35550 BURR, EDWARD C
35560 BURR, COLE
35675 DIAZ, ERASMO O
REN MAR THOROUGHBREDS
35750 GREEN ACRES RANCH INC
RANDAL & MARGARET RICH
RICH, RANDY L
36410 RAMSAY, JAMES L
36420 ROLOFF INTERNATIONAL
ROLOFF RANCH
ROLOFF, DON D
36500 MELLMAN, CARL B
36540 VELASCO, HECTOR
36835 JENKINS TANYA PERFORMANCE HORSES
MCMICHAEL, HEATH A
37028 WELLS, BOB G
37104 RIVERA, SAUL
37215 OCCUPANT UNKNOWN,
37338 KEYWAYS VINEYARD
37350 ROBERT RENZONI VINEYARDS
37750 OCCUPANT UNKNOWN,
37850 BRADY, BRIAN J
37970 COOK, EUGENE A
38060 BETTS, KEN E
38150 MAGUIRE, SKYLAR
38200 OCCUPANT UNKNOWN,
38280 MAGANA, FELIPE E
38311 LEONESSE CELLARS
38325 PAVELICH, TURNER L
38330 KARALIAN, ROBERT
38405 AFFOLTER, ALEXANDER D
38440 OCCUPANT UNKNOWN,
38600 GRANLUND, DAVID J
38660 GRANUND, DAVID J
38685 FITZPATRICK, RANDY L
38811 KUTSCHER, THOMAS K
38901 NICKELSON, ROSALYN M
38925 BALLEW, LANNY M
38975 CHAIDEZ, ANTONIO R
39050 DANZA DEL SOL WINERY
39110 HEFLEY, RYE
39300 VINA DE LESTONNAC RETREAT

Target Street	Cross Street	Source
-	✓	EDR Digital Archive

DE PORTOLA RD 2014 (Cont'd)

39500 MENDEZ, DALE K
39590 WHIPPLE, WAYNE C
39750 FRANGIPANI ESTATE WINERY
39855 HARRIS, THOMAS P
39870 COUGAR VINEYARD & WINERY
39950 LEE, CHARLES W
40050 FREDERICKSEN, MARGARET L
40111 HODGE, DON R
40125 AYERS, LAUREN
40225 OCCUPANT UNKNOWN,
40860 LUMANG, G
40930 LACY, TONI M
41280 BRANT, STEVEN
41370 RICHARDSON, DOUGLAS E
41380 OSTAPECK, GRANT W
41400 HAAS, WILLIAM M
41430 BAKER, BECKY M
41460 STREICHER, JAMES M
41590 BEARSE, STEVEN D
41700 TAYLES, HELEN F
41900 HUYGHES-LACOUR, N
41975 TISBERT, MEREDITH
41979 HOYOS, FRANCISCO J
41983 HOFFMAN, KEITH A
42331 OCCUPANT UNKNOWN,
42345 HOLLAND, STEPHEN A
42381 PHAY, KATIE L
42451 PATTON, DAVID B
42461 MCGINNIS, RON L
42525 FOLEY, CHARLES J
42550 BYAS, LOUISE M
42594 BINKERD, MARK A
42595 JONES, WAYNE C
42596 CHAVEZ, RICHARD
42597 BOENING, ROBERT J
RECYCAL SUPPLY CO
43559 BOWMAN, ALICE
44050 COUCH, DAVID I
44098 HASTIE, DAVID
44155 KIMPEL, WILLIAM R
44502 HESSE, KAREN
44545 MONSON, KRISTEN M
45020 LUPIN, MICHELLE W
45075 SORENSEN, PETER
45101 KNAPP, PATSY E
45131 BRAWNER, JAMES
45155 HEIDEMAN, CHARLES
45200 SQUIRES, SEWARD W
45205 OCCUPANT UNKNOWN,
45300 EMMERSON, GARY W

DE PORTOLA RD 2014 (Cont'd)

46000 UMIPIG, CESAR D
46505 LOUGEE, JIM
RANCHO DE CAMPEONES
46520 WHITING, ERIN
46525 BEDARD, JOHN A
46850 SYMMES, KYLE M
47050 FRITZINGER, GARY L
47200 ANDREWS, STEVE R
TEMECULA HILLS WINERY

Target Street	Cross Street	Source
-	✓	EDR Digital Archive

OAK MOUNTAIN RD 2014

37100 OCCUPANT UNKNOWN,

Target Street	Cross Street	Source
-	✓	EDR Digital Archive

DE PORTOLA RD 2010

30033 NELSON, TIMOTHY W
30065 FORTENSKY, LARRY L
30110 DEMACI, DEBORAH S
30160 KAMASHIAN ELECTRIC
OCCUPANT UNKNOWN,
30175 RODRIGUEZ, LENA M
30230 CARLSON, CURT D
30300 MADRIGAL, EUGENE R
30355 UIHLEIN, DEONNA
30370 GRIFFIN, GREG S
30375 CAMPINI, VAL J
30390 RODGERS, CHEVEL R
30405 GUZON, ALVIN M
30430 DEPORTOLA MANAGEMENT
MOREAU, DONALD J
30435 FAIRCHILD, GEORGE R
30450 MACIEL, JORGE A
30451 TOVAR, GLORIA L
30600 WORKMAN, DAVID L
30605 JORDAN, JOHN V
30655 CANALES, RICHARD I
30787 IMTERATO, MARIO
30850 GUZMAN, JOSE V
30895 PINTOR, CATHERINE
31411 OCCUPANT UNKNOWN,
31415 OCCUPANT UNKNOWN,
31450 SHUFFLEBARGER, JOHN R
31625 RHODES, DONALD L
31775 ECHEVERRIA, VICENTE E
33400 OCCUPANT UNKNOWN,
34121 AFFOLTER, JOHN U
34131 HUNTLEY RANCH
34215 STAFFORD, LANCE N
34265 LEON, ADELINA
VER HAGE FARMS
34311 MCCLINTOCK, VIRGINA L
34350 MEKEEL, ESTHER M
34355 OCCUPANT UNKNOWN,
34383 CHANDLER, LOIS A
34395 DUTHIE, RICHARD B
34520 BERG, MICHAEL D
BRADFIELD, LENNA
CASNER RANCH CO
CATALANO, CHRIS
SARGEANT, LEANN M
STCLAIR, ROBIN K
34729 OCCUPANT UNKNOWN,
34731 JONES, TIMOTHY C
34741 OCCUPANT UNKNOWN,
34915 OCCUPANT UNKNOWN,

Target Street	Cross Street	Source
-	✓	EDR Digital Archive

DE PORTOLA RD 2010 (Cont'd)

35270 SMITH, TIMOTHY E
35310 CASSINI, RON
35325 SPECIAL T THOROUGHBREDS INC
TAYLOR, RICKIE E
35394 ROGERS, LARRY K
35438 DIGELLO, DANA
DYNAMIC DESIGN
ENDAR EQUINE
RACINELLI, ANTHONY M
35480 PALERMO, ONOFRIO R
RACINELLI, ENNIO V
35560 BURR, EDWARD C
35675 DIAZ, ERASMO O
REN MAR THOROUGHBREDS
35750 GREEN ACRES RANCH INC
RICH, RANDY L
36400 DAVIS, ROBYN
36410 RAMSAY, JAMES L
36420 ROLOFF INTERNATIONAL
ROLOFF, DON D
36500 MELLMAN, CARL B
36540 BOLANOS, FRED S
37028 WELLS, BOB G
37055 RANCHO PACIFICA EQUESTRIAN CTR
37104 RIVERA, SAUL
37215 BLACKRIDGE RJH
GOMEZ, RONALD E
37350 ROBERT RENZONI VINEYARDS
37590 OCCUPANT UNKNOWN,
37970 TURSKI, ANTHONY J
38060 BETTS CONSTRUCTION & ELECL SVC
BETTS, KENNETH E
38091 QUADE, JEFFREY
38150 ROGERS, MARK E
38200 NOREN, BRAD E
38280 OCCUPANT UNKNOWN,
38311 LEONESSE CELLARS
38325 PAVELICH, LINDA M
38330 OCCUPANT UNKNOWN,
38405 AFFOLTER, ALEXANDER D
38440 OCCUPANT UNKNOWN,
38660 GRANLUND, DAVID J
38685 FITZPATRICK, BRENT L
38811 KUTSCHER, THOMAS K
38901 EASTMAN, W
38925 BALLEW, HAROLD W
38975 BROWNING, RYAN
CHAIDEZ, ANTONIO R
39050 FILSINGER VINEYARDS & WINERY
39110 OCCUPANT UNKNOWN,

Target Street	Cross Street	Source
-	✓	EDR Digital Archive

DE PORTOLA RD 2010 (Cont'd)

39300 VINA DE LESTONNAC CONVENT
VINA DE LESTONNAC RETREAT
39500 FIFER, ERIK L
39550 RAUCH, GERALD
39590 OCCUPANT UNKNOWN,
39750 FRANGIPANI ESTATE WINERY
39815 CARTAYA, MARY A
39855 HARRIS, THOMAS P
39870 COUGAR VINEYARD & WINERY
39950 LEE, CHARLES W
40050 SHAW, BRIGITTE
40125 BLASS, RICHARD C
40225 ALLEN, JULIA C
40520 OCCUPANT UNKNOWN,
40601 GLENOAK HILLS COMMUNITY
40930 LACY, TONI M
41280 BRANT, STEVEN
41370 RICHARDSON, DOUGLAS E
41380 OSTAPECK, GRANT W
41400 WOODCOCK, TERRY L
41430 BAKER, GARY L
41460 STIEFEL, OTTO P
41590 BEARSE, DONALD B
41700 TAYLES, HELEN F
41900 HUYGHES-LACOUR, N
41975 BLACK, GEORGE A
41979 HOYOS, FRANCISCO J
41983 MUELLER, M
42331 MCGINNIS, RON L
42345 HOLLAND, STEPHEN A
42381 PHAY, LAWRENCE T
42451 PATTON, DAVID B
42461 OCCUPANT UNKNOWN,
42525 FOLEY, CHARLES J
42550 BYAS, LOUISE M
42595 JONES, WAYNE C
42596 CHAVEZ, RICHARD
42597 BOENING, ROBERT J
RECYCAL SUPPLY CO
43559 ELLIS, EDWARD W
44050 COUCH, DAVID I
44098 GARCIA, MARIA T
44155 MIKESELL, PAMELA J
SOMEDAY SOMEWHERE RANCH INC
44502 HUFNAGEL, MICHAEL D
44545 MONSON, KRISTEN
45020 LUPIN, MICHELLE W
45075 SORENSEN, PETER
45101 KNAPP, PATSY E
45131 BRAWNER, LISA R

DE PORTOLA RD 2010 (Cont'd)

45155 HEIDEMAN, ROBERT C
45200 SQUIRES, SEWARD W
45205 CULBERTSON, MICHAEL R
45300 EMMERSON, GARY W
46000 UMIPIG, CESAR D
46275 OCCUPANT UNKNOWN,
46505 MCDOWELL, VICTORIA
46520 SHANNON, TREVOR
46525 BEDARD, JOHN A
46850 SYMMES, KYLE M
47050 FRITZINGER, GARY L
47200 MCCLAIN, CATHY P
TEMECULA HILLS WINERY

Target Street	Cross Street	Source
-	✓	EDR Digital Archive

OAK MOUNTAIN RD 2010

37100 SORCE, JAMES A

Target Street	Cross Street	Source
-	✓	Haines Criss-Cross Directory

DE PORTOLA RD 2006



DE PORTOLA RD 92592
TEMECULA

WEALTH CODE 1

RANCHO CALIF AREA

X VERDE DR

X PIO PICO RD

X MARGARITA RD

X ANZA RD

X CAREFREE DR

X DASH FOR CASH CIR

Target Street	Cross Street	Source
-	✓	Haines Criss-Cross Directory

DE PORTOLA RD 2006



Target Street	Cross Street	Source
-	✓	Haines Criss-Cross Directory

DE PORTOLA RD 2001



DE PORTOLA RD 92592
TEMECULA

WEALTH CODE 4 +

RANCHO CALIF AREA

30003	•NELSON Timothy	OO	+1
30005	•KELLY K M	909-302-8626	0
30110	•BRADLEY Rosario	OO	+1
30160	•FULLER H S	909-302-5701	0
	•FULLER Karen	909-302-5701	0
30175	•JONES Mark K	OO	+1
30230	•CARLSON C	909-302-5904	0
	•CARLSON Kim	909-302-5904	0
30300	•MADRIGAL Eugene	OO	+1
30285	CLINTON Ronald E	909-302-5205	+1
	CLINTON Sherrie	909-302-5205	+1
30375	•LEWIS Philip	OO	+1
30390	•DEMOULIN Neil	909-302-7567	0
30401	XXXX	OO	
30405	•HUGHES Ryan	OO	+1
30430	•MOREAU Donald	909-302-8375	+1
30450	• ALAN COMPANY THE	909-302-6346	0
	•THARALDSON Leonard	909-302-8277	0
30451	•DULIN John	909-302-8075	0
	•DULIN Linda	909-302-8075	0

X VERDE DR

30600	•BETTIS Carl	OO	+1
30605	•MCFEDWIN Michael	OO	+1
30655	•CANALETI Richard	OO	+1

X VILLA DEL SUR

30753	XXXX	OO	
30787	•STREETER Timothy	OO	+1

X PIO PICO RD

30800	•COOKS James	909-302-8871	0
30801	•THORNE Herman	909-302-3356	0
30805	•CAPEN Merle	OO	+1
30826	•LARA Theodore	OO	+1
30955	•MARSTERS Warner	OO	+1
31411	•HAYES Melvin	OO	+1
31415	•RAUTON Kenneth	OO	+1
31456	•SHUFFLEBARGER John	909-302-1698	0
31605	•RHODES Don	909-302-3403	0

X MARGARITA RD

31775	•ECHEVERRIA Vicente	OO	+1
34121	•AFFOLTER John U	909-302-1150	0
34174	• CANYON EQUINE CLINIC	909-302-3330	0
	CERVANTES Elsa	909-303-6628	0
	• MERIEL RANCH	909-303-4100	0
	• SEEMAN LAURENCE E DVM	909-302-3330	0
34215	•HOWELL Mary	OO	0
34290	•REEVES Donna	OO	0
34265	• CULBRETH CHRIS	909-302-0217	0
	•FREEK Richard	909-302-1075	0
	• MAGIC MEADOW	909-302-0217	0
34319	•ZIMMER Louise	OO	0
34350	•MERIEL Esther	OO	0
34355	•GOETZ Irene	OO	0
34383	•HASTINGS Paul	OO	+1
34520	CRAWFORD Pam	909-302-7482	0
	CRAWFORD Todd	909-302-7482	0
	• D L R RANCH	909-302-3299	0
	HALL Kelly A	909-302-5763	+1
34731	•JONES Timothy	909-302-5826	0
34741	RICHTER C	909-302-1402	0
	RICHTER R	909-302-1402	0

X ANZA RD

34915	•LEASE Larry	909-302-8454	0

Target Street	Cross Street	Source
-	✓	Haines Criss-Cross Directory

DE PORTOLA RD 2001



Target Street	Cross Street	Source
-	✓	Haines Criss-Cross Directory

DE PORTOLA RD 1996



DE PORTOLA RD 92592
TEMECULA

WEALTH CODE 4 7

RANCHO CALIF AREA

30033	XXXX	00	
30110	XXXX	00	
30160	• FULLER H Steven	676-4903	
	• FULLER Karen	676-4903	
30175	XXXX	00	
30300	XXXX	00	
30355	• WILLS TRUST ESTATE	695-2229	+6
30390	• DEMOULIN Nell	699-0317	0
30435	XXXX	00	
30450	THARALDSON Leonard	676-5044	
30451	• DULIN John	699-8464	5
	• DULIN Linda	699-8464	
30600	• HIRSCH Melville	676-8481	
30655	BLYTHE Cheryl	695-0488	
30787	XXXX	00	
30850	• COOKE Jae	676-8221	9
30851	• THORNE Herman	676-2856	2
30895	• CAPEN Merle	694-8453	2

Target Street	Cross Street	Source
-	✓	Haines Criss-Cross Directory

DE PORTOLA RD 1996



Target Street	Cross Street	Source
-	✓	Haines Criss-Cross Directory

DE PORTOLA RD 1991



Target Street	Cross Street	Source
-	✓	Haines Criss-Cross Directory

DE PORTOLA RD 1991



Target Street	Cross Street	Source
-	✓	Haines Criss-Cross Directory

DE PORTOLA RD 1979

DE PORTOLA RD 92390
TEMECULA

30390	BERGER WALTER	676-4738	+9
30450	THARALDSON LEONARD	676-5044	+9
30600	HIRSCHI MELVILLE	676-8481	
30787	SMITH WENDELL P	676-8911	
34174*	**MEKEEL RANCH**	**676-5104**	
34311	MEKEEL JOHN	676-2421	4
34383	HALE FRANK	676-5296	4
34520	CARDENAS LUIS	676-5508	7
34731	WHITCOMB GEO A	676-4248	8
35750	WEST HAROLD E-DR	676-8745	5
35876	XXXX	00	
36400	SCHIFFER KENNETH	676-8241	4
38440	WILSON ALAN B	676-4577	+9
38855	BERTRAND RICHARD V	676-5084	8
39000	NORCIA GEORGE	676-5339	+9
39050	DANIELS MARTHA J	676-5849	8
	RODRIGUEZ ALEJO	676-4390	+9
39950	THOMAS WM J	676-5211	7
40111	POLLUSAAR ANDRES	676-5319	+9
41430	SPINA JOS F	676-5488	5
41460	UHLENDORF GEORGE	676-4498	+9
41605	SCHIPPER DUANE A	676-4419	+9
	SCHIPPER LORENE J	676-4419	+9

* 1 BUS 22 RES 9 NEW

Target Street	Cross Street	Source
-	✓	Haines Criss-Cross Directory

DE PORTOLA RD 1974



DE PORTOLA RD 92390 TEMECULA

30600 HIRSCHI MELVILLE 676-8481
30787 SMITH WENDELL P 676-8911
34174 MADSON SAML C 676-5169+4
*MEKEEL RANCH 676-5104
34311 MEKEEL JOHN 676-2421+4
34383 HALE FRANK 676-5296+4
35876 WEST HAROLD E DR 676-8745+4
36400 SCHIFFER KENNETH 676-8241+4
NO #*CALDWELL T M AUCTNR 676-5291+4
NO #*GLEN OAK HILLS SLS 676-8475+4
NO #*RANCHO CONSULTANTS 676-8475+4
* 4 BUS 7 RES 8 NEW

Vail Dam Phase I ESA

Vail Dam Phase I ESA

Temecula, CA 92592

Inquiry Number: 6025303.6

April 01, 2020

Certified Sanborn® Map Report

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

Certified Sanborn® Map Report

04/01/20

Site Name:	Client Name:
Vail Dam Phase I ESA	AECOM
Vail Dam Phase I ESA	401 West A Street, Suite 1200
Temecula, CA 92592	San Diego, CA 92101
EDR Inquiry # 6025303.6	Contact: Sarah Perhala

The Sanborn Library has been searched by EDR and maps covering the target property location as provided by AECOM were identified for the years listed below. The Sanborn Library is the largest, most complete collection of fire insurance maps. The collection includes maps from Sanborn, Bromley, Perris & Browne, Hopkins, Barlow, and others. Only Environmental Data Resources Inc. (EDR) is authorized to grant rights for commercial reproduction of maps by the Sanborn Library LLC, the copyright holder for the collection. Results can be authenticated by visiting www.edrnet.com/sanborn.

The Sanborn Library is continually enhanced with newly identified map archives. This report accesses all maps in the collection as of the day this report was generated.

Certified Sanborn Results:

Certification # D13F-43A3-A1CE

PO # NA

Project 60623135 task 007

UNMAPPED PROPERTY

This report certifies that the complete holdings of the Sanborn Library, LLC collection have been searched based on client supplied target property information, and fire insurance maps covering the target property were not found.

Sanborn® Library search results

Certification #: D13F-43A3-A1CE

The Sanborn Library includes more than 1.2 million fire insurance maps from Sanborn, Bromley, Perris & Browne, Hopkins, Barlow and others which track historical property usage in approximately 12,000 American cities and towns. Collections searched:

- ☑ Library of Congress
- ☑ University Publications of America
- ☑ EDR Private Collection

The Sanborn Library LLC Since 1866™

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Appendix C

ASTM E1527-13 User Questionnaire

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AECOM

ASTM 1527-13
USER QUESTIONNAIRE

Project Title: Vail Dam Seismic and Hydrologic Remediation Project

Project Address: 37115 De Portola Road, Temecula Project City: Riverside County Project State: California

Completed by: Jacob G. Wiley Company Name: Rancho California Water District Date: 09/23/20

In order to qualify for one of the *Landowner Liability Protections (LLPs)*[35] offered by the Small Business Liability Relief and Brownfields Revitalization Act of 2001 (the *"Brownfields Amendments"*),[36] the *user* must conduct the following inquiries required by 40 CFR 312.25, 312.28, 312.29, 312.30, and 312.31. These inquiries must also be conducted by EPA Brownfield Assessment and Characterization grantees. The *user* should provide the following information to the *environmental professional*. Failure to conduct these inquiries could result in a determination that "*all appropriate inquiries*" is not complete.

1. Environmental liens that are filed or recorded against the site (40 CFR 312.25).
Did a search of recorded land title records (or judicial records where appropriate, See Note 1 below) identify any environmental liens filed or recorded against the *property* under federal, tribal state or local law? No

Note1 – In certain jurisdictions, federal, tribal, state, or local statutes, or regulations specify that environmental liens and AULs be filed in judicial records rather than in land title records. In such cases judicial records must be searched for environmental liens and AULs.

2. Activity and land use limitations that are in place on the *property* or that have been filed or recorded against the property (40 CFR 312.26(a)(1)(v) and (vi)).
Did a search of *recorded land title records* (or judicial records where appropriate, see Note 1 above) identify any AULs, such as *engineering controls*, land use restrictions or *institutional controls* that are in place at the *property* and/or have been filed or recorded against the *property* under federal, tribal, state or local law? No

3. Specialized knowledge or experience of the person seeking to qualify for the LLP (40 CFR 312.28).
Do you have any specialized knowledge or experience related to the *property* or nearby properties? For example, are you involved in the same line of business as the current or former *occupants* of the *property* or an *adjoining property* so that you would have specialized knowledge of the chemicals and processes used by this type of business? No

4. Relationship of the purchase price to the fair market value of the *property* if it were not contaminated (40 CFR 312.29).
Does the purchase price being paid for this *property* reasonably reflect the fair market value of the *property*? If you conclude that there is a difference, have you considered whether the lower purchase price is because contamination is known or believed to be present at the *property*? Not Applicable

5. Commonly known or reasonably ascertainable information about the *property* (40 DFR 312.30).
Are you aware of commonly known or *reasonable ascertainable* information about the *property* that would help the *environmental professional* to identify conditions indicative of releases or threatened releases? For example, as *user*,

a) Do you know the past uses of the *property*? Yes
b) Do you know of specific chemicals that are present or once were present at the *property*? Yes
c) Do you know of spills or other chemical releases that have taken place at the *property*? No
d) Do you know of any environmental cleanups that have taken place at the *property*? No

6. The degree of obviousness of the presence or likely presence of contamination at the *property*, and the ability to detect the contamination by appropriate investigation (40 CFR 312.31).

[35] Landowner Liability Protections, or LLP's, is the term used to describe the three types of potential defenses to Superfund liability in EPA's Interim Guidance Regarding Criteria Landowners Must Meet in Order to Qualify for Bona Fide Prospective Purchaser, Contiguous Property Owner, or Innocent Landowner Limitations on CERCLA Liability ("Common Elements" Guide) issued on March 6, 2003.
[36] P.L. 107-118.

Based on your knowledge and experience related to the *property* are there any *obvious* indicators that point to the presence or likely presence of releases at the *property*? No

Appendix D

Environmental Database Report

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Vail Dam Phase I ESA
Vail Dam Phase I ESA
Temecula, CA 92592

Inquiry Number: 6025303.10s
April 01, 2020

EDR Area / Corridor Report

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

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Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

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EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-13), the ASTM Standard Practice for Environmental Site Assessments for Forestland or Rural Property (E 2247-16), the ASTM Standard Practice for Limited Environmental Due Diligence: Transaction Screen Process (E 1528-14) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

SUBJECT PROPERTY INFORMATION

ADDRESS

VAIL DAM PHASE I ESA
TEMECULA, CA 92592

TARGET PROPERTY SEARCH RESULTS

The Target Property was identified in the following databases.

Page Numbers and Map Identifcations refer to the EDR Area/Corridor Report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

ADDITIONAL ENVIRONMENTAL RECORDS

Other Ascertainable Records

FINDS: Facility Index System/Facility Registry System

A review of the FINDS list, as provided by EDR, and dated 11/22/2019 has revealed that there is 1 FINDS site within the requested target property.

Site	Address	Map ID / Focus Map(s)	Page
RCWD VDC CHLORAMINAT Registry ID:: 110065451273	37205 DE PORTOLA RD	A1 / 1	19

HAZNET: Facility and Manifest Data

A review of the HAZNET list, as provided by EDR, and dated 12/31/2017 has revealed that there is 1 HAZNET site within the requested target property.

Site	Address	Map ID / Focus Map(s)	Page
LH WOODS & SONS INC GEPAID: CAL000348903	***37205 DE PORTOLA RD***	***A2 / 1***	***19***

EXECUTIVE SUMMARY

CIWQS: California Integrated Water Quality System

A review of the CIWQS list, as provided by EDR, and dated 12/03/2019 has revealed that there is 1 CIWQS site within the requested target property.

Site	Address	Map ID / Focus Map(s)	Page
VAIL LAKE TRANSMISSI	37205 DE PORTOLA RD	A3 / 1	26

CERS: CERS

A review of the CERS list, as provided by EDR, and dated 10/21/2019 has revealed that there is 1 CERS site within the requested target property.

Site	Address	Map ID / Focus Map(s)	Page
LH WOODS & SONS INC	***37205 DE PORTOLA RD***	***A2 / 1***	***19***

HWTS: Hazardous Waste Tracking System

A review of the HWTS list, as provided by EDR, and dated 10/15/2019 has revealed that there is 1 HWTS site within the requested target property.

Site	Address	Map ID / Focus Map(s)	Page
LH WOODS & SONS INC	***37205 DE PORTOLA RD***	***A2 / 1***	***19***

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified in the following databases.

Page Numbers and Map Identifcations refer to the EDR Area/Corridor Report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

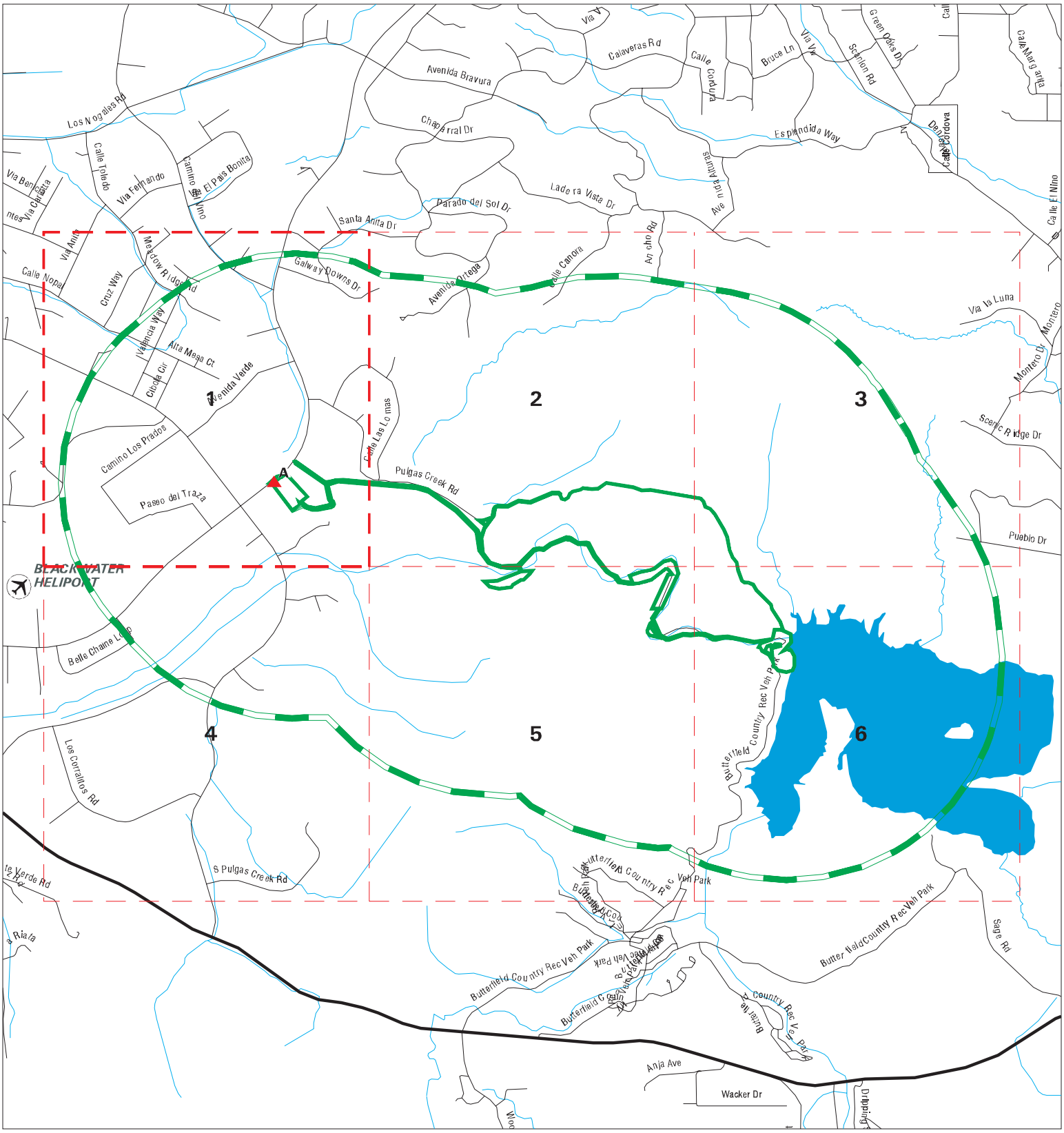
Unmappable (orphan) sites are not considered in the foregoing analysis.

MAPPED SITES SUMMARY

Target Property:
VAIL DAM PHASE I ESA
TEMECULA, CA 92592

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION
A1 / 1	RCWD VDC CHLORAMINAT	37205 DE PORTOLA RD	FINDS	TP
A2 / 1	LH WOODS & SONS INC	37205 DE PORTOLA RD	HAZNET, CERS, HWTS	TP
A3 / 1	VAIL LAKE TRANSMISSI	37205 DE PORTOLA RD	CIWQS	TP

Key Map - 6025303.10s



Sites
Target Property
Search Buffer
Focus Map - No Sites
Focus Map - Sites
National Priority List Sites
Areas of Concern
Dept. Defense Sites
Indian Reservations BIA

0 1/2 1 Miles

SITE NAME: Vail Dam Phase I ESA	CLIENT: AECOM
ADDRESS: Vail Dam Phase I ESA	CONTACT: Sarah Perhala
CITY/STATE: Temecula CA	INQUIRY #: 6025303.10s
ZIP: 92592	DATE: 04/01/20 11:10 AM

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MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
STANDARD ENVIRONMENTAL RECORDS								
Federal NPL site list								
NPL	1.000		0	0	0	0	NR	0
Proposed NPL	1.000		0	0	0	0	NR	0
NPL LIENS	1.000		0	0	0	0	NR	0
Federal Delisted NPL site list								
Delisted NPL	1.000		0	0	0	0	NR	0
Federal CERCLIS list								
FEDERAL FACILITY	0.500		0	0	0	NR	NR	0
SEMS	0.500		0	0	0	NR	NR	0
Federal CERCLIS NFRAP site list								
SEMS-ARCHIVE	0.500		0	0	0	NR	NR	0
Federal RCRA CORRACTS facilities list								
CORRACTS	1.000		0	0	0	0	NR	0
Federal RCRA non-CORRACTS TSD facilities list								
RCRA-TSDF	0.500		0	0	0	NR	NR	0
Federal RCRA generators list								
RCRA-LQG	0.250		0	0	NR	NR	NR	0
RCRA-SQG	0.250		0	0	NR	NR	NR	0
RCRA-VSQG	0.250		0	0	NR	NR	NR	0
Federal institutional controls / engineering controls registries								
LUCIS	0.500		0	0	0	NR	NR	0
US ENG CONTROLS	0.500		0	0	0	NR	NR	0
US INST CONTROLS	0.500		0	0	0	NR	NR	0
Federal ERNS list								
ERNS	TP		NR	NR	NR	NR	NR	0
State- and tribal - equivalent NPL								
RESPONSE	1.000		0	0	0	0	NR	0
State- and tribal - equivalent CERCLIS								
ENVIROSTOR	1.000		0	0	0	0	NR	0
State and tribal landfill and/or solid waste disposal site lists								
SWF/LF	0.500		0	0	0	NR	NR	0
State and tribal leaking storage tank lists								
LUST	0.500		0	0	0	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
INDIAN LUST	0.500		0	0	0	NR	NR	0
CPS-SLIC	0.500		0	0	0	NR	NR	0
State and tribal registered storage tank lists								
FEMA UST	0.250		0	0	NR	NR	NR	0
UST	0.250		0	0	NR	NR	NR	0
AST	0.250		0	0	NR	NR	NR	0
INDIAN UST	0.250		0	0	NR	NR	NR	0
State and tribal voluntary cleanup sites								
VCP	0.500		0	0	0	NR	NR	0
INDIAN VCP	0.500		0	0	0	NR	NR	0
State and tribal Brownfields sites								
BROWNFIELDS	0.500		0	0	0	NR	NR	0
ADDITIONAL ENVIRONMENTAL RECORDS								
Local Brownfield lists								
US BROWNFIELDS	0.500		0	0	0	NR	NR	0
Local Lists of Landfill / Solid Waste Disposal Sites								
WMUDS/SWAT	0.500		0	0	0	NR	NR	0
SWRCY	0.500		0	0	0	NR	NR	0
HAULERS	TP		NR	NR	NR	NR	NR	0
INDIAN ODI	0.500		0	0	0	NR	NR	0
ODI	0.500		0	0	0	NR	NR	0
DEBRIS REGION 9	0.500		0	0	0	NR	NR	0
IHS OPEN DUMPS	0.500		0	0	0	NR	NR	0
Local Lists of Hazardous waste / Contaminated Sites								
US HIST CDL	TP		NR	NR	NR	NR	NR	0
HIST Cal-Sites	1.000		0	0	0	0	NR	0
SCH	0.250		0	0	NR	NR	NR	0
CDL	TP		NR	NR	NR	NR	NR	0
Toxic Pits	1.000		0	0	0	0	NR	0
CERS HAZ WASTE	0.250		0	0	NR	NR	NR	0
US CDL	TP		NR	NR	NR	NR	NR	0
PFAS	0.500		0	0	0	NR	NR	0
Local Lists of Registered Storage Tanks								
SWEEPS UST	0.250		0	0	NR	NR	NR	0
HIST UST	0.250		0	0	NR	NR	NR	0
CA FID UST	0.250		0	0	NR	NR	NR	0
CERS TANKS	0.250		0	0	NR	NR	NR	0
Local Land Records								
LIENS	TP		NR	NR	NR	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
LIENS 2	TP		NR	NR	NR	NR	NR	0
DEED	0.500		0	0	0	NR	NR	0
Records of Emergency Release Reports								
HMIRS	TP		NR	NR	NR	NR	NR	0
CHMIRS	TP		NR	NR	NR	NR	NR	0
LDS	TP		NR	NR	NR	NR	NR	0
MCS	TP		NR	NR	NR	NR	NR	0
SPILLS 90	TP		NR	NR	NR	NR	NR	0
Other Ascertainable Records								
RCRA NonGen / NLR	0.250		0	0	NR	NR	NR	0
FUDS	1.000		0	0	0	0	NR	0
DOD	1.000		0	0	0	0	NR	0
SCRD DRYCLEANERS	0.500		0	0	0	NR	NR	0
US FIN ASSUR	TP		NR	NR	NR	NR	NR	0
EPA WATCH LIST	TP		NR	NR	NR	NR	NR	0
2020 COR ACTION	0.250		0	0	NR	NR	NR	0
TSCA	TP		NR	NR	NR	NR	NR	0
TRIS	TP		NR	NR	NR	NR	NR	0
SSTS	TP		NR	NR	NR	NR	NR	0
ROD	1.000		0	0	0	0	NR	0
RMP	TP		NR	NR	NR	NR	NR	0
RAATS	TP		NR	NR	NR	NR	NR	0
PRP	TP		NR	NR	NR	NR	NR	0
PADS	TP		NR	NR	NR	NR	NR	0
ICIS	TP		NR	NR	NR	NR	NR	0
FTTS	TP		NR	NR	NR	NR	NR	0
MLTS	TP		NR	NR	NR	NR	NR	0
COAL ASH DOE	TP		NR	NR	NR	NR	NR	0
COAL ASH EPA	0.500		0	0	0	NR	NR	0
PCB TRANSFORMER	TP		NR	NR	NR	NR	NR	0
RADINFO	TP		NR	NR	NR	NR	NR	0
HIST FTTS	TP		NR	NR	NR	NR	NR	0
DOT OPS	TP		NR	NR	NR	NR	NR	0
CONSENT	1.000		0	0	0	0	NR	0
INDIAN RESERV	1.000		0	0	0	0	NR	0
FUSRAP	1.000		0	0	0	0	NR	0
UMTRA	0.500		0	0	0	NR	NR	0
LEAD SMELTERS	TP		NR	NR	NR	NR	NR	0
US AIRS	TP		NR	NR	NR	NR	NR	0
US MINES	0.250		0	0	NR	NR	NR	0
ABANDONED MINES	0.250		0	0	NR	NR	NR	0
FINDS	TP	1	NR	NR	NR	NR	NR	1
UXO	1.000		0	0	0	0	NR	0
ECHO	TP		NR	NR	NR	NR	NR	0
DOCKET HWC	TP		NR	NR	NR	NR	NR	0
FUELS PROGRAM	0.250		0	0	NR	NR	NR	0
CA BOND EXP. PLAN	1.000		0	0	0	0	NR	0
Cortese	0.500		0	0	0	NR	NR	0
CUPA Listings	0.250		0	0	NR	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
DRYCLEANERS	0.250		0	0	NR	NR	NR	0
EMI	TP		NR	NR	NR	NR	NR	0
ENF	TP		NR	NR	NR	NR	NR	0
Financial Assurance	TP		NR	NR	NR	NR	NR	0
HAZNET	TP	1	NR	NR	NR	NR	NR	1
ICE	TP		NR	NR	NR	NR	NR	0
HIST CORTESE	0.500		0	0	0	NR	NR	0
HWP	1.000		0	0	0	0	NR	0
HWT	0.250		0	0	NR	NR	NR	0
MINES	0.250		0	0	NR	NR	NR	0
MWMP	0.250		0	0	NR	NR	NR	0
NPDES	TP		NR	NR	NR	NR	NR	0
PEST LIC	TP		NR	NR	NR	NR	NR	0
PROC	0.500		0	0	0	NR	NR	0
Notify 65	1.000		0	0	0	0	NR	0
UIC	TP		NR	NR	NR	NR	NR	0
UIC GEO	TP		NR	NR	NR	NR	NR	0
WASTEWATER PITS	0.500		0	0	0	NR	NR	0
WDS	TP		NR	NR	NR	NR	NR	0
WIP	0.250		0	0	NR	NR	NR	0
MILITARY PRIV SITES	TP		NR	NR	NR	NR	NR	0
PROJECT	TP		NR	NR	NR	NR	NR	0
WDR	TP		NR	NR	NR	NR	NR	0
CIWQS	TP	1	NR	NR	NR	NR	NR	1
CERS	TP	1	NR	NR	NR	NR	NR	1
NON-CASE INFO	TP		NR	NR	NR	NR	NR	0
OTHER OIL GAS	TP		NR	NR	NR	NR	NR	0
PROD WATER PONDS	TP		NR	NR	NR	NR	NR	0
SAMPLING POINT	TP		NR	NR	NR	NR	NR	0
WELL STIM PROJ	TP		NR	NR	NR	NR	NR	0
MINES MRDS	TP		NR	NR	NR	NR	NR	0
HWTS	TP	1	NR	NR	NR	NR	NR	1
EDR HIGH RISK HISTORICAL RECORDS								
EDR Exclusive Records								
EDR MGP	1.000		0	0	0	0	NR	0
EDR Hist Auto	0.125		0	NR	NR	NR	NR	0
EDR Hist Cleaner	0.125		0	NR	NR	NR	NR	0
EDR RECOVERED GOVERNMENT ARCHIVES								
Exclusive Recovered Govt. Archives								
RGA LF	TP		NR	NR	NR	NR	NR	0
RGA LUST	TP		NR	NR	NR	NR	NR	0
- Totals --		5	0	0	0	0	0	5

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

Focus Map - 1 - 6025303.10s



Sites
Target Property
Search Buffer
Focus Map - No Sites
Focus Map - Sites
Power Line
National Priority List Sites
Areas of Concern
Dept. Defense Sites
Indian Reservations BIA

0 1/8 1/4 Miles

SITE NAME: Vail Dam Phase I ESA	CLIENT: AECOM
ADDRESS: Vail Dam Phase I ESA	CONTACT: Sarah Perhala
CITY/STATE: Temecula CA	INQUIRY #: 6025303.10s
ZIP: 92592	DATE: 04/01/20

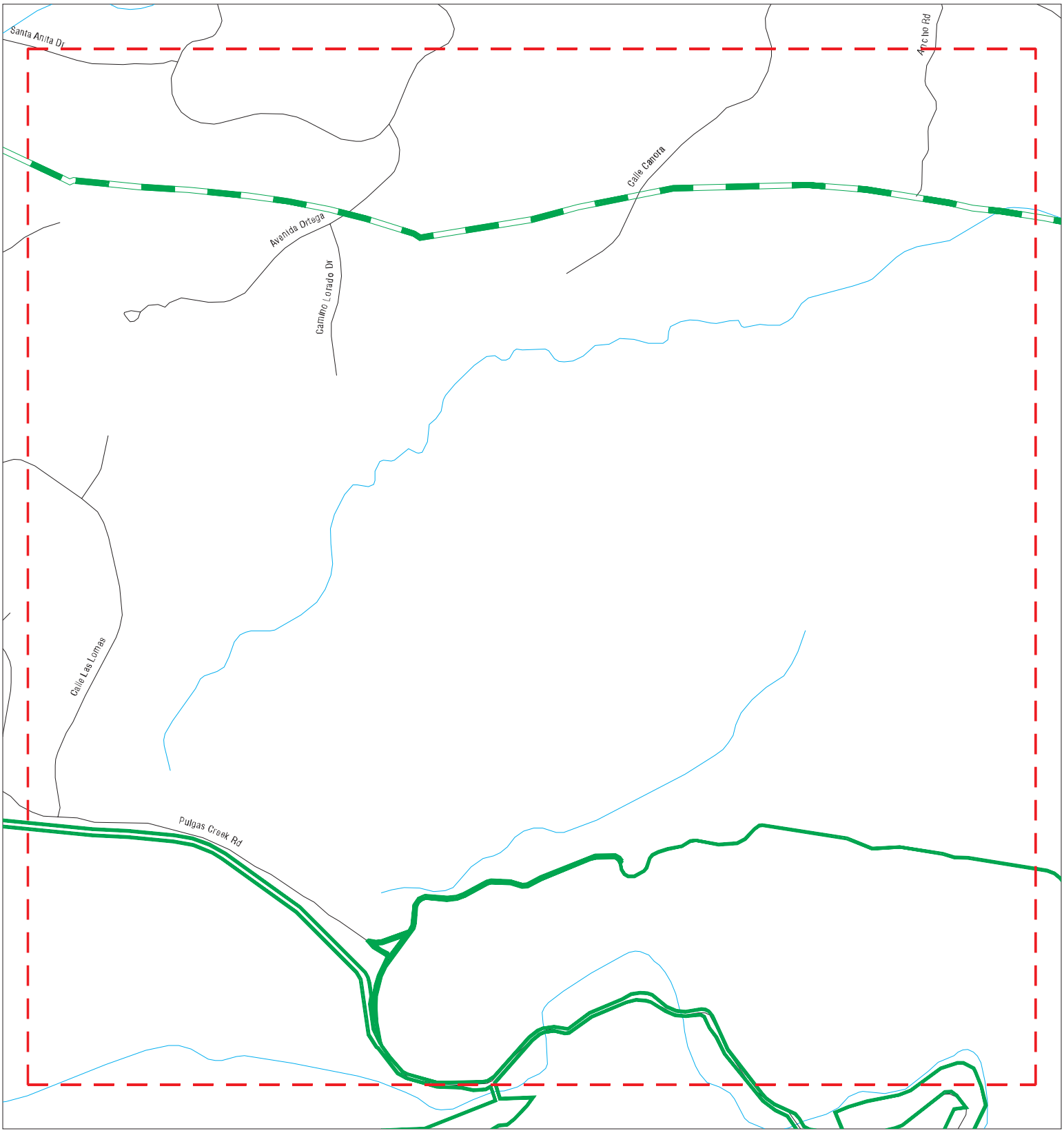
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MAPPED SITES SUMMARY - FOCUS MAP 1

Target Property:
VAIL DAM PHASE I ESA
TEMECULA, CA 92592

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION
A1 / 1	RCWD VDC CHLORAMINAT	37205 DE PORTOLA RD	FINDS	TP
A2 / 1	LH WOODS & SONS INC	37205 DE PORTOLA RD	HAZNET, CERS, HWTS	TP
A3 / 1	VAIL LAKE TRANSMISSI	37205 DE PORTOLA RD	CIWQS	TP

Focus Map - 2 - 6025303.10s



Sites
Target Property
Search Buffer
Focus Map - No Sites
Focus Map - Sites
Power Line
National Priority List Sites
Areas of Concern
Dept. Defense Sites
Indian Reservations BIA

0 1/8 1/4 Miles

SITE NAME: Vail Dam Phase I ESA	CLIENT: AECOM
ADDRESS: Vail Dam Phase I ESA	CONTACT: Sarah Perhala
CITY/STATE: Temecula CA	INQUIRY #: 6025303.10s
ZIP: 92592	DATE: 04/01/20

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MAPPED SITES SUMMARY - FOCUS MAP 2

Target Property:
VAIL DAM PHASE I ESA
TEMECULA, CA 92592

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION

NO MAPPED SITES FOUND

Focus Map - 3 - 6025303.10s



Sites
Target Property
Search Buffer
Focus Map - No Sites
Focus Map - Sites
Power Line
National Priority List Sites
Areas of Concern
Dept. Defense Sites
Indian Reservations BIA

0 1/8 1/4 Miles

SITE NAME: Vail Dam Phase I ESA	CLIENT: AECOM
ADDRESS: Vail Dam Phase I ESA	CONTACT: Sarah Perhala
CITY/STATE: Temecula CA	INQUIRY #: 6025303.10s
ZIP: 92592	DATE: 04/01/20

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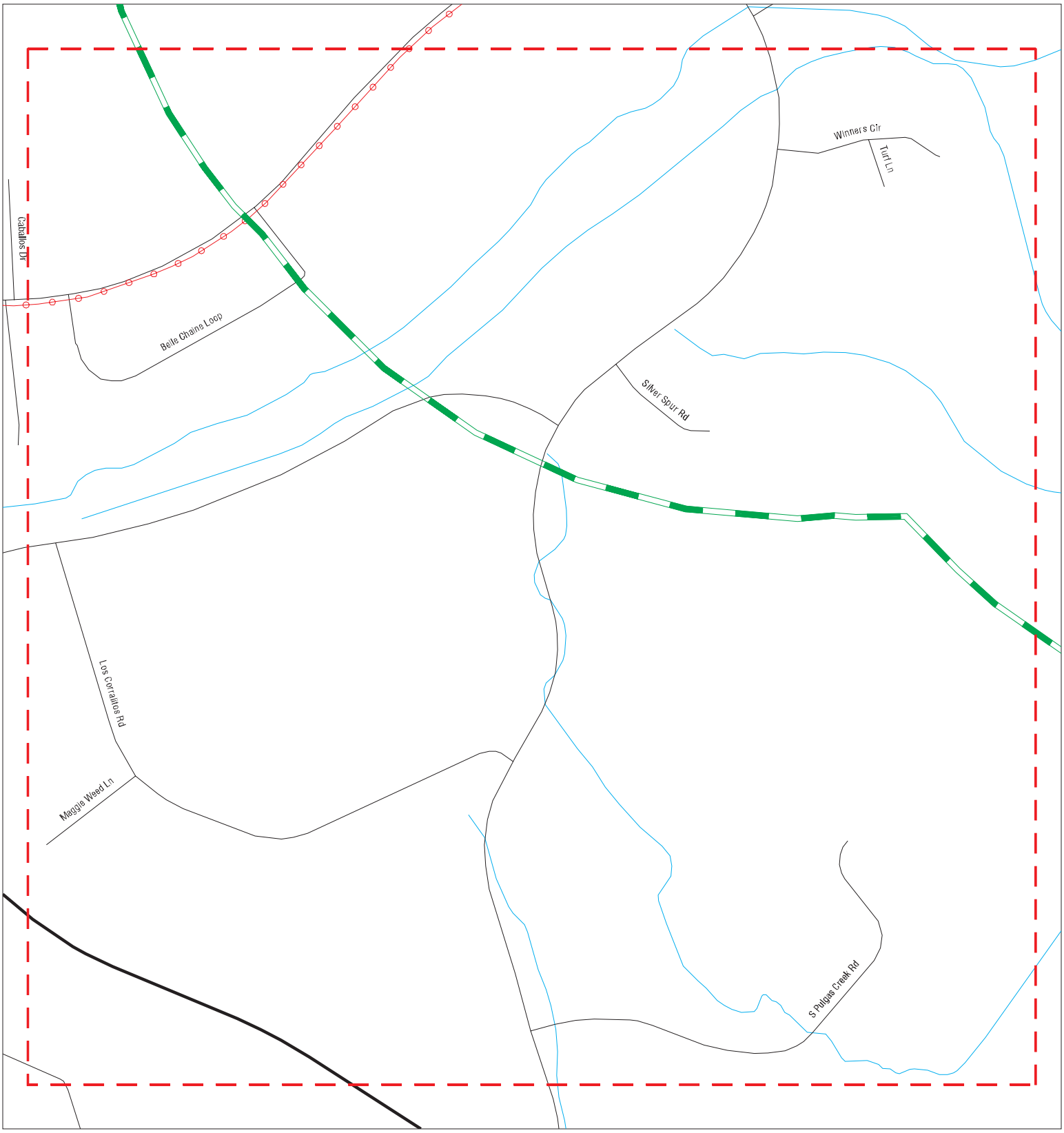
MAPPED SITES SUMMARY - FOCUS MAP 3

Target Property:
VAIL DAM PHASE I ESA
TEMECULA, CA 92592

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION

NO MAPPED SITES FOUND

Focus Map - 4 - 6025303.10s



Sites
Target Property
Search Buffer
Focus Map - No Sites
Focus Map - Sites
Power Line
National Priority List Sites
Areas of Concern
Dept. Defense Sites
Indian Reservations BIA

0 1/8 1/4 Miles

SITE NAME: Vail Dam Phase I ESA	CLIENT: AECOM
ADDRESS: Vail Dam Phase I ESA	CONTACT: Sarah Perhala
CITY/STATE: Temecula CA	INQUIRY #: 6025303.10s
ZIP: 92592	DATE: 04/01/20

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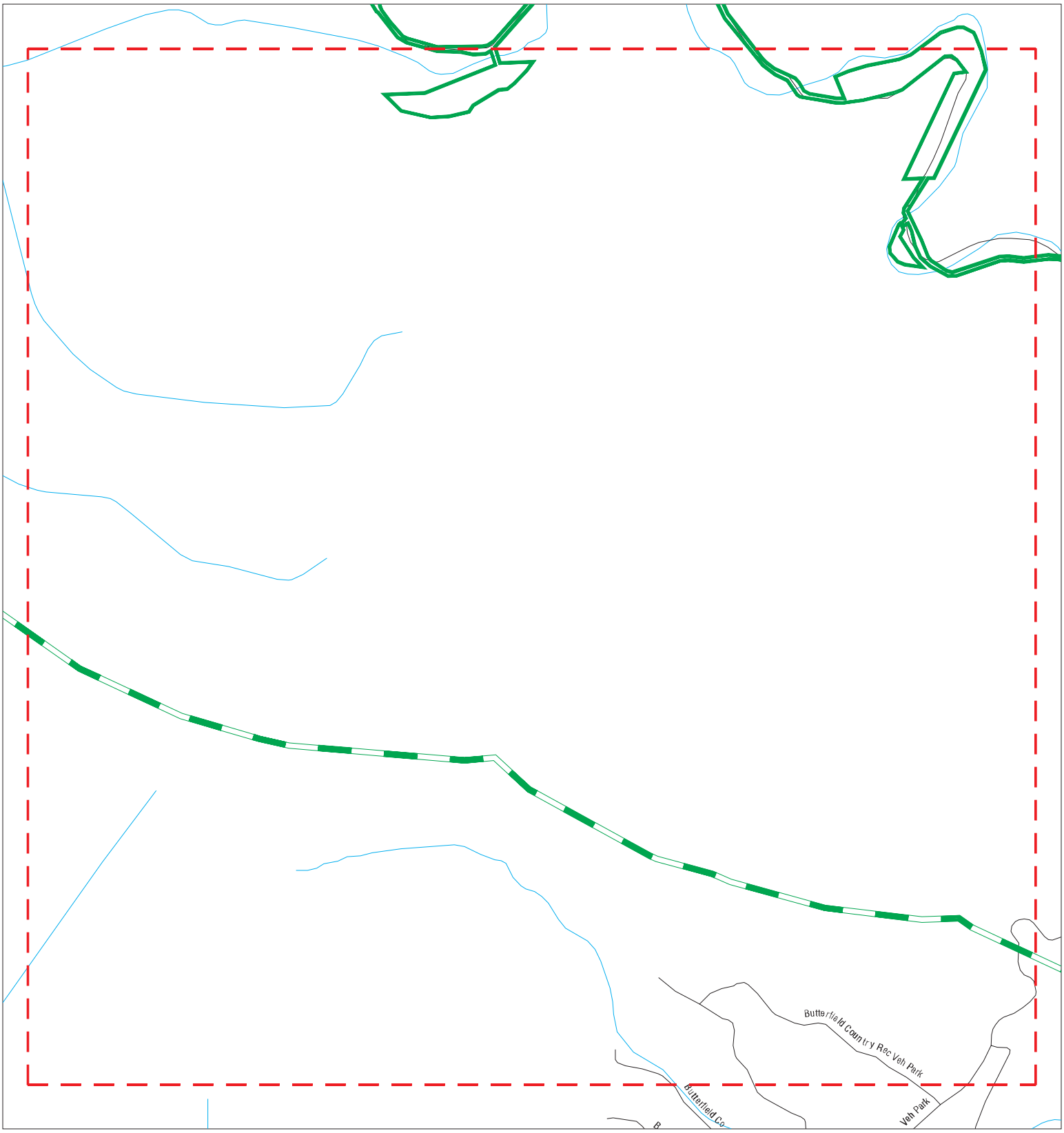
MAPPED SITES SUMMARY - FOCUS MAP 4

Target Property:
VAIL DAM PHASE I ESA
TEMECULA, CA 92592

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION

NO MAPPED SITES FOUND

Focus Map - 5 - 6025303.10s



Sites
Target Property
Search Buffer
Focus Map - No Sites
Focus Map - Sites
Power Line
National Priority List Sites
Areas of Concern
Dept. Defense Sites
Indian Reservations BIA

0 1/8 1/4 Miles

SITE NAME: Vail Dam Phase I ESA	CLIENT: AECOM
ADDRESS: Vail Dam Phase I ESA	CONTACT: Sarah Perhala
CITY/STATE: Temecula CA	INQUIRY #: 6025303.10s
ZIP: 92592	DATE: 04/01/20

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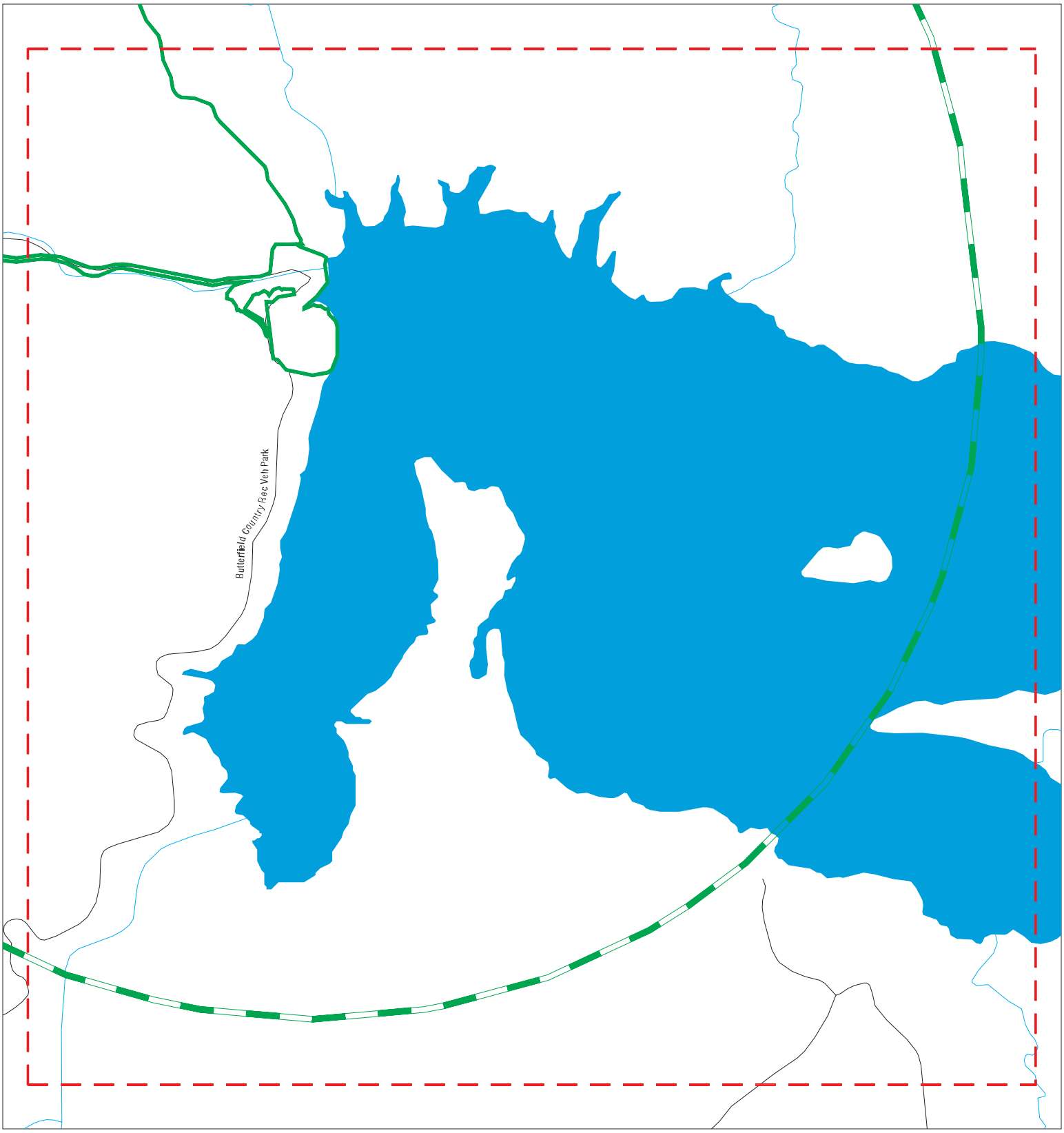
MAPPED SITES SUMMARY - FOCUS MAP 5

Target Property:
VAIL DAM PHASE I ESA
TEMECULA, CA 92592

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION

NO MAPPED SITES FOUND

Focus Map - 6 - 6025303.10s



Sites
Target Property
Search Buffer
Focus Map - No Sites
Focus Map - Sites
Power Line
National Priority List Sites
Areas of Concern
Dept. Defense Sites
Indian Reservations BIA

0 1/8 1/4 Miles

SITE NAME: Vail Dam Phase I ESA	CLIENT: AECOM
ADDRESS: Vail Dam Phase I ESA	CONTACT: Sarah Perhala
CITY/STATE: Temecula CA	INQUIRY #: 6025303.10s
ZIP: 92592	DATE: 04/01/20

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MAPPED SITES SUMMARY - FOCUS MAP 6

Target Property:
VAIL DAM PHASE I ESA
TEMECULA, CA 92592

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION

NO MAPPED SITES FOUND

A1 **RCWD VDC CHLORAMINATION** **FINDS** **1023256100**
Target **37205 DE PORTOLA RD** **N/A**
Property **TEMECULA, CA 92591**

Site 1 of 3 in cluster A

Actual: **1256 ft.**

Focus Map: **1**

FINDS:
Registry ID: 110065451273
Facility URL: http://ofmpub.epa.gov/enviro/fii_query_detail.disp_program_facility?p_registry_id=110065451273

Environmental Interest/Information System:
STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

A2 **LH WOODS & SONS INC - JOB 224 FIELD OFFICE** **HAZNET** **S113157774**
Target **37205 DE PORTOLA RD** **CERS** **N/A**
Property **TEMECULA, CA 92592** **HWTS**

Site 2 of 3 in cluster A

Actual: **1256 ft.**

Focus Map: **1**

HAZNET:

Name:	LH WOODS & SONS INC - JOB 224 FIELD OFFICE
Address:	37205 DE PORTOLA RD
Address 2:	Not reported
City,State,Zip:	TEMECULA, CA 92592
Contact:	MARK WILLIAMS
Telephone:	7605995500
Mailing Name:	Not reported
Mailing Address:	2115 LA MIRADA DR
Year:	2011
Gepaid:	CAL000348903
TSD EPA ID:	CAT080013352
CA Waste Code:	213 - Hydrocarbon solvents (benzene, hexane, Stoddard, Etc.)
Disposal Method:	H039 - Other Recovery Of Reclamation For Reuse Including Acid Regeneration, Organics Recovery Ect
Tons:	0.18765
Year:	2011
Gepaid:	CAL000348903
TSD EPA ID:	CAD097030993
CA Waste Code:	352 - Other organic solids
Disposal Method:	H141 - Storage, Bulking, And/Or Transfer Off Site--No Treatment/Reovery (H010-H129) Or (H131-H135)
Tons:	0.2

Additional Info:

Year:	2011
Gen EPA ID:	CAL000348903
Shipment Date:	20110721
Creation Date:	10/19/2011 18:30:11
Receipt Date:	20110801
Manifest ID:	008136303JJK
Trans EPA ID:	CAD028277036
Trans Name:	ASBURY ENVIRONMENTAL SERVICES
Trans 2 EPA ID:	Not reported

LH WOODS & SONS INC - JOB 224 FIELD OFFICE (Continued) **S113157774**

Trans 2 Name:	Not reported
TSDF EPA ID:	CAT080013352
Trans Name:	DEMENNO / KERDOON
TSDF Alt EPA ID:	Not reported
TSDF Alt Name:	Not reported
CA Waste Code:	213 - Hydrocarbon solvents (benzene, hexane, Stoddard, etc.
RCRA Code:	D018
Disposal Method:	H039 - Other Recovery Of Reclamation For Reuse Including Acid Regeneration, Organics Recovery Ect
Quantity Tons:	0.18765
Waste Quantity:	45
Quantity Unit:	G
Additional Code 1:	D001
Additional Code 2:	Not reported
Additional Code 3:	Not reported
Additional Code 4:	Not reported
Additional Code 5:	Not reported
Shipment Date:	20110117
Creation Date:	3/30/2011 18:30:20
Receipt Date:	20110127
Manifest ID:	008032799JJK
Trans EPA ID:	CAD028277036
Trans Name:	ASBURY ENVIRONMENTAL SERVICES
Trans 2 EPA ID:	Not reported
Trans 2 Name:	Not reported
TSDF EPA ID:	CAD097030993
Trans Name:	SIEMENS WATER TECHNOLOGIES CORP
TSDF Alt EPA ID:	Not reported
TSDF Alt Name:	Not reported
CA Waste Code:	352 - Other organic solids
RCRA Code:	Not reported
Disposal Method:	H141 - Storage, Bulking, And/Or Transfer Off Site--No Treatment/Reovery (H010-H129) Or (H131-H135)
Quantity Tons:	0.2
Waste Quantity:	400
Quantity Unit:	P
Additional Code 1:	Not reported
Additional Code 2:	Not reported
Additional Code 3:	Not reported
Additional Code 4:	Not reported
Additional Code 5:	Not reported

CERS:

Name:	RCWD VDC CHLORAMINATION, PONDS AND VAIL LAKE PUMP STATION
Address:	37205 DE PORTOLA RD
City,State,Zip:	TEMECULA, CA 92591
Site ID:	60695
CERS ID:	10329427
CERS Description:	Chemical Storage Facilities

Violations:

Site ID:	60695
Site Name:	RCWD VDC Chloramination, Ponds and Vail Lake Pump Station
Violation Date:	07-30-2015
Citation:	HSC 6.95 Multiple - California Health and Safety Code, Chapter 6.95, Section(s) Multiple

LH WOODS & SONS INC - JOB 224 FIELD OFFICE (Continued) **S113157774**

Violation Description:	Business Plan Program - Administration/Documentation - General
Violation Notes:	Returned to compliance on 08/04/2015.
Violation Division:	Riverside County Department of Env Health
Violation Program:	HMRRP
Violation Source:	CERS
Site ID:	60695
Site Name:	RCWD VDC Chloramination, Ponds and Vail Lake Pump Station
Violation Date:	07-30-2015
Citation:	19 CCR 4.5 2755.1(b) - California Code of Regulations, Title 19, Chapter 4.5, Section(s) 2755.1(b)
Violation Description:	Failure to ensure that the process is designed in compliance with recognized and generally accepted good engineering practices.
Violation Notes:	Returned to compliance on 08/06/2015.
Violation Division:	Riverside County Department of Env Health
Violation Program:	CalARP
Violation Source:	CERS
Site ID:	60695
Site Name:	RCWD VDC Chloramination, Ponds and Vail Lake Pump Station
Violation Date:	01-02-2019
Citation:	HSC 6.95 25508.1(a)-(f) - California Health and Safety Code, Chapter 6.95, Section(s) 25508.1(a)-(f)
Violation Description:	Failure to electronically update business plan within 30 days of any one of the following events: A 100 percent or more increase in the quantity of a previously disclosed material. Any handling of a previously undisclosed hazardous materials at or above reportable quantities. A change of business address, business ownership, or business name. A substantial change in the handler's operations that requires modification to any portion of the business plan.
Violation Notes:	Returned to compliance on 03/21/2019. OBSERVATION: A previously undisclosed material was brought on site more than 30 days prior to the inspection. A diesel generator has been added to this site near the ponds. CORRECTIVE ACTION: Owner/operator shall update and submit a new hazardous material inventory page in the statewide information management system at https://cers.calepa.ca.gov for each chemical stored on site at or above threshold quantities.
Violation Division:	Riverside County Department of Env Health
Violation Program:	HMRRP
Violation Source:	CERS
Site ID:	60695
Site Name:	RCWD VDC Chloramination, Ponds and Vail Lake Pump Station
Violation Date:	01-02-2019
Citation:	HSC 6.95 25508(a)(1) - California Health and Safety Code, Chapter 6.95, Section(s) 25508(a)(1)
Violation Description:	Failure to complete and electronically submit a site map with all required content.
Violation Notes:	Returned to compliance on 03/21/2019. OBSERVATION: Site map submitted in CERS was missing a diesel generator has been added to this site near the ponds. CORRECTIVE ACTION: Owner/operator shall complete an annotated site map which includes all elements outlines in CA Health and Safety Code and submit into the statewide information management system at http://cers.calepa.ca.gov.
Violation Division:	Riverside County Department of Env Health
Violation Program:	HMRRP
Violation Source:	CERS

LH WOODS & SONS INC - JOB 224 FIELD OFFICE (Continued) **S113157774**

Site ID: 60695
Site Name: RCWD VDC Chloramination, Ponds and Vail Lake Pump Station
Violation Date: 01-02-2019
Citation: HSC 6.95 25508(a)(1) - California Health and Safety Code, Chapter 6.95, Section(s) 25508(a)(1)
Violation Description: Failure to complete and electronically submit hazardous material inventory information for all reportable hazardous materials on site at or above reportable quantities.
Violation Notes: Returned to compliance on 03/21/2019. OBSERVATION: The most recent business plan submission in the statewide information management system (CERS) failed to address a diesel generator has been added to this site near the ponds. CORRECTIVE ACTION: Owner/operator shall complete a chemical inventory page for all reportable hazardous materials on site and submit to the statewide information management system at http://cers.calepa.ca.gov.
Violation Division: Riverside County Department of Env Health
Violation Program: HMRRP
Violation Source: CERS

Site ID: 60695
Site Name: RCWD VDC Chloramination, Ponds and Vail Lake Pump Station
Violation Date: 01-02-2019
Citation: HSC 6.95 25508(a)(1) - California Health and Safety Code, Chapter 6.95, Section(s) 25508(a)(1)
Violation Description: Failure to complete and electronically submit a business plan when storing/handling a hazardous material at or above reportable quantities.
Violation Notes: Returned to compliance on 03/21/2019. OBSERVATION: An incomplete Business Plan was submitted into the statewide information management system. Specifically, a diesel generator has been added to this site near the ponds. CORRECTIVE ACTION: Owner/operator shall submit all required Business Plan sections into the statewide information management system at http://cers.calepa.ca.gov.
Violation Division: Riverside County Department of Env Health
Violation Program: HMRRP
Violation Source: CERS

Evaluation:
Eval General Type: Compliance Evaluation Inspection
Eval Date: 07-30-2015
Violations Found: Yes
Eval Type: Routine done by local agency
Eval Notes: RCWD Inspections w/Justin
Eval Division: Riverside County Department of Env Health
Eval Program: CalARP
Eval Source: CERS

Eval General Type: Compliance Evaluation Inspection
Eval Date: 07-30-2015
Violations Found: Yes
Eval Type: Routine done by local agency
Eval Notes: Not reported
Eval Division: Riverside County Department of Env Health
Eval Program: HMRRP
Eval Source: CERS

Eval General Type: Compliance Evaluation Inspection

LH WOODS & SONS INC - JOB 224 FIELD OFFICE (Continued) **S113157774**

Eval Date:	01-02-2019
Violations Found:	Yes
Eval Type:	Routine done by local agency
Eval Notes:	NOTE: Fire Extinguisher under charged inside building
Eval Division:	Riverside County Department of Env Health
Eval Program:	HMRRP
Eval Source:	CERS

Enforcement Action:

Site ID:	60695
Site Name:	RCWD VDC Chloramination, Ponds and Vail Lake Pump Station
Site Address:	37205 DE PORTOLA RD
Site City:	TEMECULA
Site Zip:	92591
Enf Action Date:	07-30-2015
Enf Action Type:	Notice of Violation (Unified Program)
Enf Action Description:	Notice of Violation Issued by the Inspector at the Time of Inspection
Enf Action Notes:	Not reported
Enf Action Division:	Riverside County Department of Env Health
Enf Action Program:	CalARP
Enf Action Source:	CERS

Site ID:	60695
Site Name:	RCWD VDC Chloramination, Ponds and Vail Lake Pump Station
Site Address:	37205 DE PORTOLA RD
Site City:	TEMECULA
Site Zip:	92591
Enf Action Date:	07-30-2015
Enf Action Type:	Notice of Violation (Unified Program)
Enf Action Description:	Notice of Violation Issued by the Inspector at the Time of Inspection
Enf Action Notes:	Not reported
Enf Action Division:	Riverside County Department of Env Health
Enf Action Program:	HMRRP
Enf Action Source:	CERS

Affiliation:

Affiliation Type Desc:	CUPA District
Entity Name:	Riverside Cnty Env Health
Entity Title:	Not reported
Affiliation Address:	4065 County Circle Drive, Room 104
Affiliation City:	Riverside
Affiliation State:	CA
Affiliation Country:	Not reported
Affiliation Zip:	92503
Affiliation Phone:	(951) 358-5055

Affiliation Type Desc:	Environmental Contact
Entity Name:	Tom Greene
Entity Title:	Not reported
Affiliation Address:	P.O. Box 9017
Affiliation City:	Temecula
Affiliation State:	CA
Affiliation Country:	Not reported
Affiliation Zip:	92589-9017
Affiliation Phone:	Not reported

LH WOODS & SONS INC - JOB 224 FIELD OFFICE (Continued) **S113157774**

Affiliation Type Desc:	Parent Corporation
Entity Name:	Rancho California Water District
Entity Title:	Not reported
Affiliation Address:	Not reported
Affiliation City:	Not reported
Affiliation State:	Not reported
Affiliation Country:	Not reported
Affiliation Zip:	Not reported
Affiliation Phone:	Not reported

Affiliation Type Desc:	Document Preparer
Entity Name:	Thomas Greene
Entity Title:	Not reported
Affiliation Address:	Not reported
Affiliation City:	Not reported
Affiliation State:	Not reported
Affiliation Country:	Not reported
Affiliation Zip:	Not reported
Affiliation Phone:	Not reported

Affiliation Type Desc:	Property Owner
Entity Name:	Rancho California Water District
Entity Title:	Not reported
Affiliation Address:	P.O. Box 9017
Affiliation City:	Temecula
Affiliation State:	CA
Affiliation Country:	United States
Affiliation Zip:	92589-9017
Affiliation Phone:	(951) 296-6900

Affiliation Type Desc:	Facility Mailing Address
Entity Name:	Mailing Address
Entity Title:	Not reported
Affiliation Address:	PO Box 9017
Affiliation City:	Temecula
Affiliation State:	CA
Affiliation Country:	Not reported
Affiliation Zip:	92590
Affiliation Phone:	Not reported

Affiliation Type Desc:	Identification Signer
Entity Name:	Thomas Greene
Entity Title:	Operations Analyst
Affiliation Address:	Not reported
Affiliation City:	Not reported
Affiliation State:	Not reported
Affiliation Country:	Not reported
Affiliation Zip:	Not reported
Affiliation Phone:	Not reported

Affiliation Type Desc:	Legal Owner
Entity Name:	Rancho California Water Dist.
Entity Title:	Not reported
Affiliation Address:	P.O. Box 9017
Affiliation City:	Temecula
Affiliation State:	CA
Affiliation Country:	United States

LH WOODS & SONS INC - JOB 224 FIELD OFFICE (Continued) **S113157774**

Affiliation Zip:	92589-9017
Affiliation Phone:	(951) 296-6900
Affiliation Type Desc:	Operator
Entity Name:	Rancho California Water District
Entity Title:	Not reported
Affiliation Address:	Not reported
Affiliation City:	Not reported
Affiliation State:	Not reported
Affiliation Country:	Not reported
Affiliation Zip:	Not reported
Affiliation Phone:	(951) 296-6900

HWTS:

Name:	LH WOODS & SONS INC - JOB 224 FIELD OFFICE
Address:	37205 DE PORTOLA RD
Address 2:	Not reported
City,State,Zip:	TEMECULA, CA 92592
EPA ID:	CAL000348903
Inactive Date:	06/30/2011
Create Date:	12/22/2009
Last Act Date:	11/01/2012
Mailing Name:	Not reported
Mailing Address:	2115 LA MIRADA DR
Mailing Address 2:	Not reported
Mailing City,State,Zip:	VISTA, CA 920818830
Owner Name:	LH WOODS & SONS INC
Owner Address:	2115 LA MIRADA DR
Owner Address 2:	Not reported
Owner City,State,Zip:	VISTA, CA 920818830
Contact Name:	MARK WILLIAMS
Contact Address:	2115 LA MIRADA DR
Contact Address 2:	Not reported
City,State,Zip:	VISTA, CA 920818830

NAICS:

EPA ID:	CAL000348903
Create Date:	2009-12-22 10:03:18
NAICS Code:	23492
NAICS Description:	Power and Communication Transmission Line Construction
Issued EPA ID Date:	2009-12-22 10:03:18
Inactive Date:	2011-06-30 00:00:00
Facility Name:	LH WOODS & SONS INC - JOB 224 FIELD OFFICE
Facility Address:	37205 DE PORTOLA RD
Facility Address 2:	Not reported
Facility City:	TEMECULA
Facility County:	33
Facility State:	CA
Facility Zip:	92592

A3 **VAIL LAKE TRANSMISSION MAIN & PUMP STATION** **CIWQS** **S121687851**
Target **37205 DE PORTOLA RD** **N/A**
Property **TEMECULA, CA 92589**

Site 3 of 3 in cluster A

Actual:
1256 ft.

Focus Map:
1

CIWQS:

Name:	VAIL LAKE TRANSMISSION MAIN & PUMP STATION
Address:	37205 DE PORTOLA RD
City,State,Zip:	TEMECULA, CA 92589
Agency:	Rancho California Water District
Agency Address:	42135 Winchester Rd PO Box 9017, Temecula , CA 92589
Place/Project Type:	Construction - Utility: Water Transmission Main
SIC/NAICS:	Not reported
Region:	9
Program:	CONSTW
Regulatory Measure Status:	Terminated
Regulatory Measure Type:	Storm water construction
Order Number:	2009-0009-DWQ
WDID:	9 33C357046
NPDES Number:	CAS000002
Adoption Date:	Not reported
Effective Date:	12/23/2009
Termination Date:	03/02/2012
Expiration/Review Date:	Not reported
Design Flow:	Not reported
Major/Minor:	Not reported
Complexity:	Not reported
TTWQ:	Not reported
Enforcement Actions within 5 years:	0
Violations within 5 years:	0
Latitude:	33.52736
Longitude:	-116.98745

Count: 16 records

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
TEMECULA	S124663142	GREEN ACRES RANCH, INC	35750 DE PORTOLA ROAD	92592	HWTS
TEMECULA	S124629789	JOSH STEPHENSON	36400 DE PORTOLA RD	92592	HWTS
TEMECULA	S124577256	PALARMO ONOFRIA	35480 DE PORTOLA RD	92592	HWTS
TEMECULA	S124643166	GREEN ACRES RANCH, INC.	35750 DE PORTOLA RD	92592	HWTS
TEMECULA	S124626833	GREEN ACRES RANCH, INC.	35750 DE PORTOLA RD	92592	HWTS
TEMECULA	S111754811		REDHAWK PKWY X VAIL RANCH PKWY	92592	CHMIRS
TEMECULA	S105631582		VAIL PECK RD. / RED HAWK		CHMIRS
TEMECULA	1023253199	VAIL LAKE TRANSMISSION MAIN AND PUMP STATION	PULGAS CREEK ROAD	92592	FINDS
TEMECULA	1023273317	RCWD VDC WELL	37100 BLOCK DE PORTOLA RD	92592	FINDS
TEMECULA	S121669156	ROGERS RESIDENCE	DE PORTOLA RD	92592	CIWQS
TEMECULA	S121644952	HORSE RANCH & RESIDENCE 44155 DE PORTOLA RD	SEC BTWN DE PORTOLA RD & COLT RD	92592	CIWQS
TEMECULA	S121666687	RANCHO GLENOAKS PIPELINE	S OF LAKE SKINNER AND N OF VAIL LAKE	92592	CIWQS
TEMECULA	S121687855	VAIL RNCH TOWNE SQUARE	HWY 79 S AND MAHLON VAIL RD	92592	CIWQS
TEMECULA	S121683737	TRACT 24185	NW DE PORTOLA AND BUTTERFIELD		CIWQS
TEMECULA	S121633171	DE PORTOLA PROFESSIONAL CENTER	SEC DE PORTOLA & MARGARITA RD		CIWQS
TEMECULA	S121619556	ALOIA RESIDENCE	DE PORTOLA RD		CIWQS

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Number of Days to Update: Provides confirmation that EDR is reporting records that have been updated within 90 days from the date the government agency made the information available to the public.

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL: National Priority List

National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 01/30/2020
Date Data Arrived at EDR: 02/05/2020
Date Made Active in Reports: 02/14/2020
Number of Days to Update: 9

Source: EPA
Telephone: N/A
Last EDR Contact: 03/04/2020
Next Scheduled EDR Contact: 04/13/2020
Data Release Frequency: Quarterly

NPL Site Boundaries

Sources:

EPA's Environmental Photographic Interpretation Center (EPIC)
Telephone: 202-564-7333

EPA Region 1
Telephone 617-918-1143

EPA Region 6
Telephone: 214-655-6659

EPA Region 3
Telephone 215-814-5418

EPA Region 7
Telephone: 913-551-7247

EPA Region 4
Telephone 404-562-8033

EPA Region 8
Telephone: 303-312-6774

EPA Region 5
Telephone 312-886-6686

EPA Region 9
Telephone: 415-947-4246

EPA Region 10
Telephone 206-553-8665

Proposed NPL: Proposed National Priority List Sites

A site that has been proposed for listing on the National Priorities List through the issuance of a proposed rule in the Federal Register. EPA then accepts public comments on the site, responds to the comments, and places on the NPL those sites that continue to meet the requirements for listing.

Date of Government Version: 01/30/2020
Date Data Arrived at EDR: 02/05/2020
Date Made Active in Reports: 02/14/2020
Number of Days to Update: 9

Source: EPA
Telephone: N/A
Last EDR Contact: 03/04/2020
Next Scheduled EDR Contact: 04/13/2020
Data Release Frequency: Quarterly

NPL LIENS: Federal Superfund Liens

Federal Superfund Liens. Under the authority granted the USEPA by CERCLA of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner received notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/1991
Date Data Arrived at EDR: 02/02/1994
Date Made Active in Reports: 03/30/1994
Number of Days to Update: 56

Source: EPA
Telephone: 202-564-4267
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: No Update Planned

Federal Delisted NPL site list

Delisted NPL: National Priority List Deletions

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 01/30/2020
Date Data Arrived at EDR: 02/05/2020
Date Made Active in Reports: 02/14/2020
Number of Days to Update: 9

Source: EPA
Telephone: N/A
Last EDR Contact: 03/04/2020
Next Scheduled EDR Contact: 04/13/2020
Data Release Frequency: Quarterly

Federal CERCLIS list

FEDERAL FACILITY: Federal Facility Site Information listing

A listing of National Priority List (NPL) and Base Realignment and Closure (BRAC) sites found in the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) Database where EPA Federal Facilities Restoration and Reuse Office is involved in cleanup activities.

Date of Government Version: 04/03/2019
Date Data Arrived at EDR: 04/05/2019
Date Made Active in Reports: 05/14/2019
Number of Days to Update: 39

Source: Environmental Protection Agency
Telephone: 703-603-8704
Last EDR Contact: 01/03/2020
Next Scheduled EDR Contact: 04/13/2020
Data Release Frequency: Varies

SEMS: Superfund Enterprise Management System

SEMS (Superfund Enterprise Management System) tracks hazardous waste sites, potentially hazardous waste sites, and remedial activities performed in support of EPA's Superfund Program across the United States. The list was formerly know as CERCLIS, renamed to SEMS by the EPA in 2015. The list contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). This dataset also contains sites which are either proposed to or on the National Priorities List (NPL) and the sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 01/30/2020
Date Data Arrived at EDR: 02/05/2020
Date Made Active in Reports: 02/14/2020
Number of Days to Update: 9

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 02/05/2020
Next Scheduled EDR Contact: 04/27/2020
Data Release Frequency: Quarterly

Federal CERCLIS NFRAP site list

SEMS-ARCHIVE: Superfund Enterprise Management System Archive

SEMS-ARCHIVE (Superfund Enterprise Management System Archive) tracks sites that have no further interest under the Federal Superfund Program based on available information. The list was formerly known as the CERCLIS-NFRAP, renamed to SEMS ARCHIVE by the EPA in 2015. EPA may perform a minimal level of assessment work at a site while it is archived if site conditions change and/or new information becomes available. Archived sites have been removed and archived from the inventory of SEMS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list the site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. The decision does not necessarily mean that there is no hazard associated with a given site; it only means that. based upon available information, the location is not judged to be potential NPL site.

Date of Government Version: 01/30/2020
Date Data Arrived at EDR: 02/05/2020
Date Made Active in Reports: 02/14/2020
Number of Days to Update: 9

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 03/04/2020
Next Scheduled EDR Contact: 04/27/2020
Data Release Frequency: Quarterly

Federal RCRA CORRACTS facilities list

CORRACTS: Corrective Action Report

CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 12/16/2019
Date Data Arrived at EDR: 12/16/2019
Date Made Active in Reports: 12/20/2019
Number of Days to Update: 4

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 03/25/2020
Next Scheduled EDR Contact: 07/06/2020
Data Release Frequency: Quarterly

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF: RCRA - Treatment, Storage and Disposal

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Date of Government Version: 12/16/2019
Date Data Arrived at EDR: 12/16/2019
Date Made Active in Reports: 12/20/2019
Number of Days to Update: 4

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 03/25/2020
Next Scheduled EDR Contact: 07/06/2020
Data Release Frequency: Quarterly

Federal RCRA generators list

RCRA-LQG: RCRA - Large Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

Date of Government Version: 12/16/2019
Date Data Arrived at EDR: 12/16/2019
Date Made Active in Reports: 12/20/2019
Number of Days to Update: 4

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 03/25/2020
Next Scheduled EDR Contact: 07/06/2020
Data Release Frequency: Quarterly

RCRA-SQG: RCRA - Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

Date of Government Version: 12/16/2019
Date Data Arrived at EDR: 12/16/2019
Date Made Active in Reports: 12/20/2019
Number of Days to Update: 4

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 03/25/2020
Next Scheduled EDR Contact: 07/06/2020
Data Release Frequency: Quarterly

RCRA-VSQG: RCRA - Very Small Quantity Generators (Formerly Conditionally Exempt Small Quantity Generators)

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Very small quantity generators (VSQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

Date of Government Version: 12/16/2019
Date Data Arrived at EDR: 12/16/2019
Date Made Active in Reports: 12/20/2019
Number of Days to Update: 4

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 03/25/2020
Next Scheduled EDR Contact: 07/06/2020
Data Release Frequency: Quarterly

Federal institutional controls / engineering controls registries

LUCIS: Land Use Control Information System

LUCIS contains records of land use control information pertaining to the former Navy Base Realignment and Closure properties.

Date of Government Version: 11/04/2019
Date Data Arrived at EDR: 11/13/2019
Date Made Active in Reports: 01/28/2020
Number of Days to Update: 76

Source: Department of the Navy
Telephone: 843-820-7326
Last EDR Contact: 02/10/2020
Next Scheduled EDR Contact: 05/25/2020
Data Release Frequency: Varies

US ENG CONTROLS: Engineering Controls Sites List

A listing of sites with engineering controls in place. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.

Date of Government Version: 11/22/2019
Date Data Arrived at EDR: 11/22/2019
Date Made Active in Reports: 01/28/2020
Number of Days to Update: 67

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 02/20/2020
Next Scheduled EDR Contact: 06/08/2020
Data Release Frequency: Varies

US INST CONTROLS: Institutional Controls Sites List

A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

Date of Government Version: 11/22/2019
Date Data Arrived at EDR: 11/22/2019
Date Made Active in Reports: 01/28/2020
Number of Days to Update: 67

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 02/20/2020
Next Scheduled EDR Contact: 06/08/2020
Data Release Frequency: Varies

Federal ERNS list

ERNS: Emergency Response Notification System

Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 12/16/2019
Date Data Arrived at EDR: 12/19/2019
Date Made Active in Reports: 03/06/2020
Number of Days to Update: 78

Source: National Response Center, United States Coast Guard
Telephone: 202-267-2180
Last EDR Contact: 03/24/2020
Next Scheduled EDR Contact: 07/06/2020
Data Release Frequency: Quarterly

State- and tribal - equivalent NPL

RESPONSE: State Response Sites

Identifies confirmed release sites where DTSC is involved in remediation, either in a lead or oversight capacity. These confirmed release sites are generally high-priority and high potential risk.

Date of Government Version: 10/28/2019
Date Data Arrived at EDR: 10/29/2019
Date Made Active in Reports: 01/07/2020
Number of Days to Update: 70

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 01/28/2020
Next Scheduled EDR Contact: 05/11/2020
Data Release Frequency: Quarterly

State- and tribal - equivalent CERCLIS

ENVIROSTOR: EnviroStor Database

The Department of Toxic Substances Control's (DTSC's) Site Mitigation and Brownfields Reuse Program's (SMBRP's) EnviroStor database identifes sites that have known contamination or sites for which there may be reasons to investigate further. The database includes the following site types: Federal Superfund sites (National Priorities List (NPL)); State Response, including Military Facilities and State Superfund; Voluntary Cleanup; and School sites. EnviroStor provides similar information to the information that was available in CalSites, and provides additional site information, including, but not limited to, identification of formerly-contaminated properties that have been released for reuse, properties where environmental deed restrictions have been recorded to prevent inappropriate land uses, and risk characterization information that is used to assess potential impacts to public health and the environment at contaminated sites.

Date of Government Version: 10/28/2019
Date Data Arrived at EDR: 10/29/2019
Date Made Active in Reports: 01/07/2020
Number of Days to Update: 70

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 01/28/2020
Next Scheduled EDR Contact: 05/11/2020
Data Release Frequency: Quarterly

State and tribal landfill and/or solid waste disposal site lists

SWF/LF (SWIS): Solid Waste Information System

Active, Closed and Inactive Landfills. SWF/LF records typically contain an inve ntory of solid waste disposal facilities or landfills. These may be active or i nactive facilities or open dumps that failed to meet RCRA Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 11/11/2019
Date Data Arrived at EDR: 11/12/2019
Date Made Active in Reports: 01/08/2020
Number of Days to Update: 57

Source: Department of Resources Recycling and Recovery
Telephone: 916-341-6320
Last EDR Contact: 02/11/2020
Next Scheduled EDR Contact: 05/25/2020
Data Release Frequency: Quarterly

State and tribal leaking storage tank lists

LUST: Leaking Underground Fuel Tank Report (GEOTRACKER)

Leaking Underground Storage Tank (LUST) Sites included in GeoTracker. GeoTracker is the Water Boards data management system for sites that impact, or have the potential to impact, water quality in California, with emphasis on groundwater.

Date of Government Version: 12/09/2019
Date Data Arrived at EDR: 12/10/2019
Date Made Active in Reports: 02/14/2020
Number of Days to Update: 66

Source: State Water Resources Control Board
Telephone: see region list
Last EDR Contact: 03/10/2020
Next Scheduled EDR Contact: 06/22/2020
Data Release Frequency: Quarterly

LUST REG 2: Fuel Leak List

Leaking Underground Storage Tank locations. Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, Sonoma counties.

Date of Government Version: 09/30/2004
Date Data Arrived at EDR: 10/20/2004
Date Made Active in Reports: 11/19/2004
Number of Days to Update: 30

Source: California Regional Water Quality Control Board San Francisco Bay Region (2)
Telephone: 510-622-2433
Last EDR Contact: 09/19/2011
Next Scheduled EDR Contact: 01/02/2012
Data Release Frequency: No Update Planned

LUST REG 3: Leaking Underground Storage Tank Database

Leaking Underground Storage Tank locations. Monterey, San Benito, San Luis Obispo, Santa Barbara, Santa Cruz counties.

Date of Government Version: 05/19/2003
Date Data Arrived at EDR: 05/19/2003
Date Made Active in Reports: 06/02/2003
Number of Days to Update: 14

Source: California Regional Water Quality Control Board Central Coast Region (3)
Telephone: 805-542-4786
Last EDR Contact: 07/18/2011
Next Scheduled EDR Contact: 10/31/2011
Data Release Frequency: No Update Planned

LUST REG 6L: Leaking Underground Storage Tank Case Listing

For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 09/09/2003
Date Data Arrived at EDR: 09/10/2003
Date Made Active in Reports: 10/07/2003
Number of Days to Update: 27

Source: California Regional Water Quality Control Board Lahontan Region (6)
Telephone: 530-542-5572
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: No Update Planned

LUST REG 4: Underground Storage Tank Leak List

Los Angeles, Ventura counties. For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 09/07/2004
Date Data Arrived at EDR: 09/07/2004
Date Made Active in Reports: 10/12/2004
Number of Days to Update: 35

Source: California Regional Water Quality Control Board Los Angeles Region (4)
Telephone: 213-576-6710
Last EDR Contact: 09/06/2011
Next Scheduled EDR Contact: 12/19/2011
Data Release Frequency: No Update Planned

LUST REG 5: Leaking Underground Storage Tank Database

Leaking Underground Storage Tank locations. Alameda, Alpine, Amador, Butte, Colusa, Contra Costa, Calveras, El Dorado, Fresno, Glenn, Kern, Kings, Lake, Lassen, Madera, Mariposa, Merced, Modoc, Napa, Nevada, Placer, Plumas, Sacramento, San Joaquin, Shasta, Solano, Stanislaus, Sutter, Tehama, Tulare, Tuolumne, Yolo, Yuba counties.

Date of Government Version: 07/01/2008
Date Data Arrived at EDR: 07/22/2008
Date Made Active in Reports: 07/31/2008
Number of Days to Update: 9

Source: California Regional Water Quality Control Board Central Valley Region (5)
Telephone: 916-464-4834
Last EDR Contact: 07/01/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: No Update Planned

LUST REG 7: Leaking Underground Storage Tank Case Listing
Leaking Underground Storage Tank locations. Imperial, Riverside, San Diego, Santa Barbara counties.

Date of Government Version: 02/26/2004
Date Data Arrived at EDR: 02/26/2004
Date Made Active in Reports: 03/24/2004
Number of Days to Update: 27

Source: California Regional Water Quality Control Board Colorado River Basin Region (7)
Telephone: 760-776-8943
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: No Update Planned

LUST REG 1: Active Toxic Site Investigation
Del Norte, Humboldt, Lake, Mendocino, Modoc, Siskiyou, Sonoma, Trinity counties. For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 02/01/2001
Date Data Arrived at EDR: 02/28/2001
Date Made Active in Reports: 03/29/2001
Number of Days to Update: 29

Source: California Regional Water Quality Control Board North Coast (1)
Telephone: 707-570-3769
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: No Update Planned

LUST REG 6V: Leaking Underground Storage Tank Case Listing
Leaking Underground Storage Tank locations. Inyo, Kern, Los Angeles, Mono, San Bernardino counties.

Date of Government Version: 06/07/2005
Date Data Arrived at EDR: 06/07/2005
Date Made Active in Reports: 06/29/2005
Number of Days to Update: 22

Source: California Regional Water Quality Control Board Victorville Branch Office (6)
Telephone: 760-241-7365
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: No Update Planned

LUST REG 9: Leaking Underground Storage Tank Report
Orange, Riverside, San Diego counties. For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 03/01/2001
Date Data Arrived at EDR: 04/23/2001
Date Made Active in Reports: 05/21/2001
Number of Days to Update: 28

Source: California Regional Water Quality Control Board San Diego Region (9)
Telephone: 858-637-5595
Last EDR Contact: 09/26/2011
Next Scheduled EDR Contact: 01/09/2012
Data Release Frequency: No Update Planned

LUST REG 8: Leaking Underground Storage Tanks
California Regional Water Quality Control Board Santa Ana Region (8). For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 02/14/2005
Date Data Arrived at EDR: 02/15/2005
Date Made Active in Reports: 03/28/2005
Number of Days to Update: 41

Source: California Regional Water Quality Control Board Santa Ana Region (8)
Telephone: 909-782-4496
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: No Update Planned

INDIAN LUST R9: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Arizona, California, New Mexico and Nevada

Date of Government Version: 10/04/2019
Date Data Arrived at EDR: 12/04/2019
Date Made Active in Reports: 02/27/2020
Number of Days to Update: 85

Source: Environmental Protection Agency
Telephone: 415-972-3372
Last EDR Contact: 01/24/2020
Next Scheduled EDR Contact: 05/04/2020
Data Release Frequency: Varies

INDIAN LUST R1: Leaking Underground Storage Tanks on Indian Land
A listing of leaking underground storage tank locations on Indian Land.

Date of Government Version: 10/01/2019
Date Data Arrived at EDR: 12/04/2019
Date Made Active in Reports: 02/10/2020
Number of Days to Update: 68

Source: EPA Region 1
Telephone: 617-918-1313
Last EDR Contact: 01/24/2020
Next Scheduled EDR Contact: 05/04/2020
Data Release Frequency: Varies

INDIAN LUST R6: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in New Mexico and Oklahoma.

Date of Government Version: 10/02/2019
Date Data Arrived at EDR: 12/04/2019
Date Made Active in Reports: 02/10/2020
Number of Days to Update: 68

Source: EPA Region 6
Telephone: 214-665-6597
Last EDR Contact: 01/24/2020
Next Scheduled EDR Contact: 05/04/2020
Data Release Frequency: Varies

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Iowa, Kansas, and Nebraska

Date of Government Version: 10/15/2019
Date Data Arrived at EDR: 12/17/2019
Date Made Active in Reports: 02/10/2020
Number of Days to Update: 55

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 12/16/2019
Next Scheduled EDR Contact: 05/04/2020
Data Release Frequency: Varies

INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Florida, Mississippi and North Carolina.

Date of Government Version: 10/10/2019
Date Data Arrived at EDR: 12/05/2019
Date Made Active in Reports: 02/10/2020
Number of Days to Update: 67

Source: EPA Region 4
Telephone: 404-562-8677
Last EDR Contact: 01/24/2020
Next Scheduled EDR Contact: 05/04/2020
Data Release Frequency: Varies

INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Alaska, Idaho, Oregon and Washington.

Date of Government Version: 10/11/2019
Date Data Arrived at EDR: 12/04/2019
Date Made Active in Reports: 02/10/2020
Number of Days to Update: 68

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 01/24/2020
Next Scheduled EDR Contact: 05/04/2020
Data Release Frequency: Varies

INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming.

Date of Government Version: 10/03/2019
Date Data Arrived at EDR: 12/04/2019
Date Made Active in Reports: 02/14/2020
Number of Days to Update: 72

Source: EPA Region 8
Telephone: 303-312-6271
Last EDR Contact: 01/24/2020
Next Scheduled EDR Contact: 05/04/2020
Data Release Frequency: Varies

INDIAN LUST R5: Leaking Underground Storage Tanks on Indian Land
Leaking underground storage tanks located on Indian Land in Michigan, Minnesota and Wisconsin.

Date of Government Version: 10/01/2019
Date Data Arrived at EDR: 12/04/2019
Date Made Active in Reports: 02/10/2020
Number of Days to Update: 68

Source: EPA, Region 5
Telephone: 312-886-7439
Last EDR Contact: 01/24/2020
Next Scheduled EDR Contact: 05/04/2020
Data Release Frequency: Varies

CPS-SLIC: Statewide SLIC Cases (GEOTRACKER)

Cleanup Program Sites (CPS; also known as Site Cleanups [SC] and formerly known as Spills, Leaks, Investigations, and Cleanups [SLIC] sites) included in GeoTracker. GeoTracker is the Water Boards data management system for sites that impact, or have the potential to impact, water quality in California, with emphasis on groundwater.

Date of Government Version: 12/09/2019
Date Data Arrived at EDR: 12/10/2019
Date Made Active in Reports: 02/18/2020
Number of Days to Update: 70

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 03/10/2020
Next Scheduled EDR Contact: 06/22/2020
Data Release Frequency: Varies

SLIC REG 1: Active Toxic Site Investigations

The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 04/03/2003
Date Data Arrived at EDR: 04/07/2003
Date Made Active in Reports: 04/25/2003
Number of Days to Update: 18

Source: California Regional Water Quality Control Board, North Coast Region (1)
Telephone: 707-576-2220
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: No Update Planned

SLIC REG 2: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing

The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 09/30/2004
Date Data Arrived at EDR: 10/20/2004
Date Made Active in Reports: 11/19/2004
Number of Days to Update: 30

Source: Regional Water Quality Control Board San Francisco Bay Region (2)
Telephone: 510-286-0457
Last EDR Contact: 09/19/2011
Next Scheduled EDR Contact: 01/02/2012
Data Release Frequency: No Update Planned

SLIC REG 3: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing

The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 05/18/2006
Date Data Arrived at EDR: 05/18/2006
Date Made Active in Reports: 06/15/2006
Number of Days to Update: 28

Source: California Regional Water Quality Control Board Central Coast Region (3)
Telephone: 805-549-3147
Last EDR Contact: 07/18/2011
Next Scheduled EDR Contact: 10/31/2011
Data Release Frequency: No Update Planned

SLIC REG 4: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing

The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 11/17/2004
Date Data Arrived at EDR: 11/18/2004
Date Made Active in Reports: 01/04/2005
Number of Days to Update: 47

Source: Region Water Quality Control Board Los Angeles Region (4)
Telephone: 213-576-6600
Last EDR Contact: 07/01/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: No Update Planned

SLIC REG 5: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing

The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 04/01/2005
Date Data Arrived at EDR: 04/05/2005
Date Made Active in Reports: 04/21/2005
Number of Days to Update: 16

Source: Regional Water Quality Control Board Central Valley Region (5)
Telephone: 916-464-3291
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: No Update Planned

SLIC REG 6V: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 05/24/2005
Date Data Arrived at EDR: 05/25/2005
Date Made Active in Reports: 06/16/2005
Number of Days to Update: 22

Source: Regional Water Quality Control Board, Victorville Branch
Telephone: 619-241-6583
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: No Update Planned

SLIC REG 6L: SLIC Sites
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 09/07/2004
Date Data Arrived at EDR: 09/07/2004
Date Made Active in Reports: 10/12/2004
Number of Days to Update: 35

Source: California Regional Water Quality Control Board, Lahontan Region
Telephone: 530-542-5574
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: No Update Planned

SLIC REG 7: SLIC List
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 11/24/2004
Date Data Arrived at EDR: 11/29/2004
Date Made Active in Reports: 01/04/2005
Number of Days to Update: 36

Source: California Regional Quality Control Board, Colorado River Basin Region
Telephone: 760-346-7491
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: No Update Planned

SLIC REG 8: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 04/03/2008
Date Data Arrived at EDR: 04/03/2008
Date Made Active in Reports: 04/14/2008
Number of Days to Update: 11

Source: California Region Water Quality Control Board Santa Ana Region (8)
Telephone: 951-782-3298
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: No Update Planned

SLIC REG 9: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 09/10/2007
Date Data Arrived at EDR: 09/11/2007
Date Made Active in Reports: 09/28/2007
Number of Days to Update: 17

Source: California Regional Water Quality Control Board San Diego Region (9)
Telephone: 858-467-2980
Last EDR Contact: 08/08/2011
Next Scheduled EDR Contact: 11/21/2011
Data Release Frequency: No Update Planned

State and tribal registered storage tank lists

FEMA UST: Underground Storage Tank Listing
A listing of all FEMA owned underground storage tanks.

Date of Government Version: 08/27/2019
Date Data Arrived at EDR: 08/28/2019
Date Made Active in Reports: 11/11/2019
Number of Days to Update: 75

Source: FEMA
Telephone: 202-646-5797
Last EDR Contact: 03/19/2020
Next Scheduled EDR Contact: 07/20/2020
Data Release Frequency: Varies

MILITARY UST SITES: Military UST Sites (GEOTRACKER)
Military ust sites

Date of Government Version: 12/09/2019
Date Data Arrived at EDR: 12/10/2019
Date Made Active in Reports: 02/18/2020
Number of Days to Update: 70

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 03/10/2020
Next Scheduled EDR Contact: 06/22/2020
Data Release Frequency: Varies

UST CLOSURE: Proposed Closure of Underground Storage Tank (UST) Cases
UST cases that are being considered for closure by either the State Water Resources Control Board or the Executive Director have been posted for a 60-day public comment period. UST Case Closures being proposed for consideration by the State Water Resources Control Board. These are primarily UST cases that meet closure criteria under the decisional framework in State Water Board Resolution No. 92-49 and other Board orders. UST Case Closures proposed for consideration by the Executive Director pursuant to State Water Board Resolution No. 2012-0061. These are cases that meet the criteria of the Low-Threat UST Case Closure Policy. UST Case Closure Review Denials and Approved Orders.

Date of Government Version: 12/06/2019
Date Data Arrived at EDR: 12/10/2019
Date Made Active in Reports: 02/25/2020
Number of Days to Update: 77

Source: State Water Resources Control Board
Telephone: 916-327-7844
Last EDR Contact: 03/11/2020
Next Scheduled EDR Contact: 06/22/2020
Data Release Frequency: Varies

UST: Active UST Facilities
Active UST facilities gathered from the local regulatory agencies

Date of Government Version: 12/09/2019
Date Data Arrived at EDR: 12/10/2019
Date Made Active in Reports: 02/21/2020
Number of Days to Update: 73

Source: SWRCB
Telephone: 916-341-5851
Last EDR Contact: 03/10/2020
Next Scheduled EDR Contact: 06/22/2020
Data Release Frequency: Semi-Annually

AST: Aboveground Petroleum Storage Tank Facilities
A listing of aboveground storage tank petroleum storage tank locations.

Date of Government Version: 07/06/2016
Date Data Arrived at EDR: 07/12/2016
Date Made Active in Reports: 09/19/2016
Number of Days to Update: 69

Source: California Environmental Protection Agency
Telephone: 916-327-5092
Last EDR Contact: 03/12/2020
Next Scheduled EDR Contact: 06/29/2020
Data Release Frequency: Varies

INDIAN UST R10: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 10 (Alaska, Idaho, Oregon, Washington, and Tribal Nations).

Date of Government Version: 10/11/2019
Date Data Arrived at EDR: 12/04/2019
Date Made Active in Reports: 02/10/2020
Number of Days to Update: 68

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 01/24/2020
Next Scheduled EDR Contact: 05/04/2020
Data Release Frequency: Varies

INDIAN UST R1: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 1 (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont and ten Tribal Nations).

Date of Government Version: 10/01/2019
Date Data Arrived at EDR: 12/04/2019
Date Made Active in Reports: 02/10/2020
Number of Days to Update: 68

Source: EPA, Region 1
Telephone: 617-918-1313
Last EDR Contact: 01/24/2020
Next Scheduled EDR Contact: 05/04/2020
Data Release Frequency: Varies

INDIAN UST R4: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and Tribal Nations)

Date of Government Version: 10/10/2019
Date Data Arrived at EDR: 12/05/2019
Date Made Active in Reports: 02/10/2020
Number of Days to Update: 67

Source: EPA Region 4
Telephone: 404-562-9424
Last EDR Contact: 01/24/2020
Next Scheduled EDR Contact: 05/04/2020
Data Release Frequency: Varies

INDIAN UST R5: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 5 (Michigan, Minnesota and Wisconsin and Tribal Nations).

Date of Government Version: 10/01/2019
Date Data Arrived at EDR: 12/04/2019
Date Made Active in Reports: 02/10/2020
Number of Days to Update: 68

Source: EPA Region 5
Telephone: 312-886-6136
Last EDR Contact: 01/24/2020
Next Scheduled EDR Contact: 05/04/2020
Data Release Frequency: Varies

INDIAN UST R6: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 6 (Louisiana, Arkansas, Oklahoma, New Mexico, Texas and 65 Tribes).

Date of Government Version: 10/02/2019
Date Data Arrived at EDR: 12/04/2019
Date Made Active in Reports: 02/10/2020
Number of Days to Update: 68

Source: EPA Region 6
Telephone: 214-665-7591
Last EDR Contact: 01/24/2020
Next Scheduled EDR Contact: 05/04/2020
Data Release Frequency: Varies

INDIAN UST R7: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 7 (Iowa, Kansas, Missouri, Nebraska, and 9 Tribal Nations).

Date of Government Version: 10/11/2019
Date Data Arrived at EDR: 12/04/2019
Date Made Active in Reports: 02/10/2020
Number of Days to Update: 68

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 01/24/2020
Next Scheduled EDR Contact: 05/04/2020
Data Release Frequency: Varies

INDIAN UST R8: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 8 (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and 27 Tribal Nations).

Date of Government Version: 10/03/2019
Date Data Arrived at EDR: 12/04/2019
Date Made Active in Reports: 02/14/2020
Number of Days to Update: 72

Source: EPA Region 8
Telephone: 303-312-6137
Last EDR Contact: 01/24/2020
Next Scheduled EDR Contact: 05/04/2020
Data Release Frequency: Varies

INDIAN UST R9: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 9 (Arizona, California, Hawaii, Nevada, the Pacific Islands, and Tribal Nations).

Date of Government Version: 10/04/2019
Date Data Arrived at EDR: 12/04/2019
Date Made Active in Reports: 02/27/2020
Number of Days to Update: 85

Source: EPA Region 9
Telephone: 415-972-3368
Last EDR Contact: 01/24/2020
Next Scheduled EDR Contact: 05/04/2020
Data Release Frequency: Varies

State and tribal voluntary cleanup sites

INDIAN VCP R1: Voluntary Cleanup Priority Listing
A listing of voluntary cleanup priority sites located on Indian Land located in Region 1.

Date of Government Version: 07/27/2015
Date Data Arrived at EDR: 09/29/2015
Date Made Active in Reports: 02/18/2016
Number of Days to Update: 142
Source: EPA, Region 1
Telephone: 617-918-1102
Last EDR Contact: 03/18/2020
Next Scheduled EDR Contact: 07/06/2020
Data Release Frequency: Varies

VCP: Voluntary Cleanup Program Properties
Contains low threat level properties with either confirmed or unconfirmed releases and the project proponents have request that DTSC oversee investigation and/or cleanup activities and have agreed to provide coverage for DTSC's costs.

Date of Government Version: 10/28/2019
Date Data Arrived at EDR: 10/29/2019
Date Made Active in Reports: 01/07/2020
Number of Days to Update: 70
Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 01/28/2020
Next Scheduled EDR Contact: 05/11/2020
Data Release Frequency: Quarterly

INDIAN VCP R7: Voluntary Cleanup Priority Lisitng
A listing of voluntary cleanup priority sites located on Indian Land located in Region 7.

Date of Government Version: 03/20/2008
Date Data Arrived at EDR: 04/22/2008
Date Made Active in Reports: 05/19/2008
Number of Days to Update: 27
Source: EPA, Region 7
Telephone: 913-551-7365
Last EDR Contact: 04/20/2009
Next Scheduled EDR Contact: 07/20/2009
Data Release Frequency: Varies

State and tribal Brownfields sites

BROWNFIELDS: Considered Brownfieds Sites Listing
A listing of sites the SWRCB considers to be Brownfields since these are sites have come to them through the MOA Process.

Date of Government Version: 12/18/2019
Date Data Arrived at EDR: 12/19/2019
Date Made Active in Reports: 02/19/2020
Number of Days to Update: 62
Source: State Water Resources Control Board
Telephone: 916-323-7905
Last EDR Contact: 03/24/2020
Next Scheduled EDR Contact: 07/06/2020
Data Release Frequency: Quarterly

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS: A Listing of Brownfields Sites
Brownfields are real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Cleaning up and reinvesting in these properties takes development pressures off of undeveloped, open land, and both improves and protects the environment. Assessment, Cleanup and Redevelopment Exchange System (ACRES) stores information reported by EPA Brownfields grant recipients on brownfields properties assessed or cleaned up with grant funding as well as information on Targeted Brownfields Assessments performed by EPA Regions. A listing of ACRES Brownfield sites is obtained from Cleanups in My Community. Cleanups in My Community provides information on Brownfields properties for which information is reported back to EPA, as well as areas served by Brownfields grant programs.

Date of Government Version: 12/02/2019
Date Data Arrived at EDR: 12/16/2019
Date Made Active in Reports: 03/06/2020
Number of Days to Update: 81
Source: Environmental Protection Agency
Telephone: 202-566-2777
Last EDR Contact: 03/17/2020
Next Scheduled EDR Contact: 06/29/2020
Data Release Frequency: Semi-Annually

Local Lists of Landfill / Solid Waste Disposal Sites

WMUDS/SWAT: Waste Management Unit Database

Waste Management Unit Database System. WMUDS is used by the State Water Resources Control Board staff and the Regional Water Quality Control Boards for program tracking and inventory of waste management units. WMUDS is composed of the following databases: Facility Information, Scheduled Inspections Information, Waste Management Unit Information, SWAT Program Information, SWAT Report Summary Information, SWAT Report Summary Data, Chapter 15 (formerly Subchapter 15) Information, Chapter 15 Monitoring Parameters, TPCA Program Information, RCRA Program Information, Closure Information, and Interested Parties Information.

Date of Government Version: 04/01/2000
Date Data Arrived at EDR: 04/10/2000
Date Made Active in Reports: 05/10/2000
Number of Days to Update: 30

Source: State Water Resources Control Board
Telephone: 916-227-4448
Last EDR Contact: 01/24/2020
Next Scheduled EDR Contact: 05/11/2020
Data Release Frequency: No Update Planned

SWRCY: Recycler Database

A listing of recycling facilities in California.

Date of Government Version: 12/09/2019
Date Data Arrived at EDR: 12/10/2019
Date Made Active in Reports: 02/19/2020
Number of Days to Update: 71

Source: Department of Conservation
Telephone: 916-323-3836
Last EDR Contact: 03/10/2020
Next Scheduled EDR Contact: 06/22/2020
Data Release Frequency: Quarterly

HAULERS: Registered Waste Tire Haulers Listing

A listing of registered waste tire haulers.

Date of Government Version: 11/15/2019
Date Data Arrived at EDR: 11/15/2019
Date Made Active in Reports: 01/23/2020
Number of Days to Update: 69

Source: Integrated Waste Management Board
Telephone: 916-341-6422
Last EDR Contact: 02/07/2020
Next Scheduled EDR Contact: 05/25/2020
Data Release Frequency: Varies

INDIAN ODI: Report on the Status of Open Dumps on Indian Lands

Location of open dumps on Indian land.

Date of Government Version: 12/31/1998
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 01/24/2008
Number of Days to Update: 52

Source: Environmental Protection Agency
Telephone: 703-308-8245
Last EDR Contact: 01/27/2020
Next Scheduled EDR Contact: 05/11/2020
Data Release Frequency: Varies

ODI: Open Dump Inventory

An open dump is defined as a disposal facility that does not comply with one or more of the Part 257 or Part 258 Subtitle D Criteria.

Date of Government Version: 06/30/1985
Date Data Arrived at EDR: 08/09/2004
Date Made Active in Reports: 09/17/2004
Number of Days to Update: 39

Source: Environmental Protection Agency
Telephone: 800-424-9346
Last EDR Contact: 06/09/2004
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

DEBRIS REGION 9: Torres Martinez Reservation Illegal Dump Site Locations

A listing of illegal dump sites location on the Torres Martinez Indian Reservation located in eastern Riverside County and northern Imperial County, California.

Date of Government Version: 01/12/2009
Date Data Arrived at EDR: 05/07/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 137

Source: EPA, Region 9
Telephone: 415-947-4219
Last EDR Contact: 01/17/2020
Next Scheduled EDR Contact: 05/04/2020
Data Release Frequency: No Update Planned

IHS OPEN DUMPS: Open Dumps on Indian Land

A listing of all open dumps located on Indian Land in the United States.

Date of Government Version: 04/01/2014
Date Data Arrived at EDR: 08/06/2014
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 176

Source: Department of Health & Human Serivces, Indian Health Service
Telephone: 301-443-1452
Last EDR Contact: 01/31/2020
Next Scheduled EDR Contact: 05/11/2020
Data Release Frequency: Varies

Local Lists of Hazardous waste / Contaminated Sites

US HIST CDL: National Clandestine Laboratory Register

A listing of clandestine drug lab locations that have been removed from the DEAs National Clandestine Laboratory Register.

Date of Government Version: 06/11/2019
Date Data Arrived at EDR: 06/13/2019
Date Made Active in Reports: 09/03/2019
Number of Days to Update: 82

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 02/21/2020
Next Scheduled EDR Contact: 06/08/2020
Data Release Frequency: No Update Planned

HIST CAL-SITES: Calsites Database

The Calsites database contains potential or confirmed hazardous substance release properties. In 1996, California EPA reevaluated and significantly reduced the number of sites in the Calsites database. No longer updated by the state agency. It has been replaced by ENVIROSTOR.

Date of Government Version: 08/08/2005
Date Data Arrived at EDR: 08/03/2006
Date Made Active in Reports: 08/24/2006
Number of Days to Update: 21

Source: Department of Toxic Substance Control
Telephone: 916-323-3400
Last EDR Contact: 02/23/2009
Next Scheduled EDR Contact: 05/25/2009
Data Release Frequency: No Update Planned

SCH: School Property Evaluation Program

This category contains proposed and existing school sites that are being evaluated by DTSC for possible hazardous materials contamination. In some cases, these properties may be listed in the CalSites category depending on the level of threat to public health and safety or the environment they pose.

Date of Government Version: 10/28/2019
Date Data Arrived at EDR: 10/29/2019
Date Made Active in Reports: 01/07/2020
Number of Days to Update: 70

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 01/28/2020
Next Scheduled EDR Contact: 05/11/2020
Data Release Frequency: Quarterly

CDL: Clandestine Drug Labs

A listing of drug lab locations. Listing of a location in this database does not indicate that any illegal drug lab materials were or were not present there, and does not constitute a determination that the location either requires or does not require additional cleanup work.

Date of Government Version: 06/30/2018
Date Data Arrived at EDR: 07/16/2019
Date Made Active in Reports: 09/24/2019
Number of Days to Update: 70

Source: Department of Toxic Substances Control
Telephone: 916-255-6504
Last EDR Contact: 03/26/2020
Next Scheduled EDR Contact: 07/20/2020
Data Release Frequency: Varies

CERS HAZ WASTE: CERS HAZ WASTE

List of sites in the California Environmental Protection Agency (CalEPA) Regulated Site Portal which fall under the Hazardous Chemical Management, Hazardous Waste Onsite Treatment, Household Hazardous Waste Collection, Hazardous Waste Generator, and RCRA LQ HW Generator programs.

Date of Government Version: 10/21/2019
Date Data Arrived at EDR: 10/22/2019
Date Made Active in Reports: 01/02/2020
Number of Days to Update: 72

Source: CalEPA
Telephone: 916-323-2514
Last EDR Contact: 01/22/2020
Next Scheduled EDR Contact: 05/04/2020
Data Release Frequency: Quarterly

TOXIC PITS: Toxic Pits Cleanup Act Sites

Toxic PITS Cleanup Act Sites. TOXIC PITS identifies sites suspected of containing hazardous substances where cleanup has not yet been completed.

Date of Government Version: 07/01/1995
Date Data Arrived at EDR: 08/30/1995
Date Made Active in Reports: 09/26/1995
Number of Days to Update: 27

Source: State Water Resources Control Board
Telephone: 916-227-4364
Last EDR Contact: 01/26/2009
Next Scheduled EDR Contact: 04/27/2009
Data Release Frequency: No Update Planned

US CDL: Clandestine Drug Labs

A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 06/11/2019
Date Data Arrived at EDR: 06/13/2019
Date Made Active in Reports: 09/03/2019
Number of Days to Update: 82

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 02/21/2020
Next Scheduled EDR Contact: 06/08/2020
Data Release Frequency: Quarterly

PFAS: PFAS Contamination Site Location Listing

A listing of PFAS contaminated sites included in the GeoTracker database.

Date of Government Version: 12/09/2019
Date Data Arrived at EDR: 12/10/2019
Date Made Active in Reports: 02/19/2020
Number of Days to Update: 71

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 03/10/2020
Next Scheduled EDR Contact: 06/22/2020
Data Release Frequency: Varies

Local Lists of Registered Storage Tanks

SWEEPS UST: SWEEPS UST Listing

Statewide Environmental Evaluation and Planning System. This underground storage tank listing was updated and maintained by a company contacted by the SWRCB in the early 1990's. The listing is no longer updated or maintained. The local agency is the contact for more information on a site on the SWEEPS list.

Date of Government Version: 06/01/1994
Date Data Arrived at EDR: 07/07/2005
Date Made Active in Reports: 08/11/2005
Number of Days to Update: 35

Source: State Water Resources Control Board
Telephone: N/A
Last EDR Contact: 06/03/2005
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

UST MENDOCINO: Mendocino County UST Database

A listing of underground storage tank locations in Mendocino County.

Date of Government Version: 12/19/2019
Date Data Arrived at EDR: 12/23/2019
Date Made Active in Reports: 02/21/2020
Number of Days to Update: 60

Source: Department of Public Health
Telephone: 707-463-4466
Last EDR Contact: 02/21/2020
Next Scheduled EDR Contact: 06/08/2020
Data Release Frequency: Annually

HIST UST: Hazardous Substance Storage Container Database
The Hazardous Substance Storage Container Database is a historical listing of UST sites. Refer to local/county source for current data.

Date of Government Version: 10/15/1990
Date Data Arrived at EDR: 01/25/1991
Date Made Active in Reports: 02/12/1991
Number of Days to Update: 18
Source: State Water Resources Control Board
Telephone: 916-341-5851
Last EDR Contact: 07/26/2001
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

SAN FRANCISCO AST: Aboveground Storage Tank Site Listing
Aboveground storage tank sites

Date of Government Version: 08/01/2019
Date Data Arrived at EDR: 08/02/2019
Date Made Active in Reports: 10/11/2019
Number of Days to Update: 70
Source: San Francisco County Department of Public Health
Telephone: 415-252-3896
Last EDR Contact: 01/31/2020
Next Scheduled EDR Contact: 05/18/2020
Data Release Frequency: Varies

CA FID UST: Facility Inventory Database
The Facility Inventory Database (FID) contains a historical listing of active and inactive underground storage tank locations from the State Water Resource Control Board. Refer to local/county source for current data.

Date of Government Version: 10/31/1994
Date Data Arrived at EDR: 09/05/1995
Date Made Active in Reports: 09/29/1995
Number of Days to Update: 24
Source: California Environmental Protection Agency
Telephone: 916-341-5851
Last EDR Contact: 12/28/1998
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

CERS TANKS: California Environmental Reporting System (CERS) Tanks
List of sites in the California Environmental Protection Agency (CalEPA) Regulated Site Portal which fall under the Aboveground Petroleum Storage and Underground Storage Tank regulatory programs.

Date of Government Version: 10/21/2019
Date Data Arrived at EDR: 10/22/2019
Date Made Active in Reports: 01/03/2020
Number of Days to Update: 73
Source: California Environmental Protection Agency
Telephone: 916-323-2514
Last EDR Contact: 01/22/2020
Next Scheduled EDR Contact: 05/04/2020
Data Release Frequency: Quarterly

Local Land Records

LIENS: Environmental Liens Listing
A listing of property locations with environmental liens for California where DTSC is a lien holder.

Date of Government Version: 12/02/2019
Date Data Arrived at EDR: 12/04/2019
Date Made Active in Reports: 02/04/2020
Number of Days to Update: 62
Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 02/27/2020
Next Scheduled EDR Contact: 06/15/2020
Data Release Frequency: Varies

LIENS 2: CERCLA Lien Information
A Federal CERCLA ('Superfund') lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties.

Date of Government Version: 01/30/2020
Date Data Arrived at EDR: 02/05/2020
Date Made Active in Reports: 02/14/2020
Number of Days to Update: 9
Source: Environmental Protection Agency
Telephone: 202-564-6023
Last EDR Contact: 03/05/2020
Next Scheduled EDR Contact: 04/13/2020
Data Release Frequency: Semi-Annually

DEED: Deed Restriction Listing

Site Mitigation and Brownfields Reuse Program Facility Sites with Deed Restrictions & Hazardous Waste Management Program Facility Sites with Deed / Land Use Restriction. The DTSC Site Mitigation and Brownfields Reuse Program (SMBRP) list includes sites cleaned up under the program's oversight and generally does not include current or former hazardous waste facilities that required a hazardous waste facility permit. The list represents deed restrictions that are active. Some sites have multiple deed restrictions. The DTSC Hazardous Waste Management Program (HWMP) has developed a list of current or former hazardous waste facilities that have a recorded land use restriction at the local county recorder's office. The land use restrictions on this list were required by the DTSC HWMP as a result of the presence of hazardous substances that remain on site after the facility (or part of the facility) has been closed or cleaned up. The types of land use restriction include deed notice, deed restriction, or a land use restriction that binds current and future owners.

Date of Government Version: 12/03/2019
Date Data Arrived at EDR: 12/04/2019
Date Made Active in Reports: 02/04/2020
Number of Days to Update: 62

Source: DTSC and SWRCB
Telephone: 916-323-3400
Last EDR Contact: 03/03/2020
Next Scheduled EDR Contact: 06/15/2020
Data Release Frequency: Semi-Annually

Records of Emergency Release Reports

HMIRS: Hazardous Materials Information Reporting System

Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 12/05/2019
Date Data Arrived at EDR: 12/06/2019
Date Made Active in Reports: 02/14/2020
Number of Days to Update: 70

Source: U.S. Department of Transportation
Telephone: 202-366-4555
Last EDR Contact: 03/24/2020
Next Scheduled EDR Contact: 07/06/2020
Data Release Frequency: Quarterly

CHMIRS: California Hazardous Material Incident Report System

California Hazardous Material Incident Reporting System. CHMIRS contains information on reported hazardous material incidents (accidental releases or spills).

Date of Government Version: 12/24/2019
Date Data Arrived at EDR: 01/22/2020
Date Made Active in Reports: 03/30/2020
Number of Days to Update: 68

Source: Office of Emergency Services
Telephone: 916-845-8400
Last EDR Contact: 01/22/2020
Next Scheduled EDR Contact: 05/04/2020
Data Release Frequency: Semi-Annually

LDS: Land Disposal Sites Listing (GEOTRACKER)

Land Disposal sites (Landfills) included in GeoTracker. GeoTracker is the Water Boards data management system for sites that impact, or have the potential to impact, water quality in California, with emphasis on groundwater.

Date of Government Version: 12/09/2019
Date Data Arrived at EDR: 12/10/2019
Date Made Active in Reports: 02/14/2020
Number of Days to Update: 66

Source: State Water Qualilty Control Board
Telephone: 866-480-1028
Last EDR Contact: 03/10/2020
Next Scheduled EDR Contact: 06/22/2020
Data Release Frequency: Quarterly

MCS: Military Cleanup Sites Listing (GEOTRACKER)

Military sites (consisting of: Military UST sites; Military Privatized sites; and Military Cleanup sites [formerly known as DoD non UST]) included in GeoTracker. GeoTracker is the Water Boards data management system for sites that impact, or have the potential to impact, water quality in California, with emphasis on groundwater.

Date of Government Version: 12/09/2019
Date Data Arrived at EDR: 12/10/2019
Date Made Active in Reports: 02/18/2020
Number of Days to Update: 70

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 03/10/2020
Next Scheduled EDR Contact: 06/22/2020
Data Release Frequency: Quarterly

SPILLS 90: SPILLS90 data from FirstSearch

Spills 90 includes those spill and release records available exclusively from FirstSearch databases. Typically, they may include chemical, oil and/or hazardous substance spills recorded after 1990. Duplicate records that are already included in EDR incident and release records are not included in Spills 90.

Date of Government Version: 06/06/2012
Date Data Arrived at EDR: 01/03/2013
Date Made Active in Reports: 02/22/2013
Number of Days to Update: 50

Source: FirstSearch
Telephone: N/A
Last EDR Contact: 01/03/2013
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

Other Ascertainable Records

RCRA NonGen / NLR: RCRA - Non Generators / No Longer Regulated

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

Date of Government Version: 12/16/2019
Date Data Arrived at EDR: 12/16/2019
Date Made Active in Reports: 12/20/2019
Number of Days to Update: 4

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 03/25/2020
Next Scheduled EDR Contact: 07/06/2020
Data Release Frequency: Quarterly

FUDS: Formerly Used Defense Sites

The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

Date of Government Version: 11/12/2019
Date Data Arrived at EDR: 11/19/2019
Date Made Active in Reports: 01/28/2020
Number of Days to Update: 70

Source: U.S. Army Corps of Engineers
Telephone: 202-528-4285
Last EDR Contact: 02/19/2020
Next Scheduled EDR Contact: 06/01/2020
Data Release Frequency: Varies

DOD: Department of Defense Sites

This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 11/10/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 62

Source: USGS
Telephone: 888-275-8747
Last EDR Contact: 01/10/2020
Next Scheduled EDR Contact: 04/20/2020
Data Release Frequency: Semi-Annually

FEDLAND: Federal and Indian Lands

Federally and Indian administrated lands of the United States. Lands included are administrated by: Army Corps of Engineers, Bureau of Reclamation, National Wild and Scenic River, National Wildlife Refuge, Public Domain Land, Wilderness, Wilderness Study Area, Wildlife Management Area, Bureau of Indian Affairs, Bureau of Land Management, Department of Justice, Forest Service, Fish and Wildlife Service, National Park Service.

Date of Government Version: 04/02/2018
Date Data Arrived at EDR: 04/11/2018
Date Made Active in Reports: 11/06/2019
Number of Days to Update: 574

Source: U.S. Geological Survey
Telephone: 888-275-8747
Last EDR Contact: 01/09/2020
Next Scheduled EDR Contact: 04/20/2020
Data Release Frequency: N/A

SCRD DRYCLEANERS: State Coalition for Remediation of Drycleaners Listing

The State Coalition for Remediation of Drycleaners was established in 1998, with support from the U.S. EPA Office of Superfund Remediation and Technology Innovation. It is comprised of representatives of states with established drycleaner remediation programs. Currently the member states are Alabama, Connecticut, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, Texas, and Wisconsin.

Date of Government Version: 01/01/2017
Date Data Arrived at EDR: 02/03/2017
Date Made Active in Reports: 04/07/2017
Number of Days to Update: 63

Source: Environmental Protection Agency
Telephone: 615-532-8599
Last EDR Contact: 02/13/2020
Next Scheduled EDR Contact: 05/25/2020
Data Release Frequency: Varies

US FIN ASSUR: Financial Assurance Information

All owners and operators of facilities that treat, store, or dispose of hazardous waste are required to provide proof that they will have sufficient funds to pay for the clean up, closure, and post-closure care of their facilities.

Date of Government Version: 12/16/2019
Date Data Arrived at EDR: 12/19/2019
Date Made Active in Reports: 02/27/2020
Number of Days to Update: 70

Source: Environmental Protection Agency
Telephone: 202-566-1917
Last EDR Contact: 03/24/2020
Next Scheduled EDR Contact: 07/06/2020
Data Release Frequency: Quarterly

EPA WATCH LIST: EPA WATCH LIST

EPA maintains a "Watch List" to facilitate dialogue between EPA, state and local environmental agencies on enforcement matters relating to facilities with alleged violations identified as either significant or high priority. Being on the Watch List does not mean that the facility has actually violated the law only that an investigation by EPA or a state or local environmental agency has led those organizations to allege that an unproven violation has in fact occurred. Being on the Watch List does not represent a higher level of concern regarding the alleged violations that were detected, but instead indicates cases requiring additional dialogue between EPA, state and local agencies - primarily because of the length of time the alleged violation has gone unaddressed or unresolved.

Date of Government Version: 08/30/2013
Date Data Arrived at EDR: 03/21/2014
Date Made Active in Reports: 06/17/2014
Number of Days to Update: 88

Source: Environmental Protection Agency
Telephone: 617-520-3000
Last EDR Contact: 02/03/2020
Next Scheduled EDR Contact: 05/18/2020
Data Release Frequency: Quarterly

2020 COR ACTION: 2020 Corrective Action Program List

The EPA has set ambitious goals for the RCRA Corrective Action program by creating the 2020 Corrective Action Universe. This RCRA cleanup baseline includes facilities expected to need corrective action. The 2020 universe contains a wide variety of sites. Some properties are heavily contaminated while others were contaminated but have since been cleaned up. Still others have not been fully investigated yet, and may require little or no remediation. Inclusion in the 2020 Universe does not necessarily imply failure on the part of a facility to meet its RCRA obligations.

Date of Government Version: 09/30/2017
Date Data Arrived at EDR: 05/08/2018
Date Made Active in Reports: 07/20/2018
Number of Days to Update: 73

Source: Environmental Protection Agency
Telephone: 703-308-4044
Last EDR Contact: 02/07/2020
Next Scheduled EDR Contact: 05/18/2020
Data Release Frequency: Varies

TSCA: Toxic Substances Control Act

Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/2016
Date Data Arrived at EDR: 06/21/2017
Date Made Active in Reports: 01/05/2018
Number of Days to Update: 198

Source: EPA
Telephone: 202-260-5521
Last EDR Contact: 03/20/2020
Next Scheduled EDR Contact: 06/29/2020
Data Release Frequency: Every 4 Years

TRIS: Toxic Chemical Release Inventory System

Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/2017
Date Data Arrived at EDR: 11/16/2018
Date Made Active in Reports: 11/21/2019
Number of Days to Update: 370

Source: EPA
Telephone: 202-566-0250
Last EDR Contact: 02/05/2020
Next Scheduled EDR Contact: 06/01/2020
Data Release Frequency: Annually

SSTS: Section 7 Tracking Systems

Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 05/01/2019
Date Data Arrived at EDR: 10/23/2019
Date Made Active in Reports: 01/15/2020
Number of Days to Update: 84

Source: EPA
Telephone: 202-564-4203
Last EDR Contact: 01/24/2020
Next Scheduled EDR Contact: 05/04/2020
Data Release Frequency: Annually

ROD: Records Of Decision

Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 01/30/2020
Date Data Arrived at EDR: 02/05/2020
Date Made Active in Reports: 02/14/2020
Number of Days to Update: 9

Source: EPA
Telephone: 703-416-0223
Last EDR Contact: 03/04/2020
Next Scheduled EDR Contact: 06/15/2020
Data Release Frequency: Annually

RMP: Risk Management Plans

When Congress passed the Clean Air Act Amendments of 1990, it required EPA to publish regulations and guidance for chemical accident prevention at facilities using extremely hazardous substances. The Risk Management Program Rule (RMP Rule) was written to implement Section 112(r) of these amendments. The rule, which built upon existing industry codes and standards, requires companies of all sizes that use certain flammable and toxic substances to develop a Risk Management Program, which includes a(n): Hazard assessment that details the potential effects of an accidental release, an accident history of the last five years, and an evaluation of worst-case and alternative accidental releases; Prevention program that includes safety precautions and maintenance, monitoring, and employee training measures; and Emergency response program that spells out emergency health care, employee training measures and procedures for informing the public and response agencies (e.g the fire department) should an accident occur.

Date of Government Version: 04/25/2019
Date Data Arrived at EDR: 05/02/2019
Date Made Active in Reports: 05/23/2019
Number of Days to Update: 21

Source: Environmental Protection Agency
Telephone: 202-564-8600
Last EDR Contact: 01/21/2020
Next Scheduled EDR Contact: 05/04/2020
Data Release Frequency: Varies

RAATS: RCRA Administrative Action Tracking System

RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/1995
Date Data Arrived at EDR: 07/03/1995
Date Made Active in Reports: 08/07/1995
Number of Days to Update: 35

Source: EPA
Telephone: 202-564-4104
Last EDR Contact: 06/02/2008
Next Scheduled EDR Contact: 09/01/2008
Data Release Frequency: No Update Planned

PRP: Potentially Responsible Parties
A listing of verified Potentially Responsible Parties

Date of Government Version: 01/30/2020
Date Data Arrived at EDR: 02/06/2020
Date Made Active in Reports: 02/14/2020
Number of Days to Update: 8
Source: EPA
Telephone: 202-564-6023
Last EDR Contact: 03/04/2020
Next Scheduled EDR Contact: 05/18/2020
Data Release Frequency: Quarterly

PADS: PCB Activity Database System
PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 10/09/2019
Date Data Arrived at EDR: 10/11/2019
Date Made Active in Reports: 12/20/2019
Number of Days to Update: 70
Source: EPA
Telephone: 202-566-0500
Last EDR Contact: 01/10/2020
Next Scheduled EDR Contact: 04/20/2020
Data Release Frequency: Annually

ICIS: Integrated Compliance Information System
The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

Date of Government Version: 11/18/2016
Date Data Arrived at EDR: 11/23/2016
Date Made Active in Reports: 02/10/2017
Number of Days to Update: 79
Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 03/26/2020
Next Scheduled EDR Contact: 07/20/2020
Data Release Frequency: Quarterly

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25
Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-566-1667
Last EDR Contact: 08/18/2017
Next Scheduled EDR Contact: 12/04/2017
Data Release Frequency: No Update Planned

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
A listing of FIFRA/TSCA Tracking System (FTTS) inspections and enforcements.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25
Source: EPA
Telephone: 202-566-1667
Last EDR Contact: 08/18/2017
Next Scheduled EDR Contact: 12/04/2017
Data Release Frequency: No Update Planned

MLTS: Material Licensing Tracking System
MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 10/25/2019
Date Data Arrived at EDR: 10/25/2019
Date Made Active in Reports: 01/15/2020
Number of Days to Update: 82
Source: Nuclear Regulatory Commission
Telephone: 301-415-7169
Last EDR Contact: 01/21/2020
Next Scheduled EDR Contact: 05/04/2020
Data Release Frequency: Quarterly

COAL ASH DOE: Steam-Electric Plant Operation Data
A listing of power plants that store ash in surface ponds.

Date of Government Version: 12/31/2018
Date Data Arrived at EDR: 12/04/2019
Date Made Active in Reports: 01/15/2020
Number of Days to Update: 42
Source: Department of Energy
Telephone: 202-586-8719
Last EDR Contact: 03/06/2020
Next Scheduled EDR Contact: 06/15/2020
Data Release Frequency: Varies

COAL ASH EPA: Coal Combustion Residues Surface Impoundments List
A listing of coal combustion residues surface impoundments with high hazard potential ratings.

Date of Government Version: 01/12/2017
Date Data Arrived at EDR: 03/05/2019
Date Made Active in Reports: 11/11/2019
Number of Days to Update: 251
Source: Environmental Protection Agency
Telephone: N/A
Last EDR Contact: 02/27/2020
Next Scheduled EDR Contact: 06/15/2020
Data Release Frequency: Varies

PCB TRANSFORMER: PCB Transformer Registration Database
The database of PCB transformer registrations that includes all PCB registration submittals.

Date of Government Version: 09/13/2019
Date Data Arrived at EDR: 11/06/2019
Date Made Active in Reports: 02/10/2020
Number of Days to Update: 96
Source: Environmental Protection Agency
Telephone: 202-566-0517
Last EDR Contact: 02/07/2020
Next Scheduled EDR Contact: 05/18/2020
Data Release Frequency: Varies

RADINFO: Radiation Information Database
The Radiation Information Database (RADINFO) contains information about facilities that are regulated by U.S. Environmental Protection Agency (EPA) regulations for radiation and radioactivity.

Date of Government Version: 07/01/2019
Date Data Arrived at EDR: 07/01/2019
Date Made Active in Reports: 09/23/2019
Number of Days to Update: 84
Source: Environmental Protection Agency
Telephone: 202-343-9775
Last EDR Contact: 07/01/2019
Next Scheduled EDR Contact: 07/13/2020
Data Release Frequency: Quarterly

HIST FTTS: FIFRA/TSCA Tracking System Administrative Case Listing
A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40
Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2007
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

HIST FTTS INSP: FIFRA/TSCA Tracking System Inspection & Enforcement Case Listing
A complete inspection and enforcement case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2008
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

DOT OPS: Incident and Accident Data

Department of Transporation, Office of Pipeline Safety Incident and Accident data.

Date of Government Version: 10/01/2019
Date Data Arrived at EDR: 10/29/2019
Date Made Active in Reports: 01/15/2020
Number of Days to Update: 78

Source: Department of Transporation, Office of Pipeline Safety
Telephone: 202-366-4595
Last EDR Contact: 01/28/2020
Next Scheduled EDR Contact: 05/11/2020
Data Release Frequency: Quarterly

CONSENT: Superfund (CERCLA) Consent Decrees

Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: 12/31/2019
Date Data Arrived at EDR: 01/17/2020
Date Made Active in Reports: 03/06/2020
Number of Days to Update: 49

Source: Department of Justice, Consent Decree Library
Telephone: Varies
Last EDR Contact: 03/26/2020
Next Scheduled EDR Contact: 07/20/2020
Data Release Frequency: Varies

BRS: Biennial Reporting System

The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/2015
Date Data Arrived at EDR: 02/22/2017
Date Made Active in Reports: 09/28/2017
Number of Days to Update: 218

Source: EPA/NTIS
Telephone: 800-424-9346
Last EDR Contact: 03/25/2020
Next Scheduled EDR Contact: 07/06/2020
Data Release Frequency: Biennially

INDIAN RESERV: Indian Reservations

This map layer portrays Indian administered lands of the United States that have any area equal to or greater than 640 acres.

Date of Government Version: 12/31/2014
Date Data Arrived at EDR: 07/14/2015
Date Made Active in Reports: 01/10/2017
Number of Days to Update: 546

Source: USGS
Telephone: 202-208-3710
Last EDR Contact: 01/07/2020
Next Scheduled EDR Contact: 04/20/2020
Data Release Frequency: Semi-Annually

FUSRAP: Formerly Utilized Sites Remedial Action Program

DOE established the Formerly Utilized Sites Remedial Action Program (FUSRAP) in 1974 to remediate sites where radioactive contamination remained from Manhattan Project and early U.S. Atomic Energy Commission (AEC) operations.

Date of Government Version: 08/08/2017
Date Data Arrived at EDR: 09/11/2018
Date Made Active in Reports: 09/14/2018
Number of Days to Update: 3

Source: Department of Energy
Telephone: 202-586-3559
Last EDR Contact: 01/31/2020
Next Scheduled EDR Contact: 05/18/2020
Data Release Frequency: Varies

UMTRA: Uranium Mill Tailings Sites

Uranium ore was mined by private companies for federal government use in national defense programs. When the mills shut down, large piles of the sand-like material (mill tailings) remain after uranium has been extracted from the ore. Levels of human exposure to radioactive materials from the piles are low; however, in some cases tailings were used as construction materials before the potential health hazards of the tailings were recognized.

Date of Government Version: 08/30/2019
Date Data Arrived at EDR: 11/15/2019
Date Made Active in Reports: 01/28/2020
Number of Days to Update: 74

Source: Department of Energy
Telephone: 505-845-0011
Last EDR Contact: 02/21/2020
Next Scheduled EDR Contact: 06/01/2020
Data Release Frequency: Varies

LEAD SMELTER 1: Lead Smelter Sites

A listing of former lead smelter site locations.

Date of Government Version: 01/30/2020
Date Data Arrived at EDR: 02/05/2020
Date Made Active in Reports: 02/14/2020
Number of Days to Update: 9

Source: Environmental Protection Agency
Telephone: 703-603-8787
Last EDR Contact: 03/04/2020
Next Scheduled EDR Contact: 04/13/2020
Data Release Frequency: Varies

LEAD SMELTER 2: Lead Smelter Sites

A list of several hundred sites in the U.S. where secondary lead smelting was done from 1931and 1964. These sites may pose a threat to public health through ingestion or inhalation of contaminated soil or dust

Date of Government Version: 04/05/2001
Date Data Arrived at EDR: 10/27/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 36

Source: American Journal of Public Health
Telephone: 703-305-6451
Last EDR Contact: 12/02/2009
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

US AIRS (AFS): Aerometric Information Retrieval System Facility Subsystem (AFS)

The database is a sub-system of Aerometric Information Retrieval System (AIRS). AFS contains compliance data on air pollution point sources regulated by the U.S. EPA and/or state and local air regulatory agencies. This information comes from source reports by various stationary sources of air pollution, such as electric power plants, steel mills, factories, and universities, and provides information about the air pollutants they produce. Action, air program, air program pollutant, and general level plant data. It is used to track emissions and compliance data from industrial plants.

Date of Government Version: 10/12/2016
Date Data Arrived at EDR: 10/26/2016
Date Made Active in Reports: 02/03/2017
Number of Days to Update: 100

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 09/26/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Annually

US AIRS MINOR: Air Facility System Data

A listing of minor source facilities.

Date of Government Version: 10/12/2016
Date Data Arrived at EDR: 10/26/2016
Date Made Active in Reports: 02/03/2017
Number of Days to Update: 100

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 09/26/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Annually

MINES VIOLATIONS: MSHA Violation Assessment Data

Mines violation and assessment information. Department of Labor, Mine Safety & Health Administration.

Date of Government Version: 12/03/2019
Date Data Arrived at EDR: 12/03/2019
Date Made Active in Reports: 01/28/2020
Number of Days to Update: 56

Source: DOL, Mine Safety & Health Admi
Telephone: 202-693-9424
Last EDR Contact: 03/02/2020
Next Scheduled EDR Contact: 06/15/2020
Data Release Frequency: Quarterly

US MINES: Mines Master Index File

Contains all mine identification numbers issued for mines active or opened since 1971. The data also includes violation information.

Date of Government Version: 11/06/2019
Date Data Arrived at EDR: 11/25/2019
Date Made Active in Reports: 01/28/2020
Number of Days to Update: 64

Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959
Last EDR Contact: 02/25/2020
Next Scheduled EDR Contact: 06/08/2020
Data Release Frequency: Semi-Annually

US MINES 2: Ferrous and Nonferrous Metal Mines Database Listing

This map layer includes ferrous (ferrous metal mines are facilities that extract ferrous metals, such as iron ore or molybdenum) and nonferrous (Nonferrous metal mines are facilities that extract nonferrous metals, such as gold, silver, copper, zinc, and lead) metal mines in the United States.

Date of Government Version: 12/05/2005
Date Data Arrived at EDR: 02/29/2008
Date Made Active in Reports: 04/18/2008
Number of Days to Update: 49

Source: USGS
Telephone: 703-648-7709
Last EDR Contact: 02/28/2020
Next Scheduled EDR Contact: 06/08/2020
Data Release Frequency: Varies

US MINES 3: Active Mines & Mineral Plants Database Listing

Active Mines and Mineral Processing Plant operations for commodities monitored by the Minerals Information Team of the USGS.

Date of Government Version: 04/14/2011
Date Data Arrived at EDR: 06/08/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 97

Source: USGS
Telephone: 703-648-7709
Last EDR Contact: 02/28/2020
Next Scheduled EDR Contact: 06/08/2020
Data Release Frequency: Varies

ABANDONED MINES: Abandoned Mines

An inventory of land and water impacted by past mining (primarily coal mining) is maintained by OSMRE to provide information needed to implement the Surface Mining Control and Reclamation Act of 1977 (SMCRA). The inventory contains information on the location, type, and extent of AML impacts, as well as, information on the cost associated with the reclamation of those problems. The inventory is based upon field surveys by State, Tribal, and OSMRE program officials. It is dynamic to the extent that it is modified as new problems are identified and existing problems are reclaimed.

Date of Government Version: 12/09/2019
Date Data Arrived at EDR: 12/11/2019
Date Made Active in Reports: 02/27/2020
Number of Days to Update: 78

Source: Department of Interior
Telephone: 202-208-2609
Last EDR Contact: 03/05/2020
Next Scheduled EDR Contact: 06/22/2020
Data Release Frequency: Quarterly

FINDS: Facility Index System/Facility Registry System

Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 11/22/2019
Date Data Arrived at EDR: 12/04/2019
Date Made Active in Reports: 03/02/2020
Number of Days to Update: 89

Source: EPA
Telephone: (415) 947-8000
Last EDR Contact: 03/03/2020
Next Scheduled EDR Contact: 06/15/2020
Data Release Frequency: Quarterly

DOCKET HWC: Hazardous Waste Compliance Docket Listing

A complete list of the Federal Agency Hazardous Waste Compliance Docket Facilities.

Date of Government Version: 05/31/2018
Date Data Arrived at EDR: 07/26/2018
Date Made Active in Reports: 10/05/2018
Number of Days to Update: 71

Source: Environmental Protection Agency
Telephone: 202-564-0527
Last EDR Contact: 02/21/2020
Next Scheduled EDR Contact: 06/08/2020
Data Release Frequency: Varies

ECHO: Enforcement & Compliance History Information
ECHO provides integrated compliance and enforcement information for about 800,000 regulated facilities nationwide.

Date of Government Version: 01/05/2020
Date Data Arrived at EDR: 01/07/2020
Date Made Active in Reports: 03/06/2020
Number of Days to Update: 59
Source: Environmental Protection Agency
Telephone: 202-564-2280
Last EDR Contact: 01/07/2020
Next Scheduled EDR Contact: 04/20/2020
Data Release Frequency: Quarterly

UXO: Unexploded Ordnance Sites
A listing of unexploded ordnance site locations

Date of Government Version: 12/31/2017
Date Data Arrived at EDR: 01/17/2019
Date Made Active in Reports: 04/01/2019
Number of Days to Update: 74
Source: Department of Defense
Telephone: 703-704-1564
Last EDR Contact: 01/13/2020
Next Scheduled EDR Contact: 04/27/2020
Data Release Frequency: Varies

FUELS PROGRAM: EPA Fuels Program Registered Listing
This listing includes facilities that are registered under the Part 80 (Code of Federal Regulations) EPA Fuels Programs. All companies now are required to submit new and updated registrations.

Date of Government Version: 11/18/2019
Date Data Arrived at EDR: 11/19/2019
Date Made Active in Reports: 01/28/2020
Number of Days to Update: 70
Source: EPA
Telephone: 800-385-6164
Last EDR Contact: 02/19/2020
Next Scheduled EDR Contact: 06/01/2020
Data Release Frequency: Quarterly

CA BOND EXP. PLAN: Bond Expenditure Plan
Department of Health Services developed a site-specific expenditure plan as the basis for an appropriation of Hazardous Substance Cleanup Bond Act funds. It is not updated.

Date of Government Version: 01/01/1989
Date Data Arrived at EDR: 07/27/1994
Date Made Active in Reports: 08/02/1994
Number of Days to Update: 6
Source: Department of Health Services
Telephone: 916-255-2118
Last EDR Contact: 05/31/1994
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

CORTESE: "Cortese" Hazardous Waste & Substances Sites List
The sites for the list are designated by the State Water Resource Control Board (LUST), the Integrated Waste Board (SWF/LS), and the Department of Toxic Substances Control (Cal-Sites).

Date of Government Version: 12/18/2019
Date Data Arrived at EDR: 12/20/2019
Date Made Active in Reports: 02/20/2020
Number of Days to Update: 62
Source: CAL EPA/Office of Emergency Information
Telephone: 916-323-3400
Last EDR Contact: 03/24/2020
Next Scheduled EDR Contact: 07/06/2020
Data Release Frequency: Quarterly

CUPA LIVERMORE-PLEASANTON: CUPA Facility Listing
list of facilities associated with the various CUPA programs in Livermore-Pleasanton

Date of Government Version: 05/01/2019
Date Data Arrived at EDR: 05/14/2019
Date Made Active in Reports: 07/17/2019
Number of Days to Update: 64
Source: Livermore-Pleasanton Fire Department
Telephone: 925-454-2361
Last EDR Contact: 02/14/2020
Next Scheduled EDR Contact: 05/25/2020
Data Release Frequency: Varies

CUPA SAN FRANCISCO CO: CUPA Facility Listing
Cupa facilities

Date of Government Version: 10/31/2019
Date Data Arrived at EDR: 11/01/2019
Date Made Active in Reports: 12/11/2019
Number of Days to Update: 40

Source: San Francisco County Department of Environmental Health
Telephone: 415-252-3896
Last EDR Contact: 01/31/2020
Next Scheduled EDR Contact: 05/18/2020
Data Release Frequency: Varies

DRYCLEAN AVAQMD: Antelope Valley Air Quality Management District Drycleaner Listing
A listing of dry cleaners in the Antelope Valley Air Quality Management District.

Date of Government Version: 12/02/2019
Date Data Arrived at EDR: 12/03/2019
Date Made Active in Reports: 02/04/2020
Number of Days to Update: 63

Source: Antelope Valley Air Quality Management District
Telephone: 661-723-8070
Last EDR Contact: 02/27/2020
Next Scheduled EDR Contact: 06/15/2020
Data Release Frequency: Varies

DRYCLEAN SOUTH COAST: South Coast Air Quality Management District Drycleaner Listing
A listing of dry cleaners in the South Coast Air Quality Management District

Date of Government Version: 09/27/2019
Date Data Arrived at EDR: 10/01/2019
Date Made Active in Reports: 11/07/2019
Number of Days to Update: 37

Source: South Coast Air Quality Management District
Telephone: 909-396-3211
Last EDR Contact: 02/21/2020
Next Scheduled EDR Contact: 06/08/2020
Data Release Frequency: Varies

DRYCLEANERS: Cleaner Facilities
A list of drycleaner related facilities that have EPA ID numbers. These are facilities with certain SIC codes: power laundries, family and commercial; garment pressing and cleaner's agents; linen supply; coin-operated laundries and cleaning; drycleaning plants, except rugs; carpet and upholster cleaning; industrial launderers; laundry and garment services.

Date of Government Version: 09/06/2019
Date Data Arrived at EDR: 10/11/2019
Date Made Active in Reports: 12/12/2019
Number of Days to Update: 62

Source: Department of Toxic Substance Control
Telephone: 916-327-4498
Last EDR Contact: 02/27/2020
Next Scheduled EDR Contact: 06/15/2020
Data Release Frequency: Annually

EMI: Emissions Inventory Data
Toxics and criteria pollutant emissions data collected by the ARB and local air pollution agencies.

Date of Government Version: 12/31/2017
Date Data Arrived at EDR: 06/24/2019
Date Made Active in Reports: 08/22/2019
Number of Days to Update: 59

Source: California Air Resources Board
Telephone: 916-322-2990
Last EDR Contact: 03/20/2020
Next Scheduled EDR Contact: 06/29/2020
Data Release Frequency: Varies

ENF: Enforcement Action Listing
A listing of Water Board Enforcement Actions. Formal is everything except Oral/Verbal Communication, Notice of Violation, Expedited Payment Letter, and Staff Enforcement Letter.

Date of Government Version: 07/19/2019
Date Data Arrived at EDR: 07/22/2019
Date Made Active in Reports: 09/26/2019
Number of Days to Update: 66

Source: State Water Resoruces Control Board
Telephone: 916-445-9379
Last EDR Contact: 01/22/2020
Next Scheduled EDR Contact: 05/04/2020
Data Release Frequency: Varies

Financial Assurance 1: Financial Assurance Information Listing
Financial Assurance information

Date of Government Version: 10/17/2019
Date Data Arrived at EDR: 10/22/2019
Date Made Active in Reports: 01/02/2020
Number of Days to Update: 72

Source: Department of Toxic Substances Control
Telephone: 916-255-3628
Last EDR Contact: 01/17/2020
Next Scheduled EDR Contact: 05/04/2020
Data Release Frequency: Varies

Financial Assurance 2: Financial Assurance Information Listing

A listing of financial assurance information for solid waste facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

Date of Government Version: 11/08/2019
Date Data Arrived at EDR: 11/12/2019
Date Made Active in Reports: 01/08/2020
Number of Days to Update: 57

Source: California Integrated Waste Management Board
Telephone: 916-341-6066
Last EDR Contact: 02/07/2020
Next Scheduled EDR Contact: 05/25/2020
Data Release Frequency: Varies

HAZNET: Facility and Manifest Data

Facility and Manifest Data. The data is extracted from the copies of hazardous waste manifests received each year by the DTSC. The annual volume of manifests is typically 700,000 - 1,000,000 annually, representing approximately 350,000 - 500,000 shipments. Data are from the manifests submitted without correction, and therefore many contain some invalid values for data elements such as generator ID, TSD ID, waste category, and disposal method. This database begins with calendar year 1993.

Date of Government Version: 12/31/2017
Date Data Arrived at EDR: 05/29/2019
Date Made Active in Reports: 07/22/2019
Number of Days to Update: 54

Source: California Environmental Protection Agency
Telephone: 916-255-1136
Last EDR Contact: 04/22/2019
Next Scheduled EDR Contact: 04/20/2020
Data Release Frequency: Annually

ICE: ICE

Contains data pertaining to the Permitted Facilities with Inspections / Enforcements sites tracked in Envirostor.

Date of Government Version: 11/18/2019
Date Data Arrived at EDR: 11/19/2019
Date Made Active in Reports: 01/23/2020
Number of Days to Update: 65

Source: Department of Toxic Subsances Control
Telephone: 877-786-9427
Last EDR Contact: 02/19/2020
Next Scheduled EDR Contact: 06/01/2020
Data Release Frequency: Quarterly

HIST CORTESE: Hazardous Waste & Substance Site List

The sites for the list are designated by the State Water Resource Control Board [LUST], the Integrated Waste Board [SWF/LS], and the Department of Toxic Substances Control [CALSITES]. This listing is no longer updated by the state agency.

Date of Government Version: 04/01/2001
Date Data Arrived at EDR: 01/22/2009
Date Made Active in Reports: 04/08/2009
Number of Days to Update: 76

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 01/22/2009
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

HWP: EnviroStor Permitted Facilities Listing

Detailed information on permitted hazardous waste facilities and corrective action ("cleanups") tracked in EnviroStor.

Date of Government Version: 11/18/2019
Date Data Arrived at EDR: 11/19/2019
Date Made Active in Reports: 01/23/2020
Number of Days to Update: 65

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 02/19/2020
Next Scheduled EDR Contact: 06/01/2020
Data Release Frequency: Quarterly

HWT: Registered Hazardous Waste Transporter Database

A listing of hazardous waste transporters. In California, unless specifically exempted, it is unlawful for any person to transport hazardous wastes unless the person holds a valid registration issued by DTSC. A hazardous waste transporter registration is valid for one year and is assigned a unique registration number.

Date of Government Version: 01/06/2020
Date Data Arrived at EDR: 01/07/2020
Date Made Active in Reports: 03/05/2020
Number of Days to Update: 58

Source: Department of Toxic Substances Control
Telephone: 916-440-7145
Last EDR Contact: 01/07/2020
Next Scheduled EDR Contact: 04/20/2020
Data Release Frequency: Quarterly

MINES: Mines Site Location Listing
A listing of mine site locations from the Office of Mine Reclamation.

Date of Government Version: 12/09/2019
Date Data Arrived at EDR: 12/10/2019
Date Made Active in Reports: 02/24/2020
Number of Days to Update: 76
Source: Department of Conservation
Telephone: 916-322-1080
Last EDR Contact: 03/10/2020
Next Scheduled EDR Contact: 06/22/2020
Data Release Frequency: Quarterly

MWMP: Medical Waste Management Program Listing
The Medical Waste Management Program (MWMP) ensures the proper handling and disposal of medical waste by permitting and inspecting medical waste Offsite Treatment Facilities (PDF) and Transfer Stations (PDF) throughout the state. MWMP also oversees all Medical Waste Transporters.

Date of Government Version: 11/22/2019
Date Data Arrived at EDR: 12/04/2019
Date Made Active in Reports: 02/04/2020
Number of Days to Update: 62
Source: Department of Public Health
Telephone: 916-558-1784
Last EDR Contact: 03/03/2020
Next Scheduled EDR Contact: 06/15/2020
Data Release Frequency: Varies

NPDES: NPDES Permits Listing
A listing of NPDES permits, including stormwater.

Date of Government Version: 11/11/2019
Date Data Arrived at EDR: 11/12/2019
Date Made Active in Reports: 01/08/2020
Number of Days to Update: 57
Source: State Water Resources Control Board
Telephone: 916-445-9379
Last EDR Contact: 02/11/2020
Next Scheduled EDR Contact: 05/25/2020
Data Release Frequency: Quarterly

PEST LIC: Pesticide Regulation Licenses Listing
A listing of licenses and certificates issued by the Department of Pesticide Regulation. The DPR issues licenses and/or certificates to: Persons and businesses that apply or sell pesticides; Pest control dealers and brokers; Persons who advise on agricultural pesticide applications.

Date of Government Version: 12/03/2019
Date Data Arrived at EDR: 12/04/2019
Date Made Active in Reports: 02/04/2020
Number of Days to Update: 62
Source: Department of Pesticide Regulation
Telephone: 916-445-4038
Last EDR Contact: 03/03/2020
Next Scheduled EDR Contact: 06/15/2020
Data Release Frequency: Quarterly

PROC: Certified Processors Database
A listing of certified processors.

Date of Government Version: 12/09/2019
Date Data Arrived at EDR: 12/10/2019
Date Made Active in Reports: 02/19/2020
Number of Days to Update: 71
Source: Department of Conservation
Telephone: 916-323-3836
Last EDR Contact: 03/10/2020
Next Scheduled EDR Contact: 06/22/2020
Data Release Frequency: Quarterly

NOTIFY 65: Proposition 65 Records
Listings of all Proposition 65 incidents reported to counties by the State Water Resources Control Board and the Regional Water Quality Control Board. This database is no longer updated by the reporting agency.

Date of Government Version: 12/11/2019
Date Data Arrived at EDR: 12/12/2019
Date Made Active in Reports: 02/21/2020
Number of Days to Update: 71
Source: State Water Resources Control Board
Telephone: 916-445-3846
Last EDR Contact: 03/12/2020
Next Scheduled EDR Contact: 06/29/2020
Data Release Frequency: No Update Planned

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

UIC: UIC Listing
A listing of wells identified as underground injection wells, in the California Oil and Gas Wells database.

Date of Government Version: 12/06/2019
Date Data Arrived at EDR: 12/10/2019
Date Made Active in Reports: 02/19/2020
Number of Days to Update: 71

Source: Deaprtment of Conservation
Telephone: 916-445-2408
Last EDR Contact: 03/10/2020
Next Scheduled EDR Contact: 06/22/2020
Data Release Frequency: Varies

UIC GEO: Underground Injection Control Sites (GEOTRACKER)
Underground control injection sites

Date of Government Version: 12/09/2019
Date Data Arrived at EDR: 12/10/2019
Date Made Active in Reports: 02/18/2020
Number of Days to Update: 70

Source: State Water Resource Control Board
Telephone: 866-480-1028
Last EDR Contact: 03/10/2020
Next Scheduled EDR Contact: 06/22/2020
Data Release Frequency: Varies

WASTEWATER PITS: Oil Wastewater Pits Listing
Water officials discovered that oil producers have been dumping chemical-laden wastewater into hundreds of unlined pits that are operating without proper permits. Inspections completed by the Central Valley Regional Water Quality Control Board revealed the existence of previously unidentified waste sites. The water boards review found that more than one-third of the region's active disposal pits are operating without permission.

Date of Government Version: 11/19/2019
Date Data Arrived at EDR: 01/07/2020
Date Made Active in Reports: 03/09/2020
Number of Days to Update: 62

Source: RWQCB, Central Valley Region
Telephone: 559-445-5577
Last EDR Contact: 01/07/2020
Next Scheduled EDR Contact: 04/20/2020
Data Release Frequency: Varies

WDS: Waste Discharge System
Sites which have been issued waste discharge requirements.

Date of Government Version: 06/19/2007
Date Data Arrived at EDR: 06/20/2007
Date Made Active in Reports: 06/29/2007
Number of Days to Update: 9

Source: State Water Resources Control Board
Telephone: 916-341-5227
Last EDR Contact: 02/14/2020
Next Scheduled EDR Contact: 06/01/2020
Data Release Frequency: No Update Planned

WIP: Well Investigation Program Case List
Well Investigation Program case in the San Gabriel and San Fernando Valley area.

Date of Government Version: 07/03/2009
Date Data Arrived at EDR: 07/21/2009
Date Made Active in Reports: 08/03/2009
Number of Days to Update: 13

Source: Los Angeles Water Quality Control Board
Telephone: 213-576-6726
Last EDR Contact: 03/18/2020
Next Scheduled EDR Contact: 07/06/2020
Data Release Frequency: No Update Planned

MILITARY PRIV SITES: Military Privatized Sites (GEOTRACKER)
Military privatized sites

Date of Government Version: 12/09/2019
Date Data Arrived at EDR: 12/10/2019
Date Made Active in Reports: 02/18/2020
Number of Days to Update: 70

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 03/10/2020
Next Scheduled EDR Contact: 06/22/2020
Data Release Frequency: Varies

PROJECT: Project Sites (GEOTRACKER)
Projects sites

Date of Government Version: 12/09/2019
Date Data Arrived at EDR: 12/10/2019
Date Made Active in Reports: 02/18/2020
Number of Days to Update: 70

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 03/10/2020
Next Scheduled EDR Contact: 06/22/2020
Data Release Frequency: Varies

WDR: Waste Discharge Requirements Listing

In general, the Waste Discharge Requirements (WDRs) Program (sometimes also referred to as the "Non Chapter 15 (Non 15) Program") regulates point discharges that are exempt pursuant to Subsection 20090 of Title 27 and not subject to the Federal Water Pollution Control Act. Exemptions from Title 27 may be granted for nine categories of discharges (e.g., sewage, wastewater, etc.) that meet, and continue to meet, the preconditions listed for each specific exemption. The scope of the WDRs Program also includes the discharge of wastes classified as inert, pursuant to section 20230 of Title 27.

Date of Government Version: 12/09/2019
Date Data Arrived at EDR: 12/10/2019
Date Made Active in Reports: 02/19/2020
Number of Days to Update: 71

Source: State Water Resources Control Board
Telephone: 916-341-5810
Last EDR Contact: 03/10/2020
Next Scheduled EDR Contact: 06/22/2020
Data Release Frequency: Quarterly

CIWQS: California Integrated Water Quality System

The California Integrated Water Quality System (CIWQS) is a computer system used by the State and Regional Water Quality Control Boards to track information about places of environmental interest, manage permits and other orders, track inspections, and manage violations and enforcement activities.

Date of Government Version: 12/03/2019
Date Data Arrived at EDR: 12/04/2019
Date Made Active in Reports: 02/04/2020
Number of Days to Update: 62

Source: State Water Resources Control Board
Telephone: 866-794-4977
Last EDR Contact: 03/03/2020
Next Scheduled EDR Contact: 06/15/2020
Data Release Frequency: Varies

CERS: CalEPA Regulated Site Portal Data

The CalEPA Regulated Site Portal database combines data about environmentally regulated sites and facilities in California into a single database. It combines data from a variety of state and federal databases, and provides an overview of regulated activities across the spectrum of environmental programs for any given location in California. These activities include hazardous materials and waste, state and federal cleanups, impacted ground and surface waters, and toxic materials

Date of Government Version: 10/21/2019
Date Data Arrived at EDR: 10/22/2019
Date Made Active in Reports: 01/03/2020
Number of Days to Update: 73

Source: California Environmental Protection Agency
Telephone: 916-323-2514
Last EDR Contact: 01/22/2020
Next Scheduled EDR Contact: 05/04/2020
Data Release Frequency: Varies

NON-CASE INFO: Non-Case Information Sites (GEOTRACKER)

Non-Case Information sites

Date of Government Version: 12/09/2019
Date Data Arrived at EDR: 12/10/2019
Date Made Active in Reports: 02/18/2020
Number of Days to Update: 70

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 03/10/2020
Next Scheduled EDR Contact: 06/22/2020
Data Release Frequency: Varies

OTHER OIL GAS: Other Oil & Gas Projects Sites (GEOTRACKER)

Other Oil & Gas Projects sites

Date of Government Version: 12/09/2019
Date Data Arrived at EDR: 12/10/2019
Date Made Active in Reports: 02/18/2020
Number of Days to Update: 70

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 03/10/2020
Next Scheduled EDR Contact: 06/22/2020
Data Release Frequency: Varies

PROD WATER PONDS: Produced Water Ponds Sites (GEOTRACKER)
Produced water ponds sites

Date of Government Version: 12/09/2019
Date Data Arrived at EDR: 12/10/2019
Date Made Active in Reports: 02/18/2020
Number of Days to Update: 70

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 03/10/2020
Next Scheduled EDR Contact: 06/22/2020
Data Release Frequency: Varies

SAMPLING POINT: Sampling Point ? Public Sites (GEOTRACKER)
Sampling point - public sites

Date of Government Version: 12/09/2019
Date Data Arrived at EDR: 12/10/2019
Date Made Active in Reports: 02/18/2020
Number of Days to Update: 70

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 03/10/2020
Next Scheduled EDR Contact: 06/22/2020
Data Release Frequency: Varies

WELL STIM PROJ: Well Stimulation Project (GEOTRACKER)
Includes areas of groundwater monitoring plans, a depiction of the monitoring network, and the facilities, boundaries, and subsurface characteristics of the oilfield and the features (oil and gas wells, produced water ponds, UIC wells, water supply wells, etc?) being monitored

Date of Government Version: 12/09/2019
Date Data Arrived at EDR: 12/10/2019
Date Made Active in Reports: 02/18/2020
Number of Days to Update: 70

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 03/10/2020
Next Scheduled EDR Contact: 06/22/2020
Data Release Frequency: Varies

HWTS: Hazardous Waste Tracking System
The Hazardous Waste Tracking System (HWTS) is the Department of Toxic Substances Control?s data repository for hazardous waste Identification (ID) numbers and manifest information. HWTS generates reports on hazardous waste shipments for generators, transporters, and TSDFs.

Date of Government Version: 10/15/2019
Date Data Arrived at EDR: 11/14/2019
Date Made Active in Reports: 02/07/2020
Number of Days to Update: 85

Source: Department of Toxic Substances Control
Telephone: 916-324-2444
Last EDR Contact: 03/26/2020
Next Scheduled EDR Contact: 07/20/2020
Data Release Frequency: Varies

MINES MRDS: Mineral Resources Data System
Mineral Resources Data System

Date of Government Version: 04/06/2018
Date Data Arrived at EDR: 10/21/2019
Date Made Active in Reports: 10/24/2019
Number of Days to Update: 3

Source: USGS
Telephone: 703-648-6533
Last EDR Contact: 02/28/2020
Next Scheduled EDR Contact: 06/08/2020
Data Release Frequency: Varies

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP: EDR Proprietary Manufactured Gas Plants
The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oily waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

EDR Hist Auto: EDR Exclusive Historical Auto Stations

EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR Hist Cleaner: EDR Exclusive Historical Cleaners

EDR has searched selected national collections of business directories and has collected listings of potential dry cleaner sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include dry cleaning establishments. The categories reviewed included, but were not limited to dry cleaners, cleaners, laundry, laundromat, cleaning/laundry, wash & dry etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA LF: Recovered Government Archive Solid Waste Facilities List

The EDR Recovered Government Archive Landfill database provides a list of landfills derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Resources Recycling and Recovery in California.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 01/13/2014
Number of Days to Update: 196

Source: Department of Resources Recycling and Recovery
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

RGA LUST: Recovered Government Archive Leaking Underground Storage Tank

The EDR Recovered Government Archive Leaking Underground Storage Tank database provides a list of LUST incidents derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the State Water Resources Control Board in California.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 12/30/2013
Number of Days to Update: 182

Source: State Water Resources Control Board
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

COUNTY RECORDS

ALAMEDA COUNTY:

CS ALAMEDA: Contaminated Sites
A listing of contaminated sites overseen by the Toxic Release Program (oil and groundwater contamination from chemical releases and spills) and the Leaking Underground Storage Tank Program (soil and ground water contamination from leaking petroleum USTs).

Date of Government Version: 01/09/2019
Date Data Arrived at EDR: 01/11/2019
Date Made Active in Reports: 03/05/2019
Number of Days to Update: 53

Source: Alameda County Environmental Health Services
Telephone: 510-567-6700
Last EDR Contact: 03/26/2020
Next Scheduled EDR Contact: 07/20/2020
Data Release Frequency: Semi-Annually

UST ALAMEDA: Underground Tanks
Underground storage tank sites located in Alameda county.

Date of Government Version: 01/06/2020
Date Data Arrived at EDR: 01/07/2020
Date Made Active in Reports: 03/06/2020
Number of Days to Update: 59

Source: Alameda County Environmental Health Services
Telephone: 510-567-6700
Last EDR Contact: 03/26/2020
Next Scheduled EDR Contact: 07/24/2047
Data Release Frequency: Semi-Annually

AMADOR COUNTY:

CUPA AMADOR: CUPA Facility List
Cupa Facility List

Date of Government Version: 09/06/2019
Date Data Arrived at EDR: 09/10/2019
Date Made Active in Reports: 10/31/2019
Number of Days to Update: 51

Source: Amador County Environmental Health
Telephone: 209-223-6439
Last EDR Contact: 02/27/2020
Next Scheduled EDR Contact: 06/15/2020
Data Release Frequency: Varies

BUTTE COUNTY:

CUPA BUTTE: CUPA Facility Listing
Cupa facility list.

Date of Government Version: 04/21/2017
Date Data Arrived at EDR: 04/25/2017
Date Made Active in Reports: 08/09/2017
Number of Days to Update: 106

Source: Public Health Department
Telephone: 530-538-7149
Last EDR Contact: 03/26/2020
Next Scheduled EDR Contact: 07/20/2020
Data Release Frequency: No Update Planned

CALVERAS COUNTY:

CUPA CALVERAS: CUPA Facility Listing
Cupa Facility Listing

Date of Government Version: 12/02/2019
Date Data Arrived at EDR: 12/03/2019
Date Made Active in Reports: 02/04/2020
Number of Days to Update: 63

Source: Calveras County Environmental Health
Telephone: 209-754-6399
Last EDR Contact: 03/18/2020
Next Scheduled EDR Contact: 07/06/2020
Data Release Frequency: Quarterly

COLUSA COUNTY:

CUPA COLUSA: CUPA Facility List
Cupa facility list.

Date of Government Version: 08/14/2019
Date Data Arrived at EDR: 08/20/2019
Date Made Active in Reports: 10/18/2019
Number of Days to Update: 59

Source: Health & Human Services
Telephone: 530-458-0396
Last EDR Contact: 02/27/2020
Next Scheduled EDR Contact: 05/18/2020
Data Release Frequency: Semi-Annually

CONTRA COSTA COUNTY:

SL CONTRA COSTA: Site List
List includes sites from the underground tank, hazardous waste generator and business plan/2185 programs.

Date of Government Version: 12/02/2019
Date Data Arrived at EDR: 12/04/2019
Date Made Active in Reports: 02/04/2020
Number of Days to Update: 62

Source: Contra Costa Health Services Department
Telephone: 925-646-2286
Last EDR Contact: 01/27/2020
Next Scheduled EDR Contact: 05/11/2020
Data Release Frequency: Semi-Annually

DEL NORTE COUNTY:

CUPA DEL NORTE: CUPA Facility List
Cupa Facility list

Date of Government Version: 10/11/2019
Date Data Arrived at EDR: 10/29/2019
Date Made Active in Reports: 12/11/2019
Number of Days to Update: 43

Source: Del Norte County Environmental Health Division
Telephone: 707-465-0426
Last EDR Contact: 01/24/2020
Next Scheduled EDR Contact: 05/11/2020
Data Release Frequency: Varies

EL DORADO COUNTY:

CUPA EL DORADO: CUPA Facility List
CUPA facility list.

Date of Government Version: 12/31/2019
Date Data Arrived at EDR: 01/03/2020
Date Made Active in Reports: 03/05/2020
Number of Days to Update: 62

Source: El Dorado County Environmental Management Department
Telephone: 530-621-6623
Last EDR Contact: 01/03/2020
Next Scheduled EDR Contact: 05/11/2020
Data Release Frequency: Varies

FRESNO COUNTY:

CUPA FRESNO: CUPA Resources List
Certified Unified Program Agency. CUPA's are responsible for implementing a unified hazardous materials and hazardous waste management regulatory program. The agency provides oversight of businesses that deal with hazardous materials, operate underground storage tanks or aboveground storage tanks.

Date of Government Version: 10/08/2019
Date Data Arrived at EDR: 10/10/2019
Date Made Active in Reports: 12/11/2019
Number of Days to Update: 62

Source: Dept. of Community Health
Telephone: 559-445-3271
Last EDR Contact: 03/31/2020
Next Scheduled EDR Contact: 07/13/2020
Data Release Frequency: Semi-Annually

GLENN COUNTY:

CUPA GLENN: CUPA Facility List
Cupa facility list

Date of Government Version: 01/22/2018
Date Data Arrived at EDR: 01/24/2018
Date Made Active in Reports: 03/14/2018
Number of Days to Update: 49

Source: Glenn County Air Pollution Control District
Telephone: 830-934-6500
Last EDR Contact: 01/17/2020
Next Scheduled EDR Contact: 05/04/2020
Data Release Frequency: No Update Planned

HUMBOLDT COUNTY:

CUPA HUMBOLDT: CUPA Facility List
CUPA facility list.

Date of Government Version: 11/13/2019
Date Data Arrived at EDR: 11/14/2019
Date Made Active in Reports: 01/23/2020
Number of Days to Update: 70

Source: Humboldt County Environmental Health
Telephone: N/A
Last EDR Contact: 03/26/2020
Next Scheduled EDR Contact: 06/01/2020
Data Release Frequency: Semi-Annually

IMPERIAL COUNTY:

CUPA IMPERIAL: CUPA Facility List
Cupa facility list.

Date of Government Version: 01/21/2020
Date Data Arrived at EDR: 01/23/2020
Date Made Active in Reports: 03/30/2020
Number of Days to Update: 67

Source: San Diego Border Field Office
Telephone: 760-339-2777
Last EDR Contact: 01/17/2020
Next Scheduled EDR Contact: 05/04/2020
Data Release Frequency: Varies

INYO COUNTY:

CUPA INYO: CUPA Facility List
Cupa facility list.

Date of Government Version: 04/02/2018
Date Data Arrived at EDR: 04/03/2018
Date Made Active in Reports: 06/14/2018
Number of Days to Update: 72

Source: Inyo County Environmental Health Services
Telephone: 760-878-0238
Last EDR Contact: 02/13/2020
Next Scheduled EDR Contact: 06/01/2020
Data Release Frequency: Varies

KERN COUNTY:

UST KERN: Underground Storage Tank Sites & Tank Listing
Kern County Sites and Tanks Listing.

Date of Government Version: 10/28/2019
Date Data Arrived at EDR: 11/05/2019
Date Made Active in Reports: 01/08/2020
Number of Days to Update: 64

Source: Kern County Environment Health Services Department
Telephone: 661-862-8700
Last EDR Contact: 01/31/2020
Next Scheduled EDR Contact: 05/18/2020
Data Release Frequency: Quarterly

KINGS COUNTY:

CUPA KINGS: CUPA Facility List

A listing of sites included in the county's Certified Unified Program Agency database. California's Secretary for Environmental Protection established the unified hazardous materials and hazardous waste regulatory program as required by chapter 6.11 of the California Health and Safety Code. The Unified Program consolidates the administration, permits, inspections, and enforcement activities.

Date of Government Version: 11/25/2019
Date Data Arrived at EDR: 12/05/2019
Date Made Active in Reports: 02/04/2020
Number of Days to Update: 61

Source: Kings County Department of Public Health
Telephone: 559-584-1411
Last EDR Contact: 02/13/2020
Next Scheduled EDR Contact: 06/01/2020
Data Release Frequency: Varies

LAKE COUNTY:

CUPA LAKE: CUPA Facility List

Cupa facility list

Date of Government Version: 08/16/2019
Date Data Arrived at EDR: 08/20/2019
Date Made Active in Reports: 10/18/2019
Number of Days to Update: 59

Source: Lake County Environmental Health
Telephone: 707-263-1164
Last EDR Contact: 01/08/2020
Next Scheduled EDR Contact: 04/27/2020
Data Release Frequency: Varies

LASSEN COUNTY:

CUPA LASSEN: CUPA Facility List

Cupa facility list

Date of Government Version: 07/22/2019
Date Data Arrived at EDR: 07/23/2019
Date Made Active in Reports: 09/26/2019
Number of Days to Update: 65

Source: Lassen County Environmental Health
Telephone: 530-251-8528
Last EDR Contact: 01/17/2020
Next Scheduled EDR Contact: 05/04/2020
Data Release Frequency: Varies

LOS ANGELES COUNTY:

AOCONCERN: Key Areas of Concerns in Los Angeles County

San Gabriel Valley areas where VOC contamination is at or above the MCL as designated by region 9 EPA office. Date of Government Version: 3/30/2009 Exide Site area is a cleanup plan of lead-impacted soil surrounding the former Exide Facility as designated by the DTSC. Date of Government Version: 7/17/2017

Date of Government Version: 03/30/2009
Date Data Arrived at EDR: 03/31/2009
Date Made Active in Reports: 10/23/2009
Number of Days to Update: 206

Source: N/A
Telephone: N/A
Last EDR Contact: 03/12/2020
Next Scheduled EDR Contact: 06/29/2020
Data Release Frequency: No Update Planned

HMS LOS ANGELES: HMS: Street Number List

Industrial Waste and Underground Storage Tank Sites.

Date of Government Version: 01/15/2020
Date Data Arrived at EDR: 01/16/2020
Date Made Active in Reports: 02/07/2020
Number of Days to Update: 22

Source: Department of Public Works
Telephone: 626-458-3517
Last EDR Contact: 03/26/2020
Next Scheduled EDR Contact: 07/20/2020
Data Release Frequency: Semi-Annually

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

LF LOS ANGELES: List of Solid Waste Facilities
Solid Waste Facilities in Los Angeles County.

Date of Government Version: 01/13/2020
Date Data Arrived at EDR: 01/14/2020
Date Made Active in Reports: 03/24/2020
Number of Days to Update: 70

Source: La County Department of Public Works
Telephone: 818-458-5185
Last EDR Contact: 01/14/2020
Next Scheduled EDR Contact: 04/27/2020
Data Release Frequency: Varies

LF LOS ANGELES CITY: City of Los Angeles Landfills
Landfills owned and maintained by the City of Los Angeles.

Date of Government Version: 01/01/2019
Date Data Arrived at EDR: 01/15/2019
Date Made Active in Reports: 03/07/2019
Number of Days to Update: 51

Source: Engineering & Construction Division
Telephone: 213-473-7869
Last EDR Contact: 01/13/2020
Next Scheduled EDR Contact: 04/27/2020
Data Release Frequency: Varies

LOS ANGELES AST: Active & Inactive AST Inventory
A listing of active & inactive above ground petroleum storage tank site locations, located in the City of Los Angeles.

Date of Government Version: 06/01/2019
Date Data Arrived at EDR: 06/25/2019
Date Made Active in Reports: 08/22/2019
Number of Days to Update: 58

Source: Los Angeles Fire Department
Telephone: 213-978-3800
Last EDR Contact: 03/27/2020
Next Scheduled EDR Contact: 07/06/2020
Data Release Frequency: Varies

LOS ANGELES CO LF METHANE: Methane Producing Landfills
This data was created on April 30, 2012 to represent known disposal sites in Los Angeles County that may produce and emanate methane gas. The shapefile contains disposal sites within Los Angeles County that once accepted degradable refuse material. Information used to create this data was extracted from a landfill survey performed by County Engineers (Major Waste System Map, 1973) as well as historical records from CalRecycle, Regional Water Quality Control Board, and Los Angeles County Department of Public Health

Date of Government Version: 04/30/2012
Date Data Arrived at EDR: 04/17/2019
Date Made Active in Reports: 05/29/2019
Number of Days to Update: 42

Source: Los Angeles County Department of Public Works
Telephone: 626-458-6973
Last EDR Contact: 01/17/2020
Next Scheduled EDR Contact: 04/27/2020
Data Release Frequency: No Update Planned

LOS ANGELES HM: Active & Inactive Hazardous Materials Inventory
A listing of active & inactive hazardous materials facility locations, located in the City of Los Angeles.

Date of Government Version: 06/01/2019
Date Data Arrived at EDR: 06/25/2019
Date Made Active in Reports: 08/22/2019
Number of Days to Update: 58

Source: Los Angeles Fire Department
Telephone: 213-978-3800
Last EDR Contact: 03/27/2020
Next Scheduled EDR Contact: 07/06/2020
Data Release Frequency: Varies

LOS ANGELES UST: Active & Inactive UST Inventory
A listing of active & inactive underground storage tank site locations and underground storage tank historical sites, located in the City of Los Angeles.

Date of Government Version: 06/01/2019
Date Data Arrived at EDR: 06/25/2019
Date Made Active in Reports: 08/22/2019
Number of Days to Update: 58

Source: Los Angeles Fire Department
Telephone: 213-978-3800
Last EDR Contact: 03/27/2020
Next Scheduled EDR Contact: 07/06/2020
Data Release Frequency: Varies

SITE MIT LOS ANGELES: Site Mitigation List
Industrial sites that have had some sort of spill or complaint.

Date of Government Version: 12/31/2019
Date Data Arrived at EDR: 01/14/2020
Date Made Active in Reports: 03/24/2020
Number of Days to Update: 70

Source: Community Health Services
Telephone: 323-890-7806
Last EDR Contact: 01/14/2020
Next Scheduled EDR Contact: 04/27/2020
Data Release Frequency: Annually

UST EL SEGUNDO: City of El Segundo Underground Storage Tank
Underground storage tank sites located in El Segundo city.

Date of Government Version: 01/21/2017
Date Data Arrived at EDR: 04/19/2017
Date Made Active in Reports: 05/10/2017
Number of Days to Update: 21

Source: City of El Segundo Fire Department
Telephone: 310-524-2236
Last EDR Contact: 01/13/2020
Next Scheduled EDR Contact: 04/27/2020
Data Release Frequency: No Update Planned

UST LONG BEACH: City of Long Beach Underground Storage Tank
Underground storage tank sites located in the city of Long Beach.

Date of Government Version: 04/22/2019
Date Data Arrived at EDR: 04/23/2019
Date Made Active in Reports: 06/27/2019
Number of Days to Update: 65

Source: City of Long Beach Fire Department
Telephone: 562-570-2563
Last EDR Contact: 01/17/2020
Next Scheduled EDR Contact: 05/04/2020
Data Release Frequency: Varies

UST TORRANCE: City of Torrance Underground Storage Tank
Underground storage tank sites located in the city of Torrance.

Date of Government Version: 06/27/2019
Date Data Arrived at EDR: 07/30/2019
Date Made Active in Reports: 10/02/2019
Number of Days to Update: 64

Source: City of Torrance Fire Department
Telephone: 310-618-2973
Last EDR Contact: 01/17/2020
Next Scheduled EDR Contact: 05/04/2020
Data Release Frequency: Semi-Annually

MADERA COUNTY:

CUPA MADERA: CUPA Facility List
A listing of sites included in the county's Certified Unified Program Agency database. California's Secretary for Environmental Protection established the unified hazardous materials and hazardous waste regulatory program as required by chapter 6.11 of the California Health and Safety Code. The Unified Program consolidates the administration, permits, inspections, and enforcement activities.

Date of Government Version: 11/18/2019
Date Data Arrived at EDR: 11/20/2019
Date Made Active in Reports: 01/27/2020
Number of Days to Update: 68

Source: Madera County Environmental Health
Telephone: 559-675-7823
Last EDR Contact: 02/14/2020
Next Scheduled EDR Contact: 06/01/2020
Data Release Frequency: Varies

MARIN COUNTY:

UST MARIN: Underground Storage Tank Sites
Currently permitted USTs in Marin County.

Date of Government Version: 09/26/2018
Date Data Arrived at EDR: 10/04/2018
Date Made Active in Reports: 11/02/2018
Number of Days to Update: 29

Source: Public Works Department Waste Management
Telephone: 415-473-6647
Last EDR Contact: 12/19/2019
Next Scheduled EDR Contact: 04/13/2020
Data Release Frequency: Semi-Annually

MERCED COUNTY:

CUPA MERCED: CUPA Facility List
CUPA facility list.

Date of Government Version: 11/18/2019
Date Data Arrived at EDR: 11/20/2019
Date Made Active in Reports: 01/03/2020
Number of Days to Update: 44

Source: Merced County Environmental Health
Telephone: 209-381-1094
Last EDR Contact: 02/13/2020
Next Scheduled EDR Contact: 06/01/2020
Data Release Frequency: Varies

MONO COUNTY:

CUPA MONO: CUPA Facility List
CUPA Facility List

Date of Government Version: 11/20/2019
Date Data Arrived at EDR: 12/02/2019
Date Made Active in Reports: 02/07/2020
Number of Days to Update: 67

Source: Mono County Health Department
Telephone: 760-932-5580
Last EDR Contact: 02/21/2020
Next Scheduled EDR Contact: 06/08/2020
Data Release Frequency: Varies

MONTEREY COUNTY:

CUPA MONTEREY: CUPA Facility Listing
CUPA Program listing from the Environmental Health Division.

Date of Government Version: 11/06/2019
Date Data Arrived at EDR: 11/07/2019
Date Made Active in Reports: 01/08/2020
Number of Days to Update: 62

Source: Monterey County Health Department
Telephone: 831-796-1297
Last EDR Contact: 03/25/2020
Next Scheduled EDR Contact: 07/13/2020
Data Release Frequency: Varies

NAPA COUNTY:

LUST NAPA: Sites With Reported Contamination
A listing of leaking underground storage tank sites located in Napa county.

Date of Government Version: 01/09/2017
Date Data Arrived at EDR: 01/11/2017
Date Made Active in Reports: 03/02/2017
Number of Days to Update: 50

Source: Napa County Department of Environmental Management
Telephone: 707-253-4269
Last EDR Contact: 02/21/2020
Next Scheduled EDR Contact: 06/08/2020
Data Release Frequency: No Update Planned

UST NAPA: Closed and Operating Underground Storage Tank Sites
Underground storage tank sites located in Napa county.

Date of Government Version: 09/05/2019
Date Data Arrived at EDR: 09/09/2019
Date Made Active in Reports: 10/31/2019
Number of Days to Update: 52

Source: Napa County Department of Environmental Management
Telephone: 707-253-4269
Last EDR Contact: 03/05/2020
Next Scheduled EDR Contact: 06/08/2020
Data Release Frequency: No Update Planned

NEVADA COUNTY:

CUPA NEVADA: CUPA Facility List
CUPA facility list.

Date of Government Version: 10/30/2019
Date Data Arrived at EDR: 10/30/2019
Date Made Active in Reports: 12/11/2019
Number of Days to Update: 42

Source: Community Development Agency
Telephone: 530-265-1467
Last EDR Contact: 01/24/2020
Next Scheduled EDR Contact: 05/11/2020
Data Release Frequency: Varies

ORANGE COUNTY:

IND_SITE ORANGE: List of Industrial Site Cleanups
Petroleum and non-petroleum spills.

Date of Government Version: 10/04/2019
Date Data Arrived at EDR: 12/02/2019
Date Made Active in Reports: 02/04/2020
Number of Days to Update: 64

Source: Health Care Agency
Telephone: 714-834-3446
Last EDR Contact: 02/03/2020
Next Scheduled EDR Contact: 05/18/2020
Data Release Frequency: Annually

LUST ORANGE: List of Underground Storage Tank Cleanups
Orange County Underground Storage Tank Cleanups (LUST).

Date of Government Version: 10/04/2019
Date Data Arrived at EDR: 12/02/2019
Date Made Active in Reports: 02/04/2020
Number of Days to Update: 64

Source: Health Care Agency
Telephone: 714-834-3446
Last EDR Contact: 02/03/2020
Next Scheduled EDR Contact: 05/18/2020
Data Release Frequency: Quarterly

UST ORANGE: List of Underground Storage Tank Facilities
Orange County Underground Storage Tank Facilities (UST).

Date of Government Version: 10/04/2019
Date Data Arrived at EDR: 11/05/2019
Date Made Active in Reports: 01/08/2020
Number of Days to Update: 64

Source: Health Care Agency
Telephone: 714-834-3446
Last EDR Contact: 02/04/2020
Next Scheduled EDR Contact: 05/18/2020
Data Release Frequency: Quarterly

PLACER COUNTY:

MS PLACER: Master List of Facilities
List includes aboveground tanks, underground tanks and cleanup sites.

Date of Government Version: 12/02/2019
Date Data Arrived at EDR: 12/03/2019
Date Made Active in Reports: 02/07/2020
Number of Days to Update: 66

Source: Placer County Health and Human Services
Telephone: 530-745-2363
Last EDR Contact: 02/27/2020
Next Scheduled EDR Contact: 06/15/2020
Data Release Frequency: Semi-Annually

PLUMAS COUNTY:

CUPA PLUMAS: CUPA Facility List
Plumas County CUPA Program facilities.

Date of Government Version: 03/31/2019
Date Data Arrived at EDR: 04/23/2019
Date Made Active in Reports: 06/26/2019
Number of Days to Update: 64

Source: Plumas County Environmental Health
Telephone: 530-283-6355
Last EDR Contact: 01/17/2020
Next Scheduled EDR Contact: 05/04/2020
Data Release Frequency: Varies

RIVERSIDE COUNTY:

LUST RIVERSIDE: Listing of Underground Tank Cleanup Sites
Riverside County Underground Storage Tank Cleanup Sites (LUST).

Date of Government Version: 10/17/2019
Date Data Arrived at EDR: 10/22/2019
Date Made Active in Reports: 12/13/2019
Number of Days to Update: 52
Source: Department of Environmental Health
Telephone: 951-358-5055
Last EDR Contact: 02/10/2020
Next Scheduled EDR Contact: 06/29/2020
Data Release Frequency: Quarterly

UST RIVERSIDE: Underground Storage Tank Tank List
Underground storage tank sites located in Riverside county.

Date of Government Version: 10/17/2019
Date Data Arrived at EDR: 10/22/2019
Date Made Active in Reports: 01/03/2020
Number of Days to Update: 73
Source: Department of Environmental Health
Telephone: 951-358-5055
Last EDR Contact: 02/10/2020
Next Scheduled EDR Contact: 06/29/2020
Data Release Frequency: Quarterly

SACRAMENTO COUNTY:

CS SACRAMENTO: Toxic Site Clean-Up List
List of sites where unauthorized releases of potentially hazardous materials have occurred.

Date of Government Version: 11/14/2019
Date Data Arrived at EDR: 12/23/2019
Date Made Active in Reports: 02/20/2020
Number of Days to Update: 59
Source: Sacramento County Environmental Management
Telephone: 916-875-8406
Last EDR Contact: 03/31/2020
Next Scheduled EDR Contact: 07/13/2020
Data Release Frequency: Quarterly

ML SACRAMENTO: Master Hazardous Materials Facility List
Any business that has hazardous materials on site - hazardous material storage sites, underground storage tanks, waste generators.

Date of Government Version: 11/14/2019
Date Data Arrived at EDR: 12/23/2019
Date Made Active in Reports: 02/21/2020
Number of Days to Update: 60
Source: Sacramento County Environmental Management
Telephone: 916-875-8406
Last EDR Contact: 03/31/2020
Next Scheduled EDR Contact: 07/13/2020
Data Release Frequency: Quarterly

SAN BENITO COUNTY:

CUPA SAN BENITO: CUPA Facility List
Cupa facility list

Date of Government Version: 11/14/2019
Date Data Arrived at EDR: 11/15/2019
Date Made Active in Reports: 01/23/2020
Number of Days to Update: 69
Source: San Benito County Environmental Health
Telephone: N/A
Last EDR Contact: 01/31/2020
Next Scheduled EDR Contact: 05/18/2020
Data Release Frequency: Varies

SAN BERNARDINO COUNTY:

PERMITS SAN BERNARDINO: Hazardous Material Permits
This listing includes underground storage tanks, medical waste handlers/generators, hazardous materials handlers, hazardous waste generators, and waste oil generators/handlers.

Date of Government Version: 11/26/2019
Date Data Arrived at EDR: 11/27/2019
Date Made Active in Reports: 02/04/2020
Number of Days to Update: 69

Source: San Bernardino County Fire Department Hazardous Materials Division
Telephone: 909-387-3041
Last EDR Contact: 02/03/2020
Next Scheduled EDR Contact: 05/18/2020
Data Release Frequency: Quarterly

SAN DIEGO COUNTY:

HMMD SAN DIEGO: Hazardous Materials Management Division Database

The database includes: HE58 - This report contains the business name, site address, business phone number, establishment 'H' permit number, type of permit, and the business status. HE17 - In addition to providing the same information provided in the HE58 listing, HE17 provides inspection dates, violations received by the establishment, hazardous waste generated, the quantity, method of storage, treatment/disposal of waste and the hauler, and information on underground storage tanks. Unauthorized Release List - Includes a summary of environmental contamination cases in San Diego County (underground tank cases, non-tank cases, groundwater contamination, and soil contamination are included.)

Date of Government Version: 12/03/2019
Date Data Arrived at EDR: 12/04/2019
Date Made Active in Reports: 02/04/2020
Number of Days to Update: 62

Source: Hazardous Materials Management Division
Telephone: 619-338-2268
Last EDR Contact: 03/03/2020
Next Scheduled EDR Contact: 06/15/2020
Data Release Frequency: Quarterly

LF SAN DIEGO: Solid Waste Facilities

San Diego County Solid Waste Facilities.

Date of Government Version: 04/18/2018
Date Data Arrived at EDR: 04/24/2018
Date Made Active in Reports: 06/19/2018
Number of Days to Update: 56

Source: Department of Health Services
Telephone: 619-338-2209
Last EDR Contact: 01/17/2020
Next Scheduled EDR Contact: 05/04/2020
Data Release Frequency: Varies

SAN DIEGO CO LOP: Local Oversight Program Listing

A listing of all LOP release sites that are or were under the County of San Diego's jurisdiction. Included are closed or transferred cases, open cases, and cases that did not have a case type indicated. The cases without a case type are mostly complaints; however, some of them could be LOP cases.

Date of Government Version: 10/16/2019
Date Data Arrived at EDR: 10/22/2019
Date Made Active in Reports: 12/13/2019
Number of Days to Update: 52

Source: Department of Environmental Health
Telephone: 858-505-6874
Last EDR Contact: 01/17/2020
Next Scheduled EDR Contact: 05/04/2020
Data Release Frequency: Varies

SAN DIEGO CO SAM: Environmental Case Listing

The listing contains all underground tank release cases and projects pertaining to properties contaminated with hazardous substances that are actively under review by the Site Assessment and Mitigation Program.

Date of Government Version: 03/23/2010
Date Data Arrived at EDR: 06/15/2010
Date Made Active in Reports: 07/09/2010
Number of Days to Update: 24

Source: San Diego County Department of Environmental Health
Telephone: 619-338-2371
Last EDR Contact: 02/27/2020
Next Scheduled EDR Contact: 06/15/2020
Data Release Frequency: No Update Planned

SAN FRANCISCO COUNTY:

LUST SAN FRANCISCO: Local Oversite Facilities

A listing of leaking underground storage tank sites located in San Francisco county.

Date of Government Version: 09/19/2008
Date Data Arrived at EDR: 09/19/2008
Date Made Active in Reports: 09/29/2008
Number of Days to Update: 10

Source: Department Of Public Health San Francisco County
Telephone: 415-252-3920
Last EDR Contact: 01/31/2020
Next Scheduled EDR Contact: 05/18/2020
Data Release Frequency: No Update Planned

UST SAN FRANCISCO: Underground Storage Tank Information
Underground storage tank sites located in San Francisco county.

Date of Government Version: 01/08/2020
Date Data Arrived at EDR: 01/09/2020
Date Made Active in Reports: 03/06/2020
Number of Days to Update: 57

Source: Department of Public Health
Telephone: 415-252-3920
Last EDR Contact: 01/07/2020
Next Scheduled EDR Contact: 05/18/2020
Data Release Frequency: Quarterly

SAN JOAQUIN COUNTY:

UST SAN JOAQUIN: San Joaquin Co. UST
A listing of underground storage tank locations in San Joaquin county.

Date of Government Version: 06/22/2018
Date Data Arrived at EDR: 06/26/2018
Date Made Active in Reports: 07/11/2018
Number of Days to Update: 15

Source: Environmental Health Department
Telephone: N/A
Last EDR Contact: 03/12/2020
Next Scheduled EDR Contact: 06/29/2020
Data Release Frequency: Semi-Annually

SAN LUIS OBISPO COUNTY:

CUPA SAN LUIS OBISPO: CUPA Facility List
Cupa Facility List.

Date of Government Version: 12/12/2019
Date Data Arrived at EDR: 12/13/2019
Date Made Active in Reports: 02/20/2020
Number of Days to Update: 69

Source: San Luis Obispo County Public Health Department
Telephone: 805-781-5596
Last EDR Contact: 02/14/2020
Next Scheduled EDR Contact: 06/01/2020
Data Release Frequency: Varies

SAN MATEO COUNTY:

BI SAN MATEO: Business Inventory
List includes Hazardous Materials Business Plan, hazardous waste generators, and underground storage tanks.

Date of Government Version: 09/03/2019
Date Data Arrived at EDR: 09/09/2019
Date Made Active in Reports: 11/05/2019
Number of Days to Update: 57

Source: San Mateo County Environmental Health Services Division
Telephone: 650-363-1921
Last EDR Contact: 02/20/2020
Next Scheduled EDR Contact: 06/22/2020
Data Release Frequency: Annually

LUST SAN MATEO: Fuel Leak List
A listing of leaking underground storage tank sites located in San Mateo county.

Date of Government Version: 03/29/2019
Date Data Arrived at EDR: 03/29/2019
Date Made Active in Reports: 05/29/2019
Number of Days to Update: 61

Source: San Mateo County Environmental Health Services Division
Telephone: 650-363-1921
Last EDR Contact: 03/05/2020
Next Scheduled EDR Contact: 06/22/2020
Data Release Frequency: Semi-Annually

SANTA BARBARA COUNTY:

CUPA SANTA BARBARA: CUPA Facility Listing
CUPA Program Listing from the Environmental Health Services division.

Date of Government Version: 09/08/2011
Date Data Arrived at EDR: 09/09/2011
Date Made Active in Reports: 10/07/2011
Number of Days to Update: 28

Source: Santa Barbara County Public Health Department
Telephone: 805-686-8167
Last EDR Contact: 02/14/2020
Next Scheduled EDR Contact: 06/01/2020
Data Release Frequency: No Update Planned

SANTA CLARA COUNTY:

CUPA SANTA CLARA: Cupa Facility List
Cupa facility list

Date of Government Version: 11/18/2019
Date Data Arrived at EDR: 11/19/2019
Date Made Active in Reports: 01/23/2020
Number of Days to Update: 65

Source: Department of Environmental Health
Telephone: 408-918-1973
Last EDR Contact: 02/14/2020
Next Scheduled EDR Contact: 06/01/2020
Data Release Frequency: Varies

HIST LUST SANTA CLARA: HIST LUST - Fuel Leak Site Activity Report
A listing of open and closed leaking underground storage tanks. This listing is no longer updated by the county. Leaking underground storage tanks are now handled by the Department of Environmental Health.

Date of Government Version: 03/29/2005
Date Data Arrived at EDR: 03/30/2005
Date Made Active in Reports: 04/21/2005
Number of Days to Update: 22

Source: Santa Clara Valley Water District
Telephone: 408-265-2600
Last EDR Contact: 03/23/2009
Next Scheduled EDR Contact: 06/22/2009
Data Release Frequency: No Update Planned

LUST SANTA CLARA: LOP Listing
A listing of leaking underground storage tanks located in Santa Clara county.

Date of Government Version: 03/03/2014
Date Data Arrived at EDR: 03/05/2014
Date Made Active in Reports: 03/18/2014
Number of Days to Update: 13

Source: Department of Environmental Health
Telephone: 408-918-3417
Last EDR Contact: 02/21/2020
Next Scheduled EDR Contact: 06/08/2020
Data Release Frequency: No Update Planned

SAN JOSE HAZMAT: Hazardous Material Facilities
Hazardous material facilities, including underground storage tank sites.

Date of Government Version: 10/30/2019
Date Data Arrived at EDR: 11/01/2019
Date Made Active in Reports: 01/08/2020
Number of Days to Update: 68

Source: City of San Jose Fire Department
Telephone: 408-535-7694
Last EDR Contact: 02/13/2020
Next Scheduled EDR Contact: 05/18/2020
Data Release Frequency: Annually

SANTA CRUZ COUNTY:

CUPA SANTA CRUZ: CUPA Facility List
CUPA facility listing.

Date of Government Version: 01/21/2017
Date Data Arrived at EDR: 02/22/2017
Date Made Active in Reports: 05/23/2017
Number of Days to Update: 90

Source: Santa Cruz County Environmental Health
Telephone: 831-464-2761
Last EDR Contact: 02/14/2020
Next Scheduled EDR Contact: 06/01/2020
Data Release Frequency: Varies

SHASTA COUNTY:

CUPA SHASTA: CUPA Facility List
Cupa Facility List.

Date of Government Version: 06/15/2017
Date Data Arrived at EDR: 06/19/2017
Date Made Active in Reports: 08/09/2017
Number of Days to Update: 51

Source: Shasta County Department of Resource Management
Telephone: 530-225-5789
Last EDR Contact: 02/14/2020
Next Scheduled EDR Contact: 06/01/2020
Data Release Frequency: Varies

SOLANO COUNTY:

LUST SOLANO: Leaking Underground Storage Tanks
A listing of leaking underground storage tank sites located in Solano county.

Date of Government Version: 06/04/2019
Date Data Arrived at EDR: 06/06/2019
Date Made Active in Reports: 08/13/2019
Number of Days to Update: 68

Source: Solano County Department of Environmental Management
Telephone: 707-784-6770
Last EDR Contact: 02/27/2020
Next Scheduled EDR Contact: 06/15/2020
Data Release Frequency: Quarterly

UST SOLANO: Underground Storage Tanks
Underground storage tank sites located in Solano county.

Date of Government Version: 12/09/2019
Date Data Arrived at EDR: 12/11/2019
Date Made Active in Reports: 02/21/2020
Number of Days to Update: 72

Source: Solano County Department of Environmental Management
Telephone: 707-784-6770
Last EDR Contact: 02/27/2020
Next Scheduled EDR Contact: 06/15/2020
Data Release Frequency: Quarterly

SONOMA COUNTY:

CUPA SONOMA: Cupa Facility List
Cupa Facility list

Date of Government Version: 02/25/2020
Date Data Arrived at EDR: 02/26/2020
Date Made Active in Reports: 03/11/2020
Number of Days to Update: 14

Source: County of Sonoma Fire & Emergency Services Department
Telephone: 707-565-1174
Last EDR Contact: 03/18/2020
Next Scheduled EDR Contact: 07/06/2020
Data Release Frequency: Varies

LUST SONOMA: Leaking Underground Storage Tank Sites
A listing of leaking underground storage tank sites located in Sonoma county.

Date of Government Version: 01/02/2020
Date Data Arrived at EDR: 01/03/2020
Date Made Active in Reports: 03/05/2020
Number of Days to Update: 62

Source: Department of Health Services
Telephone: 707-565-6565
Last EDR Contact: 03/18/2020
Next Scheduled EDR Contact: 07/06/2020
Data Release Frequency: Quarterly

STANISLAUS COUNTY:

CUPA STANISLAUS: CUPA Facility List
Cupa facility list

Date of Government Version: 11/04/2019
Date Data Arrived at EDR: 11/07/2019
Date Made Active in Reports: 01/08/2020
Number of Days to Update: 62

Source: Stanislaus County Department of Ennvironmental Protection
Telephone: 209-525-6751
Last EDR Contact: 01/13/2020
Next Scheduled EDR Contact: 04/27/2020
Data Release Frequency: Varies

SUTTER COUNTY:

UST SUTTER: Underground Storage Tanks
Underground storage tank sites located in Sutter county.

Date of Government Version: 12/02/2019
Date Data Arrived at EDR: 12/03/2019
Date Made Active in Reports: 02/07/2020
Number of Days to Update: 66

Source: Sutter County Environmental Health Services
Telephone: 530-822-7500
Last EDR Contact: 02/27/2020
Next Scheduled EDR Contact: 06/15/2020
Data Release Frequency: Semi-Annually

TEHAMA COUNTY:

CUPA TEHAMA: CUPA Facility List
Cupa facilities

Date of Government Version: 05/20/2019
Date Data Arrived at EDR: 05/21/2019
Date Made Active in Reports: 07/18/2019
Number of Days to Update: 58

Source: Tehama County Department of Environmental Health
Telephone: 530-527-8020
Last EDR Contact: 03/17/2020
Next Scheduled EDR Contact: 05/18/2020
Data Release Frequency: Varies

TRINITY COUNTY:

CUPA TRINITY: CUPA Facility List
Cupa facility list

Date of Government Version: 01/21/2020
Date Data Arrived at EDR: 01/23/2020
Date Made Active in Reports: 03/30/2020
Number of Days to Update: 67

Source: Department of Toxic Substances Control
Telephone: 760-352-0381
Last EDR Contact: 01/17/2020
Next Scheduled EDR Contact: 05/04/2020
Data Release Frequency: Varies

TULARE COUNTY:

CUPA TULARE: CUPA Facility List
Cupa program facilities

Date of Government Version: 11/25/2019
Date Data Arrived at EDR: 11/27/2019
Date Made Active in Reports: 02/04/2020
Number of Days to Update: 69

Source: Tulare County Environmental Health Services Division
Telephone: 559-624-7400
Last EDR Contact: 02/03/2020
Next Scheduled EDR Contact: 05/18/2020
Data Release Frequency: Varies

TUOLUMNE COUNTY:

CUPA TUOLUMNE: CUPA Facility List
Cupa facility list

Date of Government Version: 04/23/2018
Date Data Arrived at EDR: 04/25/2018
Date Made Active in Reports: 06/25/2018
Number of Days to Update: 61

Source: Divison of Environmental Health
Telephone: 209-533-5633
Last EDR Contact: 01/17/2020
Next Scheduled EDR Contact: 05/04/2020
Data Release Frequency: Varies

VENTURA COUNTY:

BWT VENTURA: Business Plan, Hazardous Waste Producers, and Operating Underground Tanks
The BWT list indicates by site address whether the Environmental Health Division has Business Plan (B), Waste Producer (W), and/or Underground Tank (T) information.

Date of Government Version: 05/29/2019
Date Data Arrived at EDR: 07/29/2019
Date Made Active in Reports: 09/30/2019
Number of Days to Update: 63

Source: Ventura County Environmental Health Division
Telephone: 805-654-2813
Last EDR Contact: 01/21/2020
Next Scheduled EDR Contact: 05/04/2020
Data Release Frequency: Quarterly

LF VENTURA: Inventory of Illegal Abandoned and Inactive Sites
Ventura County Inventory of Closed, Illegal Abandoned, and Inactive Sites.

Date of Government Version: 12/01/2011
Date Data Arrived at EDR: 12/01/2011
Date Made Active in Reports: 01/19/2012
Number of Days to Update: 49

Source: Environmental Health Division
Telephone: 805-654-2813
Last EDR Contact: 03/20/2020
Next Scheduled EDR Contact: 07/13/2020
Data Release Frequency: No Update Planned

LUST VENTURA: Listing of Underground Tank Cleanup Sites
Ventura County Underground Storage Tank Cleanup Sites (LUST).

Date of Government Version: 05/29/2008
Date Data Arrived at EDR: 06/24/2008
Date Made Active in Reports: 07/31/2008
Number of Days to Update: 37

Source: Environmental Health Division
Telephone: 805-654-2813
Last EDR Contact: 02/07/2020
Next Scheduled EDR Contact: 05/25/2020
Data Release Frequency: No Update Planned

MED WASTE VENTURA: Medical Waste Program List
To protect public health and safety and the environment from potential exposure to disease causing agents, the Environmental Health Division Medical Waste Program regulates the generation, handling, storage, treatment and disposal of medical waste throughout the County.

Date of Government Version: 09/26/2019
Date Data Arrived at EDR: 10/23/2019
Date Made Active in Reports: 12/13/2019
Number of Days to Update: 51

Source: Ventura County Resource Management Agency
Telephone: 805-654-2813
Last EDR Contact: 01/21/2020
Next Scheduled EDR Contact: 05/04/2020
Data Release Frequency: Quarterly

UST VENTURA: Underground Tank Closed Sites List
Ventura County Operating Underground Storage Tank Sites (UST)/Underground Tank Closed Sites List.

Date of Government Version: 11/26/2019
Date Data Arrived at EDR: 12/10/2019
Date Made Active in Reports: 02/21/2020
Number of Days to Update: 73

Source: Environmental Health Division
Telephone: 805-654-2813
Last EDR Contact: 03/10/2020
Next Scheduled EDR Contact: 06/22/2020
Data Release Frequency: Quarterly

YOLO COUNTY:

UST YOLO: Underground Storage Tank Comprehensive Facility Report
Underground storage tank sites located in Yolo county.

Date of Government Version: 12/12/2019
Date Data Arrived at EDR: 01/15/2020
Date Made Active in Reports: 03/25/2020
Number of Days to Update: 70

Source: Yolo County Department of Health
Telephone: 530-666-8646
Last EDR Contact: 03/20/2020
Next Scheduled EDR Contact: 07/13/2020
Data Release Frequency: Annually

YUBA COUNTY:

CUPA YUBA: CUPA Facility List
CUPA facility listing for Yuba County.

Date of Government Version: 11/04/2019
Date Data Arrived at EDR: 11/06/2019
Date Made Active in Reports: 01/08/2020
Number of Days to Update: 63

Source: Yuba County Environmental Health Department
Telephone: 530-749-7523
Last EDR Contact: 02/07/2020
Next Scheduled EDR Contact: 05/25/2020
Data Release Frequency: Varies

OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

CT MANIFEST: Hazardous Waste Manifest Data
Facility and manifest data. Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a tsd facility.

Date of Government Version: 01/30/2020
Date Data Arrived at EDR: 01/30/2020
Date Made Active in Reports: 03/09/2020
Number of Days to Update: 39

Source: Department of Energy & Environmental Protection
Telephone: 860-424-3375
Last EDR Contact: 01/30/2020
Next Scheduled EDR Contact: 05/25/2020
Data Release Frequency: No Update Planned

NJ MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 12/31/2018
Date Data Arrived at EDR: 04/10/2019
Date Made Active in Reports: 05/16/2019
Number of Days to Update: 36

Source: Department of Environmental Protection
Telephone: N/A
Last EDR Contact: 01/06/2020
Next Scheduled EDR Contact: 04/20/2020
Data Release Frequency: Annually

NY MANIFEST: Facility and Manifest Data
Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a TSD facility.

Date of Government Version: 01/01/2019
Date Data Arrived at EDR: 05/01/2019
Date Made Active in Reports: 06/21/2019
Number of Days to Update: 51

Source: Department of Environmental Conservation
Telephone: 518-402-8651
Last EDR Contact: 01/31/2020
Next Scheduled EDR Contact: 05/11/2020
Data Release Frequency: Quarterly

PA MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 06/30/2018
Date Data Arrived at EDR: 07/19/2019
Date Made Active in Reports: 09/10/2019
Number of Days to Update: 53

Source: Department of Environmental Protection
Telephone: 717-783-8990
Last EDR Contact: 01/14/2020
Next Scheduled EDR Contact: 04/07/2020
Data Release Frequency: Annually

RI MANIFEST: Manifest information
Hazardous waste manifest information

Date of Government Version: 12/31/2018
Date Data Arrived at EDR: 10/02/2019
Date Made Active in Reports: 12/10/2019
Number of Days to Update: 69

Source: Department of Environmental Management
Telephone: 401-222-2797
Last EDR Contact: 02/18/2020
Next Scheduled EDR Contact: 06/01/2020
Data Release Frequency: Annually

WI MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 05/31/2018
Date Data Arrived at EDR: 06/19/2019
Date Made Active in Reports: 09/03/2019
Number of Days to Update: 76

Source: Department of Natural Resources
Telephone: N/A
Last EDR Contact: 03/09/2020
Next Scheduled EDR Contact: 06/22/2020
Data Release Frequency: Annually

Oil/Gas Pipelines
Source: Endeavor Business Media
Petroleum Bundle (Crude Oil, Refined Products, Petrochemicals, Gas Liquids (LPG/NGL), and Specialty Gases (Miscellaneous)) N = Natural Gas Bundle (Natural Gas, Gas Liquids (LPG/NGL), and Specialty Gases (Miscellaneous)). This map includes information copyrighted by Endeavor Business Media. This information is provided on a best effort basis and Endeavor Business Media does not guarantee its accuracy nor warrant its fitness for any particular purpose. Such information has been reprinted with the permission of Endeavor Business Media.

Electric Power Transmission Line Data
Source: Endeavor Business Media
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Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

AHA Hospitals:
Source: American Hospital Association, Inc.
Telephone: 312-280-5991
The database includes a listing of hospitals based on the American Hospital Association's annual survey of hospitals.

Medical Centers: Provider of Services Listing
Source: Centers for Medicare & Medicaid Services
Telephone: 410-786-3000
A listing of hospitals with Medicare provider number, produced by Centers of Medicare & Medicaid Services, a federal agency within the U.S. Department of Health and Human Services.

Nursing Homes
Source: National Institutes of Health
Telephone: 301-594-6248
Information on Medicare and Medicaid certified nursing homes in the United States.

Public Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on elementary and secondary public education in the United States. It is a comprehensive, annual, national statistical database of all public elementary and secondary schools and school districts, which contains data that are comparable across all states.

Private Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on private school locations in the United States.

Daycare Centers: Licensed Facilities
Source: Department of Social Services
Telephone: 916-657-4041

Flood Zone Data: This data was obtained from the Federal Emergency Management Agency (FEMA). It depicts 100-year and 500-year flood zones as defined by FEMA. It includes the National Flood Hazard Layer (NFHL) which incorporates Flood Insurance Rate Map (FIRM) data and Q3 data from FEMA in areas not covered by NFHL.
Source: FEMA
Telephone: 877-336-2627
Date of Government Version: 2003, 2015

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002, 2005 and 2010 from the U.S. Fish and Wildlife Service.

State Wetlands Data: Wetland Inventory
Source: Department of Fish and Wildlife
Telephone: 916-445-0411

STREET AND ADDRESS INFORMATION

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Appendix E

County of Riverside DEH HMMD Files

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County of Riverside Community Health Agency • Department of Environmental Health
Hazardous Materials Management Division

Change of Status Form

Mandatory: Information must be completed for all Change Of Status requests.

Date: 4/24/08 Facility I.D. #: PR0033275 PROO23533 ☐ New HA2340 Specialist: Manny Vargas

ENTER INFORMATION TO BE CHANGED

Type	Former/OOB Information	Current Information
DBA/Facility Name	Blackridge RJH, Inc	
Facility Address	37115 Deportola	
	Temecula, CA 92592	
Facility Phone Number	951-737-8633	
Facility Contact Name		
Mailing Address	37115 Deportola	
	Temecula, CA 92592	
Owner Name		
Owner Phone Number		

Jurisdiction: ☐ Banning ☐ Corona ☐ Riverside ☐ All Other/Unincorporated

Type of Change Requested (Check all that apply.)

☐ New Facility ☐ New Permit ☐ New Owner	☐ Generator Number of Employee _____ ☐ Disclosure Current Level _____ ***Revised Level*** _____
☐ Change of Address Only ☐ Facility Moved ☐ Billing Invoice Needed ☐ Bulk Liquid CO_2	☐ Tanks Number of tanks _____ Tank I.D.# _____ Tank Contents _____ Tank Size _____
☐ Exempt ☒ OOB (Out of Business) ☐ Mail: ____ UST Application(s) _____ ____ UST Transfer Form ____ Generator Application ____ Business Emergency Plan Packet	☐ Tank(s) Added _____ ☐ Tank(s) Removed _____ ☐ Plan Check # _____
☐ Completed by OA ____ *(Initials)*	☐ Cal-ARP ☐ Tiered Permitting

Comments: This facility does not have any hazmat.

Forward COS form for review and initial & date by the following sequence after completion.

1) Supervisor GB Initial 5/5/08 Date 2) Accounting Initial 5/14/08 Date 3) OA ROSIE ALVARADO Initial Date AUG 1

County of Riverside Community Health Agency ● Department of Environmental Health
Hazardous Materials Management Division

Change of Status Form

Mandatory: Information must be completed for all Change Of Status requests.

Date: 4/24/08 Facility I.D. #: PR0033275 FA2340 / PR0023533 ☐ New Specialist: Manny Vargas

ENTER INFORMATION TO BE CHANGED

Type	Former/OOB Information	Current Information
DBA/Facility Name	Blackridge RJH, Inc	
Facility Address	37115 Deportola	
	Temecula, CA 92592	
Facility Phone Number	951-737-8633	
Facility Contact Name		
Mailing Address	37115 Deportola	
	Temecula, CA 92592	
Owner Name		
Owner Phone Number		

Jurisdiction: ☐ Bannir... ☐ Corona ☐ Riverside ☐ All Other/Unincorporated

Type of Change Requested (Check all that apply.)

☐ New Facility ☐ New Permit ☐ New Owner	☐ Generator Number of Employee _____ ☐ Disclosure Current Level _____ *Revised Level* _____
☐ Change of Address Only ☐ Facility Moved ☐ Billing Invoice Needed ☐ Bulk Liquid CO_2	☐ Tanks Number of tanks _____ Tank I.D.# _____ Tank Contents _____ Tank Size _____
☐ Exempt ☒ OOB (Out of Business) ☐ Mail: _____ UST Application(s) _____ _____ UST Transfer Form _____ Generator Application _____ Business Emergency Plan Packet	☐ Tank(s) Added _____ ☐ Tank(s) Removed _____ ☐ Plan Check # _____
☐ Completed by OA _____ *(Initials)*	☐ Cal-ARP ☐ Tiered Permitting

Comments: This facility does not have any hazmat.

Forward COS form for review and initial & date by the following sequence after completion.

1) Supervisor _____ (Initial) _____ (Date) 2) Accounting _____ (Initial) 4/08/08 (Date) 3) OA _____ (Initial) _____ (Date)

Facility: 89473 DBA: Blackridge RJH, Inc AS: A

37115 De Portola Temecula Balance: $0.00 New Facility

General | Tanks | Accounting | Inspections | History | CUPA

Owner:

Address: 37115 De Portola More: Area: 2 District: 4

City: Temecula St: CA Zip: 92592 Anniversary: 12/28/2006

MAddress: 37115 De Portola MMore: 5-y Anniv:

MCity: Temecula MSt: CA MZip: 92592 EPA ID #:

Generate?: Yes # Emps: 4 GenStat: Jurisdiction: Unino Contact: Robert Hughes LQG:

Tanks?: # Tanks: TankStat: TierType: DA:

Disclose?: Yes Haz Class: D DiscStat: Recycle:

Tier?: RefToLOP?: Cal Arp: 37115 De Portola

Bus PlanDate: Update: Comments: MEMO

FacPhone: 951 303-6988 Status: 2006 Er Phone: 951 737-8633

☒ **New Site** - Need a complete new Business Emergency Plan

☐ **Update** - Need completed updated Business Emergency Plan

Last done was _____

NEW

Office Use Only
Level 1
Initials CK
Date Reviewed 3/21/06

HAZARDOUS MATERIALS
BUSINESS EMERGENCY PLAN AND INVENTORY CERTIFICATION FORM

Business Name Blackhawk RV, Inc. Facility # 89473
Owner/Operator Name Telephone 951-303-6988
Facility Address 37115 Ste Postal Rd.
City Temecula State Ca Zip Code 92592

Annual Business Emergency Plan Inventory Review and Update

X The information contained on the annual inventory form most recently submitted to the administering agency is complete, accurate, and up to date and complies with all of the following statements:

1. There has been no change in the quantity of any hazardous material as reported in the most recently submitted annual inventory;
2. No hazardous materials subject to the inventory requirements of Chapter 6.95 H&SC are being handled that are not listed on the most recently submitted annual inventory form; and
3. The most recently submitted annual inventory form contains the information required by sec. 11022 of Title 42 of the United States Code. (The County/OES form 2731meets this requirement)

___ The inventory as previously reported has changed. Attached are new inventory reporting forms for all changes.

Triennial (3 Year) Business Emergency Plan Review and Certification

X I certify that the Business Emergency Plan has been reviewed and the information contained in it is accurate and complete as of this date 1-1-06.

___ I certify that I have reviewed the Business Emergency Plan and have updated the following items (updated items are attached):

- ___ Emergency contacts names and/or telephone numbers.
- ___ Site and/or facility map(s).
- ___ Emergency procedures.
- ___ Other Information: _____.

Notification should be made to this agency within 30 days if any of the following events occur: change of ownership; change of business name; mailing address; phone number; location; emergency contact person; 100% or more increase in the quantity of a disclosed material; or any handling of a previously undisclosed material subject to regulation. A copy of this form should be kept at the business and available for review upon request of this agency. This form can only be used if you have already submitted the most current version of the Chemical Inventory Form (OES Form 2731). If your business falls under EPCRA/SARA Title III, this form does not meet the annual inventory reporting requirements.

I certify under penalty of law that I have examined and am familiar with the information submitted in this and all attached documents, that the information provided herein is true, accurate, and complete to the best of my knowledge.

Nan ___ Signature
Title OWNER Date 1-1-06

02/02

Certified Unified Program Agency
County of Riverside Community Health Agency
Department of Environmental Health
Hazardous Materials Management Division

Page ___ of ___ pages

SUPPLEMENTAL REPORT

Reference Date 7/9/07

Name Blackridge RTH, Inc

Address 37115 Deportola Rd Temecula CA 92592

Re: Hazardous Waste Generator + Facility # 89473

Remarks: Hazardous Materials Handlers

I was contacted By Mrs. Barbara Tardy regarding their Facility Permit The Facility wanted to Know IF They can get out of their County Permits. I Visited The Facility. They still have several AST and 55 Gallon drums with Waste Materials. I Told Mrs. Barbara that in Order For them to get OFF From this permit, They shall dispose and get rid off all their Waste / Materials and the Tanks. Mrs Barbara said That She will have Mr. Paul Brizio Cell # (909) 376-3991 / Office (951) 780-3401, Pick up the Tanks and the Waste will be disposed OFF Properly. Mrs. Barbara Stated That They do not Fill up Fuel or Repair any OF their Farm Equipment at their Facility. All Repair are done Outside and They will Fill up the Vehicles at a Service Station. I Told Mrs. Tardy that Once they remove the Waste and Containers, TO give me a Call For me to do a Follow-up Inspection.

Specialist M. Vargas Received By ___

DEH-HEH-002 (rev 5/02) HMHC 2002

white-specialist; yellow-operator; pink-file

Facility: 89473 DBA: Blackridge RJH, Inc
37115 De Portola Temecula
AS: A
Balance: $0.00
New Facility

General | Tanks | Accounting | Inspections | History | CUPA

Owner:
Address: 37115 De Portola More:
City: Temecula St: CA Zip: 92592
MAddress: 37115 De Portola MMore:
MCity: Temecula MSt: CA MZip: 92592
Area: 2 District: 4
Anniversary: 12/28/2006
5-y Anniv:
EPA ID #:
Contact: Robert Hughes

Generate?: Yes # Emps: 4 GenStat: Jurisdiction: Unino LQG:
Tanks?: # Tanks: TankStat: TierType: DA:
Disclose?: Yes Haz Class: D DiscStat: Recycle:
Tier?: RefToLOP?: Cal Arp: 37115 De Portola
Bus PlanDate: Update: Comments: MEMO
FacPhone: 951 303-6988 Status: 2006 Er Phone: 951 737-8633

☒ **New Site** - Need a complete new Business Emergency Plan

☐ **Update** - Need completed updated Business Emergency Plan
Last done was _____

NEW SITE

Office Use Only
Level 1
Initials JAB
Date Reviewed 1 minutes

HAZARDOUS MATERIALS
BUSINESS EMERGENCY PLAN AND INVENTORY CERTIFICATION FORM

Business Name BLACKRIDGE RTH Facility # 89473
Owner/Operator Name _____ Telephone 951-303-6988
Facility Address 37115 DE PORTOLA RD.
City TEMECULA State CA Zip Code 92592

Annual Business Emergency Plan Inventory Review and Update

X The information contained on the annual inventory form most recently submitted to the administering agency is complete, accurate, and up to date and complies with all of the following statements:

1. There has been no change in the quantity of any hazardous material as reported in the most recently submitted annual inventory;
2. No hazardous materials subject to the inventory requirements of Chapter 6.95 H&SC are being handled that are not listed on the most recently submitted annual inventory form; **and**
3. The most recently submitted annual inventory form contains the information required by sec. 11022 of Title 42 of the United States Code. (The County/OES form 2731meets this requirement)

___ The inventory as previously reported has changed. Attached are new inventory reporting forms for all changes.

Triennial (3 Year) Business Emergency Plan Review and Certification

X I certify that the Business Emergency Plan has been reviewed and the information contained in it is accurate and complete as of this date 1-1-05.

___ I certify that I have reviewed the Business Emergency Plan and have updated the following items (updated items are attached):

___ Emergency contacts names and/or telephone numbers.
___ Site and/or facility map(s).
___ Emergency procedures.
___ Other Information: _____.

Notification should be made to this agency within 30 days if any of the following events occur: change of ownership; change of business name; mailing address; phone number; location; emergency contact person; 100% or more increase in the quantity of a disclosed material; or any handling of a previously undisclosed material subject to regulation. A copy of this form should be kept at the business and available for review upon request of this agency. This form can only be used if you have already submitted the most current version of the Chemical Inventory Form (OES Form 2731). If your business falls under EPCRA/SARA Title III, this form does not meet the annual inventory reporting requirements.

I certify under penalty of law that I have examined and am familiar with the information submitted in this and all attached documents, that the information provided herein is true, accurate, and complete to the best of my knowledge.

Name _____ Signature _____
Title OWNER Date 1-1-05

02/02

COUNTY OF RIVERSIDE • COMMUNITY HEALTH AGENCY

DEPARTMENT OF ENVIRONMENTAL HEALTH

Certified Unified Program Agency

HAZARDOUS MATERIALS MANAGEMENT PERMIT

NON-TRANSFERABLE

Owner:
DBA: Blackridge RJH, Inc.
Mailing Address: 37115 De Portola
City and State: Temecula, CA 92592

Facility Number: 89473
Expiration Date: 12/28/2007

Area: 2 District: 4

Type of Business: Hazardous Materials Facility

Facility Location: 37115 De Portola
City: Temecula

Hazardous Waste Generator – County Ordinance No. 615
Hazardous Materials Disclosure – County Ordinance No. 651

Thursday, February 22, 2007
Date Issued

Gary L. Root, Director
Department of Environmental Health

This permit is granted for the business indicated on the condition that the business will comply with the laws, ordinances, and regulations that are now or may hereafter be in force by the United States Government, the State of California and the County of Riverside pertaining to the above mentioned business. This permit serves as a receipt for payment of fees for the above-listed programs. **This permit must be renewed on or before the Expiration Date indicated above. This permit may be suspended or revoked for cause. Inspection of this business may be conducted by a duly authorized representative of the Department of Environmental Health.**

Western County Office
4065 County Circle Dr.
Riverside, CA 92503
(951) 358-5055

Corona Office
2275 S. Main Street #204
Corona, CA 92882
(951) 273-9143

Desert County Office
47950 Arabia Street, Suite A
Indio, CA 92201
(760) 863-8976

South County Office
800 S. Sanderson
Hemet, CA 92545
(951) 766-6524

POST IN A CONSPICUOUS PLACE

COUNTY OF RIVERSIDE MAY 9, 1893

COUNTY OF RIVERSIDE • COMMUNITY HEALTH AGENCY
DEPARTMENT OF ENVIRONMENTAL HEALTH

Certified Unified Program Agency

HAZARDOUS MATERIALS MANAGEMENT PERMIT
NON-TRANSFERABLE

Owner:
DBA: Blackridge RJH, Inc
Mailing Address: 37115 De Portola
City and State: Temecula, CA 92592

Facility Number: 89473
Expiration Date: 12/28/2006

Area: 2 District: 4

Type of Business: Hazardous Materials Facility

Facility Location: 37115 De Portola
City: Temecula

Hazardous Waste Generator -- County Ordinance No. 615
Hazardous Materials Disclosure -- County Ordinance No. 651

Thursday, May 18, 2006
Date Issued

Gary L. Root, Director
Department of Environmental Health

This permit is granted for the business indicated on the condition that the business will comply with the laws, ordinances, and regulations that are now or may hereafter be in force by the United States Government, the State of California and the County of Riverside pertaining to the above mentioned business. This permit serves as a receipt for payment of fees for the above-listed programs. **This permit must be renewed on the Expiration Date indicated above. This permit may be suspended or revoked for cause. Inspection of this business may be conducted by a duly authorized representative of the Department of Environmental Health.**

Western County Office
4065 County Circle Dr.
Riverside, CA 92503
(951) 358-5055

Desert County Office
47-923 Oasis Street E4
Indio, CA 92201
(760) 863-8976

Central County Office
800 South Sanderson Avenue
Hemet, CA 92545
(951) 766-6524

POST IN A CONSPICUOUS PLACE

COUNTY OF RIVERSIDE • COMMUNITY HEALTH AGENCY

DEPARTMENT OF ENVIRONMENTAL HEALTH

Certified Unified Program Agency

HAZARDOUS MATERIALS MANAGEMENT PERMIT

NON-TRANSFERABLE

Owner
DBA: Blackridge RJH, Inc
Mailing Address: 37115 De Portola
City and State: Temecula, CA 92592

Facility Number: 89473
Expiration Date: 12/28/2006

Area: 2 District: 4

Type of Business: Hazardous Materials Facility

Facility Location: 37115 De Portola
City: Temecula

Hazardous Waste Generator -- County Ordinance No. 615
Hazardous Materials Disclosure -- County Ordinance No. 651

Tuesday, January 31, 2006
Date Issued

Gary L. Root, Director
Department of Environmental Health

This permit is granted for the business indicated on the condition that the business will comply with the laws, ordinances, and regulations that are now or may hereafter be in force by the United States Government, the State of California and the County of Riverside pertaining to the above mentioned business. This permit serves as a receipt for payment of fees for the above-listed programs. **This permit must be renewed on the Expiration Date indicated above. This permit may be suspended or revoked for cause. Inspection of this business may be conducted by a duly authorized representative of the Department of Environmental Health.**

Western County Office
4065 County Circle Dr.
Riverside, CA 92503
(951) 358-5055

Desert County Office
47-923 Oasis Street E4
Indio, CA 92201
(760) 863-8976

Central County Office
800 South Sanderson Avenue
Hemet, CA 92545
(951) 766-6524

POST IN A CONSPICUOUS PLACE

COUNTY OF RIVERSIDE • COMMUNITY HEALTH AGENCY

DEPARTMENT OF ENVIRONMENTAL HEALTH

Certified Unified Program Agency

HAZARDOUS MATERIALS MANAGEMENT PERMIT

NON-TRANSFERABLE

Owner:
DBA: Blackridge RJH, Inc
Mailing Address: 37115 De Portola
City and State: Temecula, CA 92592

Facility Number: 89473
Expiration Date: 12/28/2005

Area: 2 District: 4

Type of Business: Hazardous Materials Facility

Facility Location: 37115 De Portola
City: Temecula

Hazardous Waste Generator -- County Ordinance No. 615
Hazardous Materials Disclosure -- County Ordinance No. 651

Friday, February 04, 2005
Date Issued

Gary L. Root, Director
Department of Environmental Health

This permit is granted for the business indicated on the condition that the business will comply with the laws, ordinances, and regulations that are now or may hereafter be in force by the United States Government, the State of California and the County of Riverside pertaining to the above mentioned business. This permit serves as a receipt for payment of fees for the above-listed programs. **This permit must be renewed on the Expiration Date indicated above. This permit may be suspended or revoked for cause. Inspection of this business may be conducted by a duly authorized representative of the Department of Environmental Health.**

Western County Office
4065 County Circle Dr.
Riverside, CA 92503
(951) 358-5055

Desert County Office
47-923 Oasis Street E4
Indio, CA 92201
(760) 863-8976

Central County Office
800 South Sanderson Avenue
Hemet, CA 92545
(951) 766-6824

COUNTY OF RIVERSIDE
MAY 9, 1893

POST IN A CONSPICUOUS PLACE

COUNTY OF RIVERSIDE • COMMUNITY HEALTH AGENCY

DEPARTMENT OF ENVIRONMENTAL HEALTH

Certified Unified Program Agency

HAZARDOUS MATERIALS MANAGEMENT PERMIT

NON-TRANSFERABLE

Owner:

DBA: Blackridge RJH, Inc

Mailing Address: 37115 De Portola

City and State: Temecula, CA 92592

EPA ID#:

Facility Number: 89473

Expiration Date: 12/28/2004

Area: 2 District: 4

Type of Business: Hazardous Materials Facility Facility Location: 37115 De Portola

City: Temecula

Hazardous Waste Generator – County Ordinance No. 615

Hazardous Materials Disclosure – County Ordinance No. 651

Tuesday, March 16, 2004

Date Issued

Cheryl L. Root, Director
Department of Environmental Health

This permit is granted for the business indicated on the condition that the business will comply with the laws, ordinances, and regulations that are now or may hereafter be in force by the United States Government, the State of California and the County of Riverside pertaining to the above-mentioned business. This permit serves as a receipt for payment of fees for the above-listed programs. **This permit must be renewed on the Expiration Date indicated above. This permit may be suspended or revoked for cause. Inspection of this business may be conducted by a duly authorized representative of the Department of Environmental Health.**

Western County Office
4065 County Circle Dr.
Riverside, CA 92503
(909) 358-5055

Desert County Office
47-923 Oasis Street E4
Indio, CA 92201
(760) 863-8276

Central County Office
800 South Sanderson Avenue
Hemet, CA 92545
(909) 766-6524

POST IN A CONSPICUOUS PLACE

County of Riverside Health Services Agency ▪ Department of Environmental Health
Hazardous Materials Management Division

Change of Status Form

Full

Mandatory Information – Must Be Completed For All Change Of Status Request.

Date: 4 MAR 04 **Facility I.D. #:** 89473 **Specialist:** Sapp

ENTER INFORMATION TO BE CHANGED

Type	Former/OOB Information	Current
DBA/Facility Name	ROCKWALKER STABLES	BLACKRIDGE RJH, INC.
Facility Address		37115 DE PORTOLA
		TEMECULA
Facility Phone Number		
Mail Address		
Owner		
Owner Phone Number		

Jurisdiction: ☐ Banning ☐ Corona ☐ Riverside ☒ All Other/Unincorporated

Type of Change Requested (check all that apply)

- ☐ New Facility
- ☑ New Permit
- ☐ OOB (Out of Business)
- ☐ Exempt
- ☐ Billing Invoice Needed
- ☐ Mail : ___ UST Application
  ___ Generator Application
  ___ Business Emergency Plan Pkt.

CHANGE OWNER NAME

- ☐ Generator
  Number of Employees _____
- ☐ Disclosure
  Level _____
  Update _____
- ☐ Tanks
  Number of tanks _____
  Tank I.D. # _____
  Tank Contents _____
  Tank Size _____
- ☐ Tank(s) Added
- ☐ Tank(s) Removed
- ☐ Plan Check # _____

Comments: _____

Forward form for review and initial by the following sequence after completion.

1) Supervisor _____ Initial 3/9/04 Date 2) Clerical _____ Initial 3/9/04 Date 3) Accounting _____ Initial 3/12/04 Date

ver: Dec. 2000:br

County of Riverside Health Services Agency ▪ Department of Environmental Health
Hazardous Materials Management Division

Change of Status Form

Mandatory Information – Must Be Completed For All Change Of Status Request.

88425

Date: 12/4/02 **Facility I.D: ~~88245~~new** **Specialist: JS**

ENTER INFORMATION TO BE CHANGED 89473

Type	Former/OOB Information	Current
DBA/Facility Name	Nexstar Ranch	Rock Walker Stables
Facility Address	37215 De Portola Rd	37115 De Portola
	Temecula	Temecula
Facility Phone Number		303-6988
Mail Address		Same
Owner		
Owner Phone Number		

Jurisdiction: **Banning** **Corona** **Riverside** **All Other/Unincorporated**

Type of Change Requested (check all that apply)

___X___ New Facility

__X___ New Permit

__X___ OOB (Out of Business)

_____ Exempt

____X___ Generator
Number of Employees____4___

___X__ Disclosure
Level __I_____

Update _____

__X___ Billing Invoice Needed

Mail : ___ UST Application
___ Generator Application
___ Business Emergency Plan Pkt.

____ Tanks
Number of tanks _____
Tank I.D. # _____
Tank Contents _____
Tank Size _____

____ Tank(s) Added

____ Tank(s) Removed

____ Plan Check _____

Comment: Please make Nexstar Ranch OOB and assign a new facility number to Rock Walker Stables and invoice. thanks

Supervisor____RL_____12/10//02__ Clerical_____adm_____12/10/02__ Accounting DS 12/10/02
Initial Date Initial Date Initial Date

ver: Dec. 2000:br

County of Riverside Health Services Agency ▪ Department of Environmental Health
Hazardous Materials Management Division

Change of Status Form

Mandatory Information – Must Be Completed For All Change Of Status Request.

Date: 4 Dec 02 **Facility I.D. #:** 88425 / 89473 (New) **Specialist:** Symington

ENTER INFORMATION TO BE CHANGED

Type	Former/OOB Information	Current
DBA/Facility Name	Nextar Ranch (OOB)	Rock Walker Stables
Facility Address	37215 De Portola	37115 De Portola
		Temecula
Facility Phone Number		303-6988
Mail Address		same
Owner		
Owner Phone Number		
Jurisdiction: ☐ Banning ☐ Corona ☐ Riverside		☑ All Other/Unincorporated

Type of Change Requested (check all that apply)

- ☑ New Facility
- ☐ New Permit
- ☑ OOB (Out of Business)
- ☐ Exempt
- ☐ Billing Invoice Needed
- ☐ Mail : ___ UST Application
  ___ Generator Application
  ___ Business Emergency Plan Pkt.
- ☑ Generator
  Number of Employees 4
- ☑ Disclosure
  Level 1
  Update ____
- ☐ Tanks
  Number of tanks ____
  Tank I.D. # ____
  Tank Contents ____
  Tank Size ____
- ☐ Tank(s) Added
- ☐ Tank(s) Removed
- ☐ Plan Check # ____

Comments: same facility - NOTE: change of address
New owner + name

Forward form for review and initial by the following sequence after completion.

1) Supervisor ____ ____ (Initial / Date) 2) Clerical ____ ____ (Initial / Date) 3) Accounting [signature] 12/16/02 (Initial / Date)

ver: Dec. 2000:br

COUNTY OF RIVERSIDE • COMMUNITY HEALTH AGENCY

DEPARTMENT OF ENVIRONMENTAL HEALTH

Certified Unified Program Agency

HAZARDOUS MATERIALS MANAGEMENT PERMIT

NON-TRANSFERABLE

Owner [redacted]

DBA: Rock Walker Stables

Mailing Address: 37115 De Portola

City and State: Temecula, CA 92592

EPA ID#:

Facility Number: 89473

Expiration Date: 12/28/2003

Area: 2 District: 4

Type of Business: Hazardous Materials Facility

Facility Location: 37115 De Portola

City: Temecula

Hazardous Waste Generator -- County Ordinance No. 615

Hazardous Materials Disclosure -- County Ordinance No. 651

Monday, December 23, 2002

Date Issued

Gary L. Root, Director
Department of Environmental Health

This permit is granted for the business indicated on the condition that the business will comply with the laws, ordinances, and regulations that are now or may hereafter be in force by the United States Government, the State of California and the County of Riverside pertaining to the above mentioned business. This permit serves as a receipt for payment of fees for the above-listed programs. **This permit must be renewed on the Expiration Date indicated above. This permit may be suspended or revoked for cause. Inspection of this business may be conducted by a duly authorized representative of the Department of Environmental Health.**

Western County Office
4065 County Circle Dr.
Riverside, CA 92503
(909) 358-5055

Desert County Office
47-923 Oasis Street E4
Indio, CA 92201
(760) 863-8976

South County Office
1370 South State St
San Jacinto, CA 92583
(909) 791-2200

POST IN A CONSPICUOUS PLACE

County of Riverside Health Services Agency ▪ Department of Environmental Health
Hazardous Materials Management Division

Change of Status Form

Mandatory Information – Must Be Completed For All Change Of Status Request.

Date: 4 Dec 02 **Facility I.D. #:** 88425 **Specialist:** Symington

ENTER INFORMATION TO BE CHANGED

Type	Former/OOB Information	Current
DBA/Facility Name	Nextar Ranch OOB	Rock Walker Stables
Facility Address	37215 DePortola	37115 DePortola
		Temecula
Facility Phone Number		303-6988
Mail Address		same
Owner		
Owner Phone Number		

Jurisdiction: ☐ Banning ☐ Corona ☐ Riverside ☑ All Other/Unincorporated

Type of Change Requested (check all that apply)

- ☑ New Facility
- ☐ New Permit
- ☑ OOB (Out of Business)
- ☐ Exempt
- ☐ Billing Invoice Needed
- ☐ Mail : ___ UST Application
  ___ Generator Application
  ___ Business Emergency Plan Pkt.
- ☑ Generator
  Number of Employees 4
- ☑ Disclosure
  Level 1
  Update ____
- ☐ Tanks
  Number of tanks ____
  Tank I.D. # ____
  Tank Contents ____
  Tank Size ____
- ☐ Tank(s) Added
- ☐ Tank(s) Removed
- ☐ Plan Check # ____

Comments: Same facility - NOTE: change of address
New owner + name

Forward form for review and initial by the following sequence after completion.

1) Supervisor ____ ____ 2) Clerical ____ ____ 3) Accounting ____ ____
Initial Date Initial Date Initial Date

*ver: Dec. 2000:*br

Certified Unified Program Agency
County of Riverside Community Health Agency
Department of Environmental Health
Hazardous Materials Management Division

Page ___ of ___ pages

SUPPLEMENTAL REPORT

Reference Date 5/23/08

Name Blackridge RTH, Inc.

Address 37115 De Portola, Temecula CA 92592

Re: Permit Investigation Facility # _____

Remarks:

The Facility removed (2) Fuel AST From their Site. They still have (6) drums with Hazardous Waste / Materials and (2) Used Batteries that need to be disposed OFF properly. The Facility was given a List of Authorized Haulers of Hazardous Waste. The Facility shall dispose OFF the Waste properly and send Copies of the Waste Manifest TO the Hemet Office, Riverside County.

Specialist M. Vargas Received By Barbara Tardy

DEH-HEH-002 (rev 5/02) HMHC 2002

white-specialist; yellow-operator; pink-file

Certified Unified Program Agency
Department of Environmental Health
Hazardous Materials Management Division
Hazardous Waste Generator Report Form

ENTERED

Facility Name: Blackridge RTH Inc
Address: 31115 De Portola Rd
City: Temecula CA Zip Code: 92592
Contact Person: Robert Hughes Number of Employees:
Date: 6/1/06
Inspection Routine [ ] Re-Inspection [ ]
Facility #: 04473
Telephone: (951) 303-6488

Health & Safety Code, Chapter 6.5 — California Code of Regulations, Title 22 — Riverside County Code, Title 8.60 (Ordinance 615.3)
C=Compliance, Viol. Type=Violation Type, N/A= Non-Applicable

Hazardous Waste Storage	C Yes	C No	Viol Type	N/A
200. H&SC 225195 Access for Inspection	✓			
201. 22 CCR 66265.31 Maintained and Operated to Minimize the Possibility of Fire, Explosion, or Release	✓			
202. 22 CCR 66262.34 Accumulation Time		✓		
203. 22 CCR 66262.34 (e) Satellite Accumulation				✓
204. 22CCR 66262.34 (d) (2), 66262.34 (a) (1), 66265.177 Separation of Incompatible Materials				✓
Containers				
205. 22CCR 66262.34 (d) (2), 66262.34 (a) (1), 66265.172 Compatibility of Waste with Container	✓			
206. 22CCR 66262.34 (d) (2), 66262.34 (a) (2), 66262.34 (f) Container Marking and Labeling		✓		
207. 22CCR 66262.34 (d) (2), 66262.34 (a) (1), 66265.174 Weekly Inspections		✓		
208. 22CCR 66262.34 (d) (2), 66262.34 (a) (1), 66265.171 Container Condition	✓			
209. 22CCR 66262.173 (b) Containers Not Leaking	✓			
210. 22CCR 66262.34 (d) (2), 66262.34 (a) (1), 66265.173 (a) Management of Containers (Stored Closed)		✓		
211. 22CCR 66265.176, 66262.34 (a) (1) Ignitable or Reactive Wastes Stored At Least 50 ft From Property line	✓			
212. 22CCR 66262.34 (d) (2), 66262.34 (a) (3), 66265.35 Aisle Space	✓			
Aboveground Hazardous Waste Tank Systems				
213. 22CCR 66265.193 Containment of and Detection of Leaks	✓			
214. 22CCR 66265.194 Aboveground Tanks Holding Hazardous Waste Operating Requirements	✓			
215. 22CCR 662265.195 Inspection of Aboveground Tanks Containing Hazardous Waste	✓			
216. 22 CCR 66265.196 Leaks, Spills, or Unfit AST's	✓			
217. H&SC 25270.5(c) Spill Prevention Control and Counter-measure Plan Complete [Referral to RWQCB If No Plan]	✓			
Preparedness, Prevention and Contingency Planning				
218. 22CCR 66262.34 (d) (2), 66262.34 (a) (3), 66265.32 Required Fire, Spill, & Decontamination Equipment	✓			
219. 22CCR 66262.34 (d) (2), 66262.34 (a) (3), 66265.33 Testing and Maintenance Fire, Spill, & Decontamination of Equipment	✓			
220. 22CCR 66262.34 (d) (2), 66262.34 (a) (3), 66265.34 Access to Communications or Alarms	✓			
221. 22CCR 66262.34 (d) Evacuation Plan		✓		
222. 22CCR 66262.34 (d) (2), 66262.34 (a) (3), 66265.37, 66265.56, 66265.52 (f), 66265.55 Arrangements with Local Authorities				✓
223. 22CCR 66262.34 (d) Emergency Coordinator Listed		✓		
224. 66262.34 (a) (3), 66265.52 Emergency Response Procedures		✓		

General Hazardous Waste Requirements	C Yes	C No	Viol Type	N/A
225. Riverside County Code Title 8.60 (Ord. 615.3) Hazardous Waste Generator Permit Fees	✓			
226. 22CCR 66262.12 (a) EPA ID Number CA		✓		
227. 22CCR 66262.11 Hazardous Waste Determination				✓
228. H&SC 25189.5(a) Disposed Treated at an Authorized Location				✓
229. H&SC 25201 (a), 22CCR 66270.1 Treatment/Storage/Transfer/Disposal Permit				✓
230. H&SC 25143.10 Recycling Plan Complete and Reported				✓
231. H&SC 25143.2 Excluded Recyclable Materials				✓
Records Review				
232. H&SC 25160.2, 22CCR 66262.20-66262.23 General Manifesting Requirements		✓		
233. 22CCR66262.42 Manifesting Exception Reports		✓		
234. 22CCR 66262.16, 66262.34 (a) (3) Personnel Training & Training Documents Maintained & Available		✓		
235. 22CCR66268.7 Waste Analysis				✓
236. 22CCR 67100.1-67100.11 Hazardous Waste Source Reduction & Management Review (Waste Minimization)				✓
237. 22CCR 66262.41 Biennial Reports				✓
Transportation				
238. H&SC 25163 (a), 22CCR 66262.10 Use of a Registered Transporter of Hazardous Waste		✓		
Management of Used Oil, Oil Filters & Batteries				
239. H&SC 25250.4 Used Oil Managed Properly		✓		
240. H&SC 25160.2 Used Oil Shipment Record Keeping		✓		
241. H&SC 25250.7 Used Oil Not Contaminated with Hazardous Waste		✓		
242. 22CCR 66266.130 Used Oil Filters				✓
243. 22CCR 66266.81 Batteries Properly Managed		✓		
Universal Waste				
244. 40 CFR 273, 22 CCR 66273 Universal Waste Fluorescent tubes, batteries, and mercury switches				✓
Specific Materials				
245. H&SC 25144.6 Contaminated Rags				✓
246. H&SC 25143.13, 40 CFR 261 Silver Only Waste				✓
247. Other:				

The above mentioned violations shall be corrected within 30 days — Correct by 1 July 2006

Specialist: Vargas
Received By: Barbara Tardy
Print Name: BARBARA TARDY
Title:

DEHHEH-022/Rev 7/2002
Distribution: White-Office, Canary-Owner/Operator, Pink-Specialist

Offices:
Indio (760) 863-8376 47-923 Oasis Rd Rm E4 Indio, CA 92201
Hemet (909) 766-6524 800 S. Sanderson Ave Hemet, CA 92545
Murrieta (909) 461-0834 38740 Sky Canyon Dr Murrieta, CA 92563
Riverside (909) 358-5055 4065 County Circle Dr Riverside, CA 92503

Certified Unified Program Agency
County of Riverside Community Health Agency
Department of Environmental Health
Hazardous Materials Management Division

SUPPLEMENTAL REPORT

Reference Date 6/1/06

Name Blackridge RTH, INC.

Address 37115 De Portola Rd Temecula CA 92592

Re: Hazardous Waste Generator Facility # 89473

Remarks:

The facility has a Hazardous Waste Permit That They will no longer be needing. They do not do any vehicle Maintenace or Other Waste generating Activity. This Information was provided by Mr. Robert Hughes.

#206, 207, 210, 202. Observed The Following Containers That were not properly Identified or Labeled. (6) 55 Gallons next to The Diesel + Unleaded Fuel Tanks also (2) 5 Gl cans of Used oil (one by The Fuel Tanks and other by The Barn in The Back area of Lot), The Owner stated That They will dispose of all The Drums with in The 30 days given To correct problems.

220, 223 + 224) The Facility does not have an Evacuation and Emergency Response Procedure available. The Facility was given a Blank Business Emergency Plan Package To Correct This Violation.

226, 232, 233 + 234) The Facility does not have an EPA ID number and Therefore has not been getting rid off all Their Waste. The Facility was given The information on how To obtain a Temporary EPA Id #. That They Can Use To Clean out Their Facility of all The Waste

238, 239, 240, 241, 242) The Facility has all The Waste ~~need~~ listed above and will be given 30 days To waste The Materials From The Facility. At That Time, Their Hazardous Waste generator Permit will be Removed.

Specialist Vargas Received By Barbara Tardy

DEH-HEH-002 (rev 5/02) HMHC 2002

white-specialist; yellow-operator; pink-file

Certified Unified Program Agency
County of Riverside Health Services Agency
Department of Environmental Health
Hazardous Materials Management Division
Hazardous Waste Generator Inspection Report

ENTERED 9/2/03 LP

Facility Name	ROCK WALKER STABLES			Page 1 of	2
Street Address	37115 DE PORTOLA RD.			Date of Inspection	2 DEC 02
City	TEMECULA	Zip Code	92592	# of Employees	6
Business Contact		Business Phone #	303-6988	Inspection Type	ROUTINE
Health & Safety Code, Chapter 6.5 California Code of Regulations, Title 22 Riverside County Ordinance 615.3				Re-Inspection Date	

Hazardous Waste Storage	Y	N	NA	Viol. Type
100. Current Permit Ordinance 6139 Facility ID # ~~89473~~ 89473		✓		
101 A. Accumulation Time 22CCR66262.34	✓			
101 B Satellite Accumulation Time 22CCR 66262.34(e)	·		✓	
102 Incompatibles Segregated 22CCR66265.177			✓	1 2 m
103 Containers				
A. **Compatible With Waste 22CCR66265.172**	✓			1 2 m
B. Labeled Properly 22CCR66262.34(f)(3)		✓		
C. Inspected Weekly 22CCR66262.174	✓			
D. **Good Condition 22CCR6626.171**	✓			1 2 m
E. **Not Leaking 22CCR 66262.173(b)**	✓			1 2 m
F. **Stored Closed 22CCR66265.173(a)**	·	✓		1 2 m
G. Ignitable or Reactive Hazardous Wastes Stored at Least 50 ft From Property Line 22CCR66265.176			✓	
H. Storage Area Inspected Weekly 22CCR66262.174	✓			
I. Aisle Space 22CCR66264.35	✓			
104. Aboveground Hazardous Waste Tank Systems				
A. Operating Requirements 22CCR 66265.194			✓	
B. Storage Area Inspected Daily 22CCR 66265.195			✓	
105. Preparedness, Prevention and Contingency Plan Prepared and Completed 22CCR66265.51	·	✓		
A. Communications and Alarms 22CCR66265.34	✓			
B. Required Fire, Spill and Decontamination Equipment 22CCR66265.32	✓			
C. Testing of Fire, Spill and Decontamination Equipment 22CCR66265.33	✓			
D. Emergency Response Procedures 22CCR66265.56	·	✓		
E. Arrangements with Local Authorities 22CCR66265. 55	✓			
F. Evacuation Plan 22CCR66265.52(f)		✓		
G. Emergency Coordinators Listed 22CCR 66265.55		✓		
106. Maintained and Operated to Minimize the Possibility of Fire, Explosion, or Release 22CCR66265.31	✓			1 2 m

Genera Hazardous Waste Requirements	Y	N	NA	Viol. Type
107. EPA ID#: _____ 22CCR66262.12(a)			✓	
108 A. Recyclable Hazardous Waste Managed H&SC 25143.2			✓	
108 B. Excluded Recyclable Materials H&SC 25143.2			✓	
109. Storage / Treatment Authorized H&SC25201(a)	✓			1 2 m
110. Access for Inspection H&SC 25195	✓			1 2 m
111. Hazardous Waste Determination 22CCR66262.11	✓			1 2 m
Records Review				
112. Manifests 22CCR66262.20-23			✓	
113. Biennial and Exception Reports 22CR66262.41			✓	
114. Training Documentation Maintained and Available 22CCR66265.16		✓		
115. Waste Analysis 22CCR66262.40(c)			✓	
116. Hazardous Waste Source Reduction Requirements comp ete 22CCR67100.3			✓	
Transportation and Disposal				
117. Registered Transporter 22CCR66262.10			✓	1 2 m
118. Disposed / Treated at an Authorized Location H&SC 25189.5			✓	1 2 m
Management of Used Oil and Batteries				
119. Used Oil Managed Properly H&SC 25250.4	✓			
120. Used Oil Shipp ng Records CCR 66266.130(b)(3)			✓	
121. Not Contam naled with Haza d us Waste H&SC25250.7	✓			
122. Filters Properly Managed 22CCR66266.130			✓	
123. Batteries Properly Managed 22CCR66266.81			✓	
Other				
124. Tiered Permitting *(Joint Inspection Required)*			✓	
125. SPCC Plan Complete (>660 gallon AGT or >1320 gallons aggregate H&SC25270.5 (c)			✓	
126. Contaminated Rags H &SC 25270.5(c)			✓	
127. Silver Only Waste H&SC 25143.23			✓	
128. Universal Waste 22CCR66273			✓	
129. NPDES Information Provided			✓	
130.			✓	

BOLD violations may be considered CLASS 1 violations and may be subject to legal and enforcement action.

☐ ***NOTICE OF VIOLATION***: The violat[illegible]) days. Failure to comply may result in legal action.

Specialist: SAPPINGTON

Title: OWNER - PARTNER

DEHHEH-022(Rev1/2000) Distribution: White-Office; Canary-Owner/Oper Pin -Specialist

OFFICES:

Riverside
(909)358-5055
4065 County Circle Drive
Riverside, CA 92503

Hemet
(909)766-6524
800 South Sanderson Ave.
Hemet, CA 92545-9045

Indio
(760)863-8976
47-923 Oasis St.
Indio, CA 92201

COUNTY OF RIVERSIDE HEALTH SERVICES AGENCY
DEPARTMENT OF ENVIRONMENTAL HEALTH
HAZARDOUS MATERIALS MANAGEMENT BRANCH

No.

SUPPLEMENTAL REPORT

Reference Date 3 DEC 02

Name ROCK WALKER STABLES

Address 37115 DE PORTOLA RD. City TEMECULA

Topic HAZ WASTE GENERATOR INSPECTION

REMARKS:

SEVERAL DRUMS (55gal) WERE FOUND IN THE CONTAINMENT AREA SOME OPEN & LACKING LABELS. ALL SUCH CONTAINERS ARE TO REMAIN PROPERLY LABELED AND CLOSED.

ALL HAZARDOUS WASTE IS TO REMAIN STORED IN A MANNER THAT WOULD PRECLUDE A RELEASE (eg SECONDARICY CONTAINMENT).

ALL RECORDS OF DISPOSAL ARE TO REMAIN ON SITE 3 YEARS.

Inspector J. Symington

Received by R. Male

DEH-HEH-002 (Rev 6/94)

DISTRIBUTION: ORIGINAL-Specialist; COPY-Supervisor

Certified Unified Program Agency
County of Riverside Community Health Agency
Department of Environmental Health Hazardous Materials Management Division
Hazardous Materials Handler Inspection Report

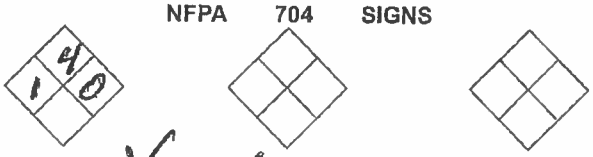
ENTERED Page ___ of ___

Facility Name: Blackridge RTH, Inc Date 6/1/06
Address: 37115 De Portola Rd Inspection: Routine [✓] Reinspection [ ]
City Temecula CA Zip Code: 92592 Level: ___ Facility #: 89473
Contact Person: Robert Hughes Number of Employees: ___ Telephone: (951) 303-6988

Riverside County Ordinance 651 California Code of Regulations Title 19 Health & Safety Code Chapter 6.95 California Fire Code

Y	N	N/A	Item marked "No" are violations of the above-referenced codes and must be corrected as follows:	
✓			**100. Current Permit**	101) The facility does not have a Business Emergency Plan available. The Owner was given a blank package for them to complete and submit to the Hemet office. The BEP will cover all the required information needed on Block 102 + 103
			101. Hazardous Materials Business Emergency Plan	
	✓		A. Approved Plan on Site and Available for Review	
	✓		B. Plan Updated within Past 3 Years	
			102. Chemical Inventory Disclosure	
	✓		A. Chemical Inventory Complete	
	✓		B. Inventory Updated Annually	
			103. Emergency Response Plans and Procedures	
	✓		A. Prevention, Mitigation and Abatement Measures	
	✓		B. Documented Employee Training	
	✓		C. Evacuation Plan with Routes	
	✓		D. Facility Map with Location of Chemicals	104) The facility does not have an NFPA 704 sign posted at the Main Entrance and by the Propane tank. The Owner shall post the appropriate NFPA 704 sign as stated below.
	✓		E. MSDS Available	
			104. Posting	
	✓		A. NFPA 704 Sign(s) Posted	
	✓		B. Emergency Phone Numbers Posted	
	✓		C. Hazardous Materials Storage Area Posted	
✓			D. Emergency Equipment Posted	
		✓	E. Pesticide Storage Area Posted	
			105. Storage	
✓			A. Maintained to Minimize the Possibility of Release	
✓			B. Handling Areas Secured	
	✓		C. Incompatibles Stored Separately	
	✓		D. Containers Properly Labeled	
			106. Other	

NFPA 704 SIGNS



Specialist: Vargas

The above noted violations shall be corrected within ___ days.
Received by: Barbara Tardy
Print Name: BARBARA TARDY
Title: Office Manager

Riverside Office (909) 358-5055
P.O. Box 7489
Riverside, CA 92513-7489

Indio Office (760) 863-8976
47-923 Oasis Street, Rm. E-4
Indio, CA 92201

Hemet Office (909) 766-6524
800 S. Sanderson Avenue
Hemet, CA 92545

ENTERED 10/24/03

Certified Unified Program Agency
County of Riverside Health Services Agency
Department of Environmental Health Hazardous Materials Management Division
Hazardous Materials Handler Inspection Report

Facility Name: Rock Walker Stables Date: 3 DECOR

Address: 37115 De Portola Rd. Inspection: Routine [X] Reinspection [ ]

City: Temecula Zip Code: 92592 Level: 1 Facility #: 88425

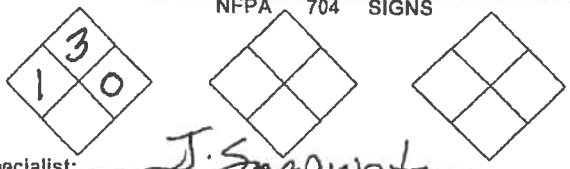
Contact Persor. ___ Number of Employees: 6 Telephone: 303-6988

Riverside County Ordinance 651 | California Code of Regulations Title 19 | Health & Safety Code Chapter 6.95 | California Fire Code

Y	N	n/a	Items marked "No" are violations of the above-referenced codes and must be corrected as follows:
	✓		100. Current Permit
			101. Hazardous Materials Business Emergency Plan
	✓		A. Approved Plan on Site and Available for Review
		✓	B. Plan Updated within Past 3 Years
			102. Chemical Inventory Disclosure
.	✓		A. Chemical Inventory Complete
	.	✓	B. Inventory Updated Annually
			103. Emergency Response Plans and Procedures
✓			A. Prevention, Mitigation and Abatement Measures
	✓		B. Documented Employee Training
	✓		C. Evacuation Plan with Routes
	✓		D. Facility Map with Location of Chemicals
	✓		E. MSDS Available
			104. Posting
	✓		A. NFPA 704 Sign(s) Posted
.	✓		B. Emergency Phone Numbers Posted
	✓		C. Hazardous Materials Storage Area Posted
✓			D. Emergency Equipment Posted
		✓	E. Pesticide Storage Area Posted
			105. Storage
✓			A. Maintained to Minimize the Possibility of Release
✓			B. Handling Areas Secured
		✓	C. Incompatibles Stored Separately
.	✓		D. Containers Properly Labeled
			106. Other

THIS FACILITY RECENTLY CHANGED OWNERSHIP.
A HAZARDOUS MATERIALS HANDLER PERMIT IS REQUIRED.
A BUSINESS EMERGENCY PLAN IS TO BE COMPLETED + SUBMITTED TO THIS OFFICE.
AN NFPA 704 SIGN IS TO REMAIN POSTED AT THE FUEL STORAGE AREA.
A CHECK # 13696 WAS RECD ($687.50) AT THIS TIME.

NFPA 704 SIGNS



Specialist: J. Symington

The above ___ in ___ days.

Received ___

Print Name: ___

Title: Owner – Partner

Riverside Office (909) 358-5055
P.O. Box 7600
Riverside, CA 92513

Indio Office (760) 863-8976
47-923 Oasis St. Rm. E-4
Indio, CA 92201

Hemet Office (909) 766-6524
800 S. Sanderson Ave.
Hemet, CA 92545

Appendix F

Qualifications of Environmental Professional

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JESSICA HIMEBAUCH

SENIOR GEOLOGIST
LA METRO REGION

AREAS OF EXPERTISE

Phase I and II Environmental Site Assessments/Project Management

Technical Review/Quality Control

EDUCATION

BS, Geological Sciences, University of Southern California

YEARS OF EXPERIENCE

With Firm	25
With Other Firms	0

SUMMARY

Ms. Himebauch has over 25 years of environmental due diligence experience working for clients in the government and private sector. As an environmental due diligence consultant, Jessica's experience encompasses project management, report preparation, technical editing, quality control, and client interaction. She has worked with various regulatory agencies including the Regional Water Quality Control Board, the Department of Toxic Substances Control, local fire departments, and various city and county departments. A summary of past selected work experience is provided below.

EXPERIENCE

Due Diligence, Northern & Southern California, Multiple Projects, City and County of Los Angeles, Cornerstone Real Estate Advisers LLC, Lincoln Property Company, Regency Centers, MetLife Real Estate Investments, Bixby Land Company, Pacific Harbor Line, and other private real estate investment/management firms. Senior Geologist providing project management, client interaction, reviewing and assisting with Phase I ESA report writing for various projects including industrial, manufacturing, agricultural, health care, commercial, and retail properties.

Hazardous Materials Lead Technical Resource, City of Los Angeles Department of Public Works, Bureau of Engineering, Homeless Bridge Housing Project in the City of Los Angeles, CA. Prepared hazardous materials technical memorandums and environmental site assessment reports in support of the Los Angeles City Mayor's Homeless Bridge Housing Project throughout the City's council districts.

Due Diligence, City of Irvine and Tierra Verde Industries at Orange County Great Park, Irvine, CA. Prepared Phase I ESA reports for City-leased property at the Orange County Great Park (former Marine Corps Air Station El Toro) to meet City of Irvine lease requirements.

Caltrans Initial Site Assessment; Long Beach Freeway (I-710) Corridor, Los Angeles County, CA; Los Angeles County Metropolitan Transportation Authority (Metro) and Partner Agencies. Managed and conducted a California Department of Transportation (Caltrans) Initial Site Assessment (ISA) for the properties associated with the proposed Long Beach Freeway (I-710) Corridor Project, which project involved 19 miles of I-710 between Long Beach and State Route 60 (SR-60). Purpose of the ISA was to evaluate the potential presence of hazardous materials prior to design and construction within the proposed project so that liability issues could be identified relating to site clean-up and construction impacts.

Caltrans ISA; The Old Road over Santa Clara River and Southern Pacific Transportation Company (SPT Co.) Bridge Project, County of Los Angeles Department of Public Works in Cooperation with Caltrans and City of Santa Clarita. Conducted a Caltrans ISA for The Old Road Improvement Project. The project consisted of 2.12 miles of The Old Road from Henry Mayo Drive and Magic Mountain Parkway in the unincorporated Castaic Junction in western Los Angeles County. The purpose of the ISA was to evaluate the potential for the presence of hazardous materials prior to design and construction within the proposed

improvements to Colima Road so that liability issues can be identified relating to site cleanup and construction impacts.

Caltrans ISA; Interstate 405 (I-405) Auxiliary Lanes Improvement Project, Los Angeles County, CA; Los Angeles County Metropolitan Transportation Authority (Metro), California Department of Transportation (Caltrans) District 7, and South Bay Cities Council of Governments (SBCCOG). Managed and conducted a Caltrans ISA for the proposed I-405 Auxiliary Lanes Project from Redondo Beach Boulevard to El Segundo Boulevard. Objective of the ISA was to evaluate the potential for the presence of hazardous materials prior to design and construction within the proposed project right-of-way so that liability issues can be identified relating to site clean-up and construction impacts.

Caltrans ISA; Colima Road Improvement Project; Los Angeles County, CA; County of Los Angeles Department of Public Works in Cooperation with the City of Industry and Caltrans. Conducted a Caltrans ISA for the Colima Road Improvement Project. The project consisted of Colima Road, extending 4.8 miles from the City of Whittier Boundary through unincorporated Hacienda Heights. Purpose of the ISA was to evaluate the potential for the presence of hazardous materials prior to design and construction within the proposed improvements to Colima Road so that liability issues can be identified relating to site cleanup and construction impacts.

Caltrans ISA; State Route 47 (SR-47) Interchange Project; City of Los Angeles, CA; Port of Los Angeles in cooperation with the City of Los Angeles and Caltrans. Conducted a Caltrans ISA for the SR-47 Interchange Project. The project included the proposed reconfiguration of the existing interchange at State Route 47/Vincent Thomas Bridge and Harbor Boulevard/Front Street. Purpose of the ISA was to identify sites that have the potential to affect the proposed project with hazardous materials and/or wastes from current and historical environmental conditions.

Principal Investigator and Project Manager, Phase I Environmental Site Assessments throughout the United States; Canada, and Colombia, Major Media and Entertainment Company (Confidential). Scope of work included a standard Phase I and the addition of a limited compliance and environmental health and safety audit of various facilities.

Other Projects include:

Lead Technical Resource of the PEA Program for the Los Angeles Unified School District (LAUSD). Directed the background research efforts for multiple proposed new schools and school additions for LAUSD. Assisted the project director in the preparation of work plans for LAUSD proposed school sites pursuant to California regulatory requirements and attended meetings with regulatory agencies on behalf of the LAUSD.

Assisted with the Palmdale to Burbank Section of the California High Speed (HSR) System, Hazardous Materials and Wastes Technical Report for the California High-Speed Rail Authority and US Department of Transportation (DOT) Federal Railroad Administration including technical review and QA/QC.

Assisted with the Westside Subway Extension Hazardous Materials Technical Report for Metro including report preparation/writing, QA/QC, and technical review.

Managed Phase I Investigations for the Alameda Corridor Transportation Authority (ACTA) including technical review, report preparation/writing, QA/QC, and client correspondence.

Performed environmental assessments for cellular telephone antenna installations for a major cellular operator. Tasks included inspections of numerous buildings, installations, additions, collocations, and vacant land, and asbestos and lead sampling at these facilities throughout Southern California.

Principal Investigator and participant in various Phase II Investigations including soil sampling, groundwater sampling, and soil-vapor sampling through Geoprobe drilling techniques. Activities included review of historical documents, analysis of

previous reports, scheduling and overseeing subcontractors, site reconnaissance, preparation of work plans and health and safety plans, regulatory agency interaction, data analysis, and technical report preparation.

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AECOM Technical Services Inc.
401 West A Street, Suite 1200
San Diego, California 92101
aecom.com

Appendix C

Environmental Database Report

Vail Dam
37115 and 37205 De Portola Road
Temecula, CA 92592

Inquiry Number: 7061920.5s
July 21, 2022

EDR Area / Corridor Report

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

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Executive Summary	ES1
Mapped Sites Summary	2
Key Map	2
Map Findings Summary	3
Focus Maps	8
Map Findings	20
Orphan Summary	OR-1
Government Records Searched/Data Currency Tracking	GR-1

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

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EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E1527-21), the ASTM Standard Practice for Environmental Site Assessments for Forestland or Rural Property (E 2247-16), the ASTM Standard Practice for Limited Environmental Due Diligence: Transaction Screen Process (E 1528-14) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

SUBJECT PROPERTY INFORMATION

ADDRESS

37115 AND 37205 DE PORTOLA ROAD
TEMECULA, CA 92592

TARGET PROPERTY SEARCH RESULTS

The Target Property was identified in the following databases.

Page Numbers and Map Identifcations refer to the EDR Area/Corridor Report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

ADDITIONAL ENVIRONMENTAL RECORDS

Other Ascertainable Records

FINDS: Facility Index System/Facility Registry System

A review of the FINDS list, as provided by EDR, and dated 05/13/2022 has revealed that there are 2 FINDS sites within the requested target property.

Site	Address	Map ID / Focus Map(s)	Page
RCWD VDC WELL Registry ID:: 110065634353	37100 BLOCK DE PORTO	1 / 1	19
VAIL LAKE TRANSMISSI Registry ID:: 110065420057	PULGAS CREEK ROAD	2 / 6	19

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified in the following databases.

Page Numbers and Map Identifcations refer to the EDR Area/Corridor Report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

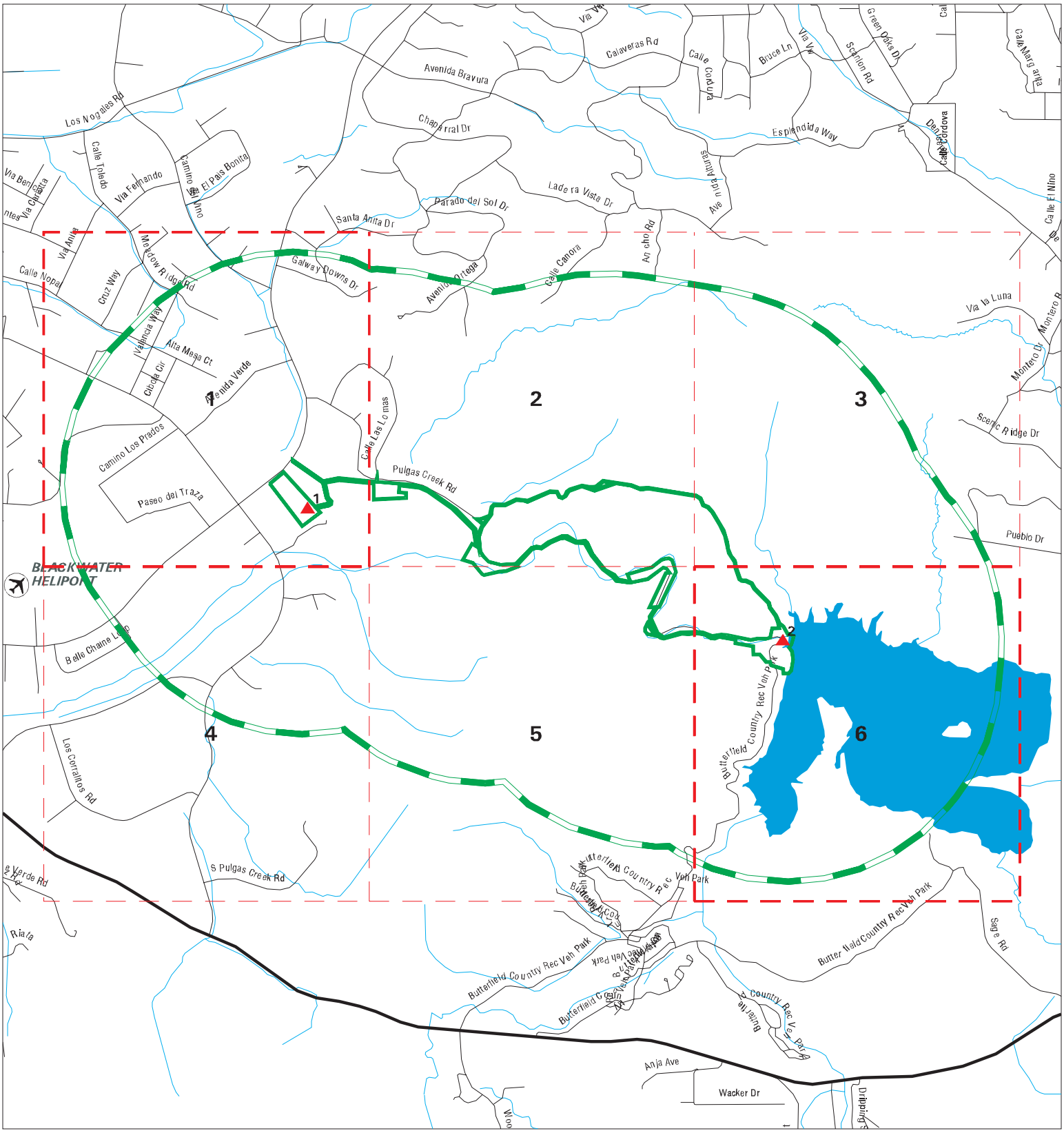
Unmappable (orphan) sites are not considered in the foregoing analysis.

MAPPED SITES SUMMARY

Target Property:
37115 AND 37205 DE PORTOLA ROAD
TEMECULA, CA 92592

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION
1 / 1	RCWD VDC WELL	37100 BLOCK DE PORTO	FINDS	TP
2 / 6	VAIL LAKE TRANSMISSI	PULGAS CREEK ROAD	FINDS	TP

Key Map - 7061920.5s



Sites
Target Property
Search Buffer
Focus Map - No Sites
Focus Map - Sites
National Priority List Sites
Areas of Concern
Dept. Defense Sites
Indian Reservations BIA

0 1/2 1 Miles

SITE NAME: Vail Dam	CLIENT: AECOM
ADDRESS: 37115 and 37205 De Portola Road	CONTACT: Sarah Perhala
CITY/STATE: Temecula CA	INQUIRY #: 7061920.5s
ZIP: 92592	DATE: 07/21/22 5:13 PM

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MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
STANDARD ENVIRONMENTAL RECORDS								
Lists of Federal NPL (Superfund) sites								
NPL	1.000		0	0	0	0	NR	0
Proposed NPL	1.000		0	0	0	0	NR	0
NPL LIENS	1.000		0	0	0	0	NR	0
Lists of Federal Delisted NPL sites								
Delisted NPL	1.000		0	0	0	0	NR	0
Lists of Federal sites subject to CERCLA removals and CERCLA orders								
FEDERAL FACILITY	0.500		0	0	0	NR	NR	0
SEMS	0.500		0	0	0	NR	NR	0
Lists of Federal CERCLA sites with NFRAP								
SEMS-ARCHIVE	0.500		0	0	0	NR	NR	0
Lists of Federal RCRA facilities undergoing Corrective Action								
CORRACTS	1.000		0	0	0	0	NR	0
Lists of Federal RCRA TSD facilities								
RCRA-TSDF	0.500		0	0	0	NR	NR	0
Lists of Federal RCRA generators								
RCRA-LQG	0.250		0	0	NR	NR	NR	0
RCRA-SQG	0.250		0	0	NR	NR	NR	0
RCRA-VSQG	0.250		0	0	NR	NR	NR	0
Federal institutional controls / engineering controls registries								
LUCIS	0.500		0	0	0	NR	NR	0
US ENG CONTROLS	0.500		0	0	0	NR	NR	0
US INST CONTROLS	0.500		0	0	0	NR	NR	0
Federal ERNS list								
ERNS	TP		NR	NR	NR	NR	NR	0
Lists of state- and tribal (Superfund) equivalent sites								
RESPONSE	1.000		0	0	0	0	NR	0
Lists of state- and tribal hazardous waste facilities								
ENVIROSTOR	1.000		0	0	0	0	NR	0
Lists of state and tribal landfills and solid waste disposal facilities								
SWF/LF	0.500		0	0	0	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
Lists of state and tribal leaking storage tanks								
LUST	0.500		0	0	0	NR	NR	0
INDIAN LUST	0.500		0	0	0	NR	NR	0
CPS-SLIC	0.500		0	0	0	NR	NR	0
Lists of state and tribal registered storage tanks								
FEMA UST	0.250		0	0	NR	NR	NR	0
UST	0.250		0	0	NR	NR	NR	0
AST	0.250		0	0	NR	NR	NR	0
INDIAN UST	0.250		0	0	NR	NR	NR	0
Lists of state and tribal voluntary cleanup sites								
INDIAN VCP	0.500		0	0	0	NR	NR	0
VCP	0.500		0	0	0	NR	NR	0
Lists of state and tribal brownfield sites								
BROWNFIELDS	0.500		0	0	0	NR	NR	0
ADDITIONAL ENVIRONMENTAL RECORDS								
Local Brownfield lists								
US BROWNFIELDS	0.500		0	0	0	NR	NR	0
Local Lists of Landfill / Solid Waste Disposal Sites								
WMUDS/SWAT	0.500		0	0	0	NR	NR	0
SWRCY	0.500		0	0	0	NR	NR	0
HAULERS	TP		NR	NR	NR	NR	NR	0
INDIAN ODI	0.500		0	0	0	NR	NR	0
DEBRIS REGION 9	0.500		0	0	0	NR	NR	0
ODI	0.500		0	0	0	NR	NR	0
IHS OPEN DUMPS	0.500		0	0	0	NR	NR	0
Local Lists of Hazardous waste / Contaminated Sites								
US HIST CDL	TP		NR	NR	NR	NR	NR	0
HIST Cal-Sites	1.000		0	0	0	0	NR	0
SCH	0.250		0	0	NR	NR	NR	0
CDL	TP		NR	NR	NR	NR	NR	0
CERS HAZ WASTE	0.250		0	0	NR	NR	NR	0
Toxic Pits	1.000		0	0	0	0	NR	0
US CDL	TP		NR	NR	NR	NR	NR	0
AQUEOUS FOAM	TP		NR	NR	NR	NR	NR	0
PFAS	0.500		0	0	0	NR	NR	0
Local Lists of Registered Storage Tanks								
SWEEPS UST	0.250		0	0	NR	NR	NR	0
HIST UST	0.250		0	0	NR	NR	NR	0
CA FID UST	0.250		0	0	NR	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
CERS TANKS	0.250		0	0	NR	NR	NR	0
Local Land Records								
LIENS	TP		NR	NR	NR	NR	NR	0
LIENS 2	TP		NR	NR	NR	NR	NR	0
DEED	0.500		0	0	0	NR	NR	0
Records of Emergency Release Reports								
HMIRS	TP		NR	NR	NR	NR	NR	0
CHMIRS	TP		NR	NR	NR	NR	NR	0
LDS	TP		NR	NR	NR	NR	NR	0
MCS	TP		NR	NR	NR	NR	NR	0
SPILLS 90	TP		NR	NR	NR	NR	NR	0
Other Ascertainable Records								
RCRA NonGen / NLR	0.250		0	0	NR	NR	NR	0
FUDS	1.000		0	0	0	0	NR	0
DOD	1.000		0	0	0	0	NR	0
SCRD DRYCLEANERS	0.500		0	0	0	NR	NR	0
US FIN ASSUR	TP		NR	NR	NR	NR	NR	0
EPA WATCH LIST	TP		NR	NR	NR	NR	NR	0
2020 COR ACTION	0.250		0	0	NR	NR	NR	0
TSCA	TP		NR	NR	NR	NR	NR	0
TRIS	TP		NR	NR	NR	NR	NR	0
SSTS	TP		NR	NR	NR	NR	NR	0
ROD	1.000		0	0	0	0	NR	0
RMP	TP		NR	NR	NR	NR	NR	0
RAATS	TP		NR	NR	NR	NR	NR	0
PRP	TP		NR	NR	NR	NR	NR	0
PADS	TP		NR	NR	NR	NR	NR	0
ICIS	TP		NR	NR	NR	NR	NR	0
FTTS	TP		NR	NR	NR	NR	NR	0
MLTS	TP		NR	NR	NR	NR	NR	0
COAL ASH DOE	TP		NR	NR	NR	NR	NR	0
COAL ASH EPA	0.500		0	0	0	NR	NR	0
PCB TRANSFORMER	TP		NR	NR	NR	NR	NR	0
RADINFO	TP		NR	NR	NR	NR	NR	0
HIST FTTS	TP		NR	NR	NR	NR	NR	0
DOT OPS	TP		NR	NR	NR	NR	NR	0
CONSENT	1.000		0	0	0	0	NR	0
INDIAN RESERV	1.000		0	0	0	0	NR	0
FUSRAP	1.000		0	0	0	0	NR	0
UMTRA	0.500		0	0	0	NR	NR	0
LEAD SMELTERS	TP		NR	NR	NR	NR	NR	0
US AIRS	TP		NR	NR	NR	NR	NR	0
US MINES	0.250		0	0	NR	NR	NR	0
ABANDONED MINES	0.250		0	0	NR	NR	NR	0
FINDS	TP	2	NR	NR	NR	NR	NR	2
DOCKET HWC	TP		NR	NR	NR	NR	NR	0
ECHO	TP		NR	NR	NR	NR	NR	0
UXO	1.000		0	0	0	0	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
FUELS PROGRAM	0.250		0	0	NR	NR	NR	0
CA BOND EXP. PLAN	1.000		0	0	0	0	NR	0
Cortese	0.500		0	0	0	NR	NR	0
CUPA Listings	0.250		0	0	NR	NR	NR	0
DRYCLEANERS	0.250		0	0	NR	NR	NR	0
EMI	TP		NR	NR	NR	NR	NR	0
ENF	TP		NR	NR	NR	NR	NR	0
Financial Assurance	TP		NR	NR	NR	NR	NR	0
HAZNET	TP		NR	NR	NR	NR	NR	0
ICE	TP		NR	NR	NR	NR	NR	0
HIST CORTESE	0.500		0	0	0	NR	NR	0
HWP	1.000		0	0	0	0	NR	0
HWT	0.250		0	0	NR	NR	NR	0
MINES	0.250		0	0	NR	NR	NR	0
MWMP	0.250		0	0	NR	NR	NR	0
NPDES	TP		NR	NR	NR	NR	NR	0
PEST LIC	TP		NR	NR	NR	NR	NR	0
PROC	0.500		0	0	0	NR	NR	0
Notify 65	1.000		0	0	0	0	NR	0
UIC	TP		NR	NR	NR	NR	NR	0
UIC GEO	TP		NR	NR	NR	NR	NR	0
WASTEWATER PITS	0.500		0	0	0	NR	NR	0
WDS	TP		NR	NR	NR	NR	NR	0
WIP	0.250		0	0	NR	NR	NR	0
MILITARY PRIV SITES	TP		NR	NR	NR	NR	NR	0
PROJECT	TP		NR	NR	NR	NR	NR	0
WDR	TP		NR	NR	NR	NR	NR	0
CIWQS	TP		NR	NR	NR	NR	NR	0
CERS	TP		NR	NR	NR	NR	NR	0
NON-CASE INFO	TP		NR	NR	NR	NR	NR	0
OTHER OIL GAS	TP		NR	NR	NR	NR	NR	0
PROD WATER PONDS	TP		NR	NR	NR	NR	NR	0
SAMPLING POINT	TP		NR	NR	NR	NR	NR	0
WELL STIM PROJ	TP		NR	NR	NR	NR	NR	0
MINES MRDS	TP		NR	NR	NR	NR	NR	0
HWTS	TP		NR	NR	NR	NR	NR	0
EDR HIGH RISK HISTORICAL RECORDS								
EDR Exclusive Records								
EDR MGP	1.000		0	0	0	0	NR	0
EDR Hist Auto	0.125		0	NR	NR	NR	NR	0
EDR Hist Cleaner	0.125		0	NR	NR	NR	NR	0
EDR RECOVERED GOVERNMENT ARCHIVES								
Exclusive Recovered Govt. Archives								
RGA LF	TP		NR	NR	NR	NR	NR	0
RGA LUST	TP		NR	NR	NR	NR	NR	0
- Totals --		2	0	0	0	0	0	2

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted

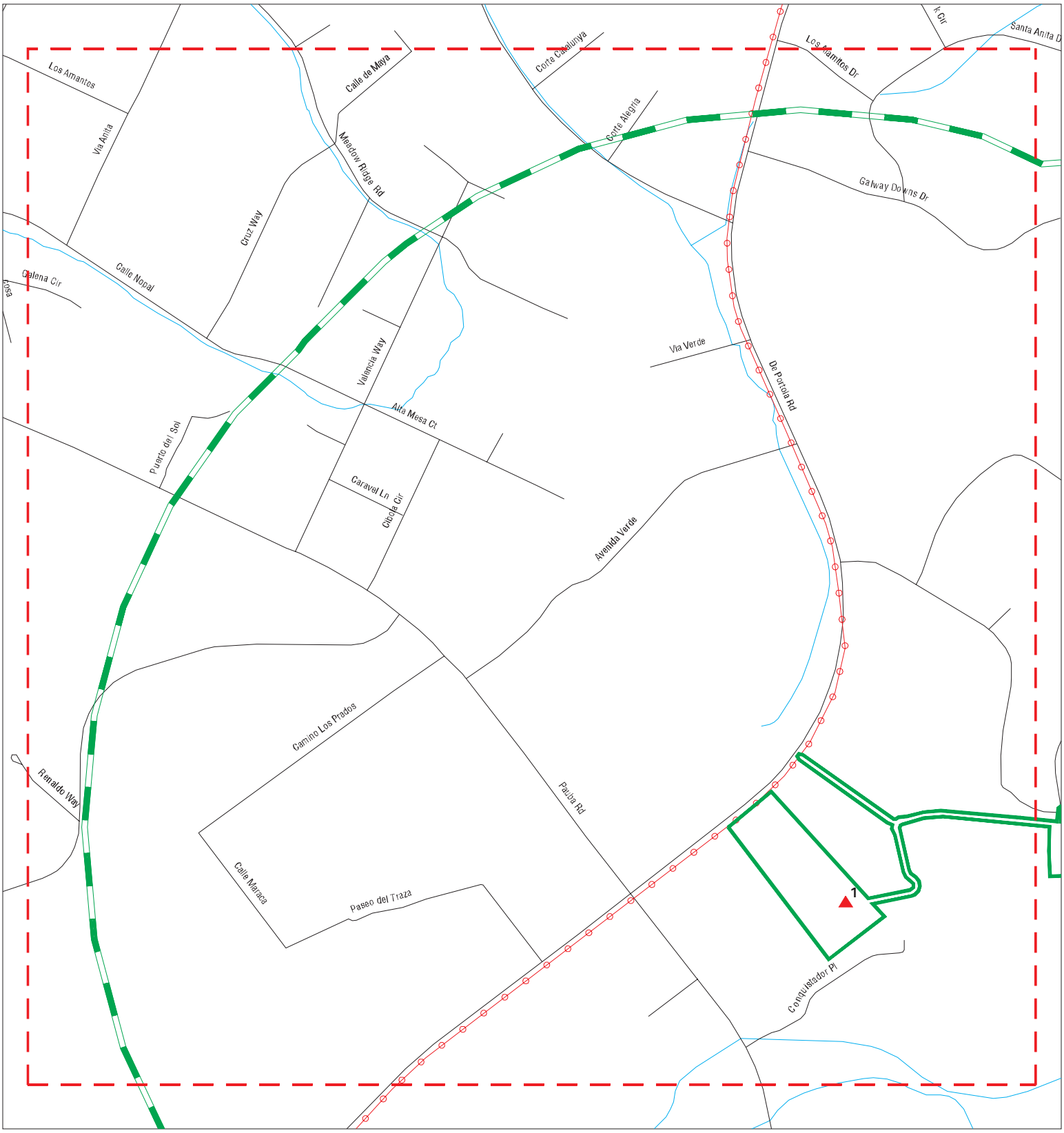
NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

Focus Map - 1 - 7061920.5s



- Sites
- Target Property
- Search Buffer
- Focus Map - No Sites
- Focus Map - Sites
- Power Line
- National Priority List Sites
- Areas of Concern
- Dept. Defense Sites
- Indian Reservations BIA

0 1/8 1/4 Miles

SITE NAME: Vail Dam	CLIENT: AECOM
ADDRESS: 37115 and 37205 De Portola Road	CONTACT: Sarah Perhala
CITY/STATE: Temecula CA	INQUIRY #: 7061920.5s
ZIP: 92592	DATE: 07/21/22

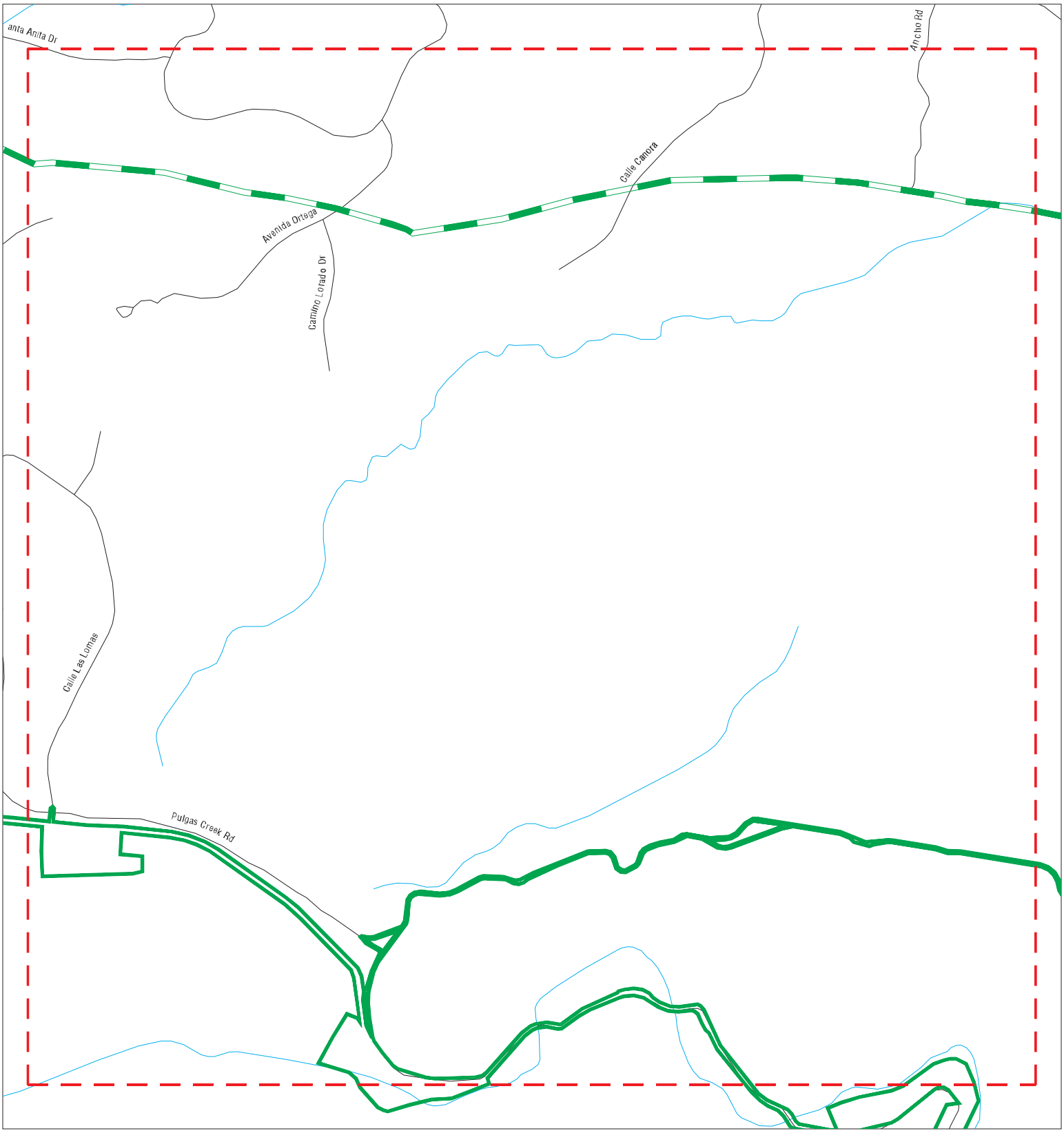
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MAPPED SITES SUMMARY - FOCUS MAP 1

Target Property:
37115 AND 37205 DE PORTOLA ROAD
TEMECULA, CA 92592

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION
1 / 1	RCWD VDC WELL	37100 BLOCK DE PORTO	FINDS	TP

Focus Map - 2 - 7061920.5s



Sites
Target Property
Search Buffer
Focus Map - No Sites
Focus Map - Sites
Power Line
National Priority List Sites
Areas of Concern
Dept. Defense Sites
Indian Reservations BIA

0 1/8 1/4 Miles

SITE NAME: Vail Dam	CLIENT: AECOM
ADDRESS: 37115 and 37205 De Portola Road	CONTACT: Sarah Perhala
CITY/STATE: Temecula CA	INQUIRY #: 7061920.5s
ZIP: 92592	DATE: 07/21/22

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MAPPED SITES SUMMARY - FOCUS MAP 2

Target Property:
37115 AND 37205 DE PORTOLA ROAD
TEMECULA, CA 92592

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION

NO MAPPED SITES FOUND

Focus Map - 3 - 7061920.5s



Sites
Target Property
Search Buffer
Focus Map - No Sites
Focus Map - Sites
Power Line
National Priority List Sites
Areas of Concern
Dept. Defense Sites
Indian Reservations BIA

0 1/8 1/4 Miles

SITE NAME: Vail Dam	CLIENT: AECOM
ADDRESS: 37115 and 37205 De Portola Road	CONTACT: Sarah Perhala
CITY/STATE: Temecula CA	INQUIRY #: 7061920.5s
ZIP: 92592	DATE: 07/21/22

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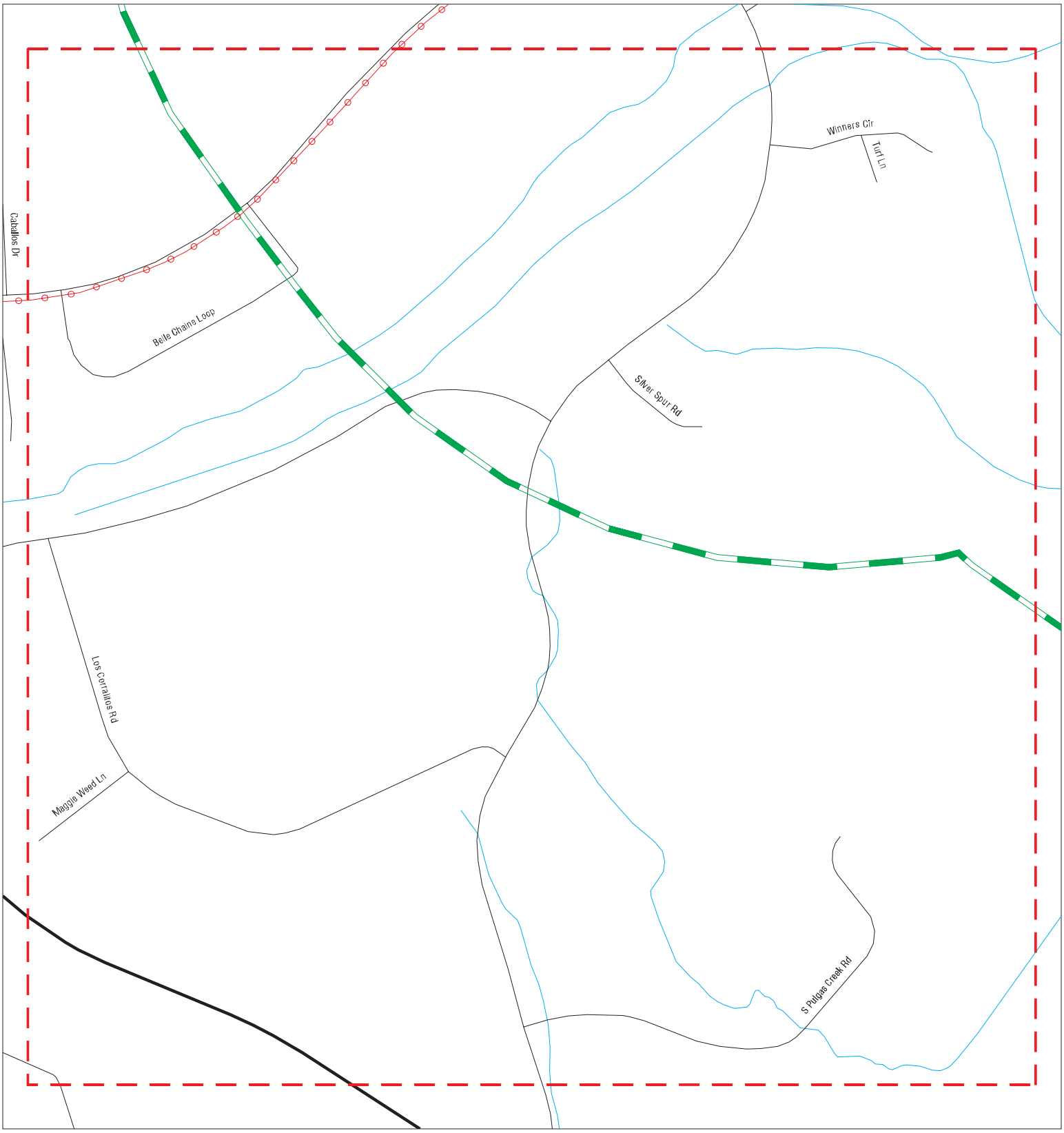
MAPPED SITES SUMMARY - FOCUS MAP 3

Target Property:
37115 AND 37205 DE PORTOLA ROAD
TEMECULA, CA 92592

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION

NO MAPPED SITES FOUND

Focus Map - 4 - 7061920.5s



Sites
Target Property
Search Buffer
Focus Map - No Sites
Focus Map - Sites
Power Line
National Priority List Sites
Areas of Concern
Dept. Defense Sites
Indian Reservations BIA

0 1/8 1/4 Miles

SITE NAME: Vail Dam	CLIENT: AECOM
ADDRESS: 37115 and 37205 De Portola Road	CONTACT: Sarah Perhala
CITY/STATE: Temecula CA	INQUIRY #: 7061920.5s
ZIP: 92592	DATE: 07/21/22

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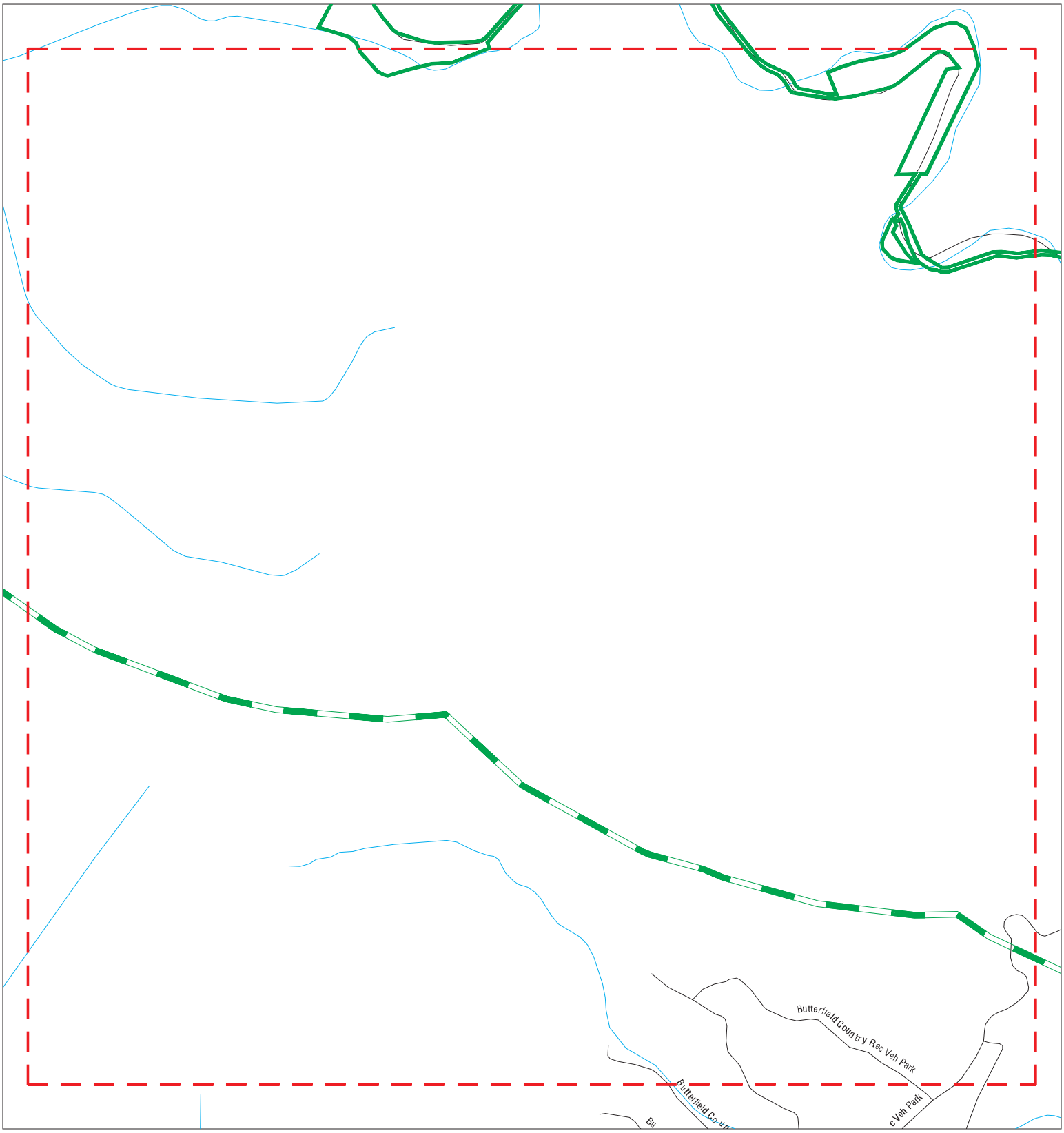
MAPPED SITES SUMMARY - FOCUS MAP 4

Target Property:
37115 AND 37205 DE PORTOLA ROAD
TEMECULA, CA 92592

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION

NO MAPPED SITES FOUND

Focus Map - 5 - 7061920.5s



Sites
Target Property
Search Buffer
Focus Map - No Sites
Focus Map - Sites
Power Line
National Priority List Sites
Areas of Concern
Dept. Defense Sites
Indian Reservations BIA

0 1/8 1/4 Miles

SITE NAME: Vail Dam	CLIENT: AECOM
ADDRESS: 37115 and 37205 De Portola Road	CONTACT: Sarah Perhala
CITY/STATE: Temecula CA	INQUIRY #: 7061920.5s
ZIP: 92592	DATE: 07/21/22

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MAPPED SITES SUMMARY - FOCUS MAP 5

Target Property:
37115 AND 37205 DE PORTOLA ROAD
TEMECULA, CA 92592

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION

NO MAPPED SITES FOUND

Focus Map - 6 - 7061920.5s



Sites
Target Property
Search Buffer
Focus Map - No Sites
Focus Map - Sites
Power Line
National Priority List Sites
Areas of Concern
Dept. Defense Sites
Indian Reservations BIA

0 1/8 1/4 Miles

SITE NAME: Vail Dam ADDRESS: 37115 and 37205 De Portola Road CITY/STATE: Temecula CA ZIP: 92592	CLIENT: AECOM CONTACT: Sarah Perhala INQUIRY #: 7061920.5s DATE: 07/21/22

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MAPPED SITES SUMMARY - FOCUS MAP 6

Target Property:
37115 AND 37205 DE PORTOLA ROAD
TEMECULA, CA 92592

MAP ID / FOCUS MAP	SITE NAME	ADDRESS	DATABASE ACRONYMS	DIST (ft. & mi.) DIRECTION
2 / 6	VAIL LAKE TRANSMISSI	PULGAS CREEK ROAD	FINDS	TP

1 **RCWD VDC WELL** **FINDS** **1023273317**
Target Property **37100 BLOCK DE PORTOLA RD** **N/A**
TEMECULA, CA 92592

FINDS:
Registry ID: 110065634353

Actual: 1255 ft.

Click Here for FRS Facility Detail Report:

Focus Map: 1

Environmental Interest/Information System:
STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

---

2 **VAIL LAKE TRANSMISSION MAIN AND PUMP STATION** **FINDS** **1023253199**
Target Property **PULGAS CREEK ROAD** **N/A**
TEMECULA, CA 92592

FINDS:
Registry ID: 110065420057

Actual: 1363 ft.

Click Here for FRS Facility Detail Report:

Focus Map: 6

Environmental Interest/Information System:
STATE MASTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

Count: 72 records

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
LAKE ELSINORE	S118119503	PASADENA INDUSTRIAL PARK	PASADENA AND HUNCO WAY	92592	NPDES
RIVERSIDE COUNTY	S105635101		WHITE WATER WASH OFF I-10 AND PALM DRIVE		CHMIRS
RIVERSIDE COUNTY	S105641074		INTER/MILES AND OASIS		CHMIRS
RIVERSIDE COUNTY	S105631945		PIO RICO RD. AND AMERITA, TEMECULA		CHMIRS
RIVERSIDE COUNTY	S105632241		INDIO BLVD BETWEEN CIVIC CENTER AND DILLION RD		CHMIRS
RIVERSIDE COUNTY	S105630539		DEVONSHIRE AND STATE STREET		CHMIRS
RIVERSIDE COUNTY	S106388993		CLOVERDALE AND HARRISON N/W CORNER OF RIVERSIDE CO. NEAR THE TOWN OF MIRALOMA AND NORCO		CHMIRS
RIVERSIDE COUNTY	1023264791	FRENCH VALLEY INDUSTRIAL CENTER	NORTHWEST CORNER OF INTERSECTION OF LEON RD AND JO		FINDS
RIVERSIDE COUNTY	S121635955	EASTVALE DOWNS COPPERWOOD	SEC ARCHIBALD AND CLOVERDALE		CIWQS
RIVERSIDE COUNTY	S121666283	QUINTA DO LAGO 06C-010 401 CERT	SOUTHEAST CORNER OF BRUSSELS AND LEON		CIWQS
SAGE	S105646651		CALLE BREZE AND GEISUBAUER	92592	CHMIRS
TEMECULA	S114001684		PUJOL AND 6TH	92592	CHMIRS
TEMECULA	S118465703		NORTH OF INTERSECTION, BUTTERFIELD STAGE RD. AND WELTON RD.	92592	CHMIRS
TEMECULA	S105668228		VIA ROBERTO RD AND PALA RD		CHMIRS
TEMECULA	S110424420		TERAMO ST AND CHARM ST		CHMIRS
TEMECULA	S121504394		CORNER OF CALLE MEDUSA AND NICKELS RD.		CHMIRS
TEMECULA	S107453123		PALA RD. AND WOLF		CHMIRS
TEMECULA	S113999192		INTERSECTION OF PUJOL AND 6TH ST		CHMIRS
TEMECULA	S116779115		NEXT TO AND GOES BEHIND 40495 CALE MEDUSA		CHMIRS
TEMECULA	S116779435		1ST ST. AND OLD TOWN FRONT ST.		CHMIRS
TEMECULA	S106396924		IN CONSTRUCTION AREA NEAR BUTTERFIELD STAGE ROAD AND NIGHTHAWK ROAD		CHMIRS
TEMECULA	S106399013		RANCHO CALIFORNIA RD AND FRONT STREET		CHMIRS
TEMECULA	S118736839		NIGHT HAWK PASS AND MONTE CELLO WAY		CHMIRS
TEMECULA	S105885280		SOLANO WAY AND MARGARITA ROAD		CHMIRS
TEMECULA	S108406159		CORDERA AND CAPISTRANO		CHMIRS
TEMECULA	S110421169		ANZA RD AND RANCHO CALIFORNIA		CHMIRS
TEMECULA	S110983283		INTERSECTION OF BENTON AND CADDY ST.		CHMIRS
TEMECULA	S110977652		INTERSECTION OF PUJOL AND MAIN STREET		CHMIRS
TEMECULA	S118465075		REDHAWK PKWY AND NIGHTHAWK		CHMIRS
TEMECULA	S128201540		STATE ROUTE 79 AND STATE ROUTE 371		CHMIRS
TEMECULA	1016421629	SCE PECHANGA SUBSTATION	N OF HWY 79 AND W OF ANZA RD	92592	FINDS
TEMECULA	1027014059	PASCAL 12KV LINEAR CONSTRUCTION ACTIVITIES	PALA ROAD AND BIA PECHANGA RESERVATION	92592	FINDS
TEMECULA	1026864300	PASCAL 12KV LINEAR CONSTRUCTION ACTIVITIES	PALA ROAD AND BIA PECHANGA RESERVATION	92592	ECHO
TEMECULA	S118152156	E. BENTON ROAD	SOUTHEAST OF THE INTERSECTION OF EAST BENTON ROAD AND WARREN ROAD		ENF, CIWQS
TEMECULA	S111213577	TEMECULA EDUCATION CENTER	NW CORNER DIDZ ROAD AND DENDY PRKWY		ENF, CIWQS
TEMECULA	S122248737	PASEO DEL SOL PA 6A	SW CORNER OF DEPORTOLA AND MEADOWS PKWY	92592	NPDES
TEMECULA	S117696707	CAMINO ROMO & PAUBA RD	CAMINO ROMO AND PAUBA ROAD	92592	NPDES, CIWQS
TEMECULA	S121022987	INDIGIO PLACE	NWC MIRA LOMA DRIVE AND RANCHO VISTA ROAD	92592	NPDES
TEMECULA	S117698065	COPPER MOON	PECHANGA PKWY AND PALA RD	92592	NPDES, CIWQS

Count: 72 records

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
TEMECULA	S121679149	TEMECULA COMMERCIAL CTR	DATE STREET AND DEL HAVEN	92592	CIWQS
TEMECULA	S110736783	TRACT 30264-2-6-8-12-13@	NE QUADRANT OF WOLF VALLEY RD. AND PECHANGA PKWY	92592	CIWQS
TEMECULA	S121692307	WOLF STORE RETAIL PARK	HWY 79 S AND WOLF STORE RD	92592	CIWQS
TEMECULA	S121666687	RANCHO GLENOAKS PIPELINE	S OF LAKE SKINNER AND N OF VAIL LAKE	92592	CIWQS
TEMECULA	S121667314	REDHAWK TOWN CTR	HWY 79 SOUTH AND REDHAWK PKWY	92592	CIWQS
TEMECULA	S121657004	MORGAN VALLEY	NW OF RANCHO PAUBA AND BUTTERFIELD STAGE RD	92592	CIWQS
TEMECULA	S121669156	ROGERS RESIDENCE	DE PORTOLA RD	92592	CIWQS
TEMECULA	S121644952	HORSE RANCH & RESIDENCE 44155 DE PORTOLA RD	SEC BTWN DE PORTOLA RD & COLT RD	92592	CIWQS
TEMECULA	S121687855	VAIL RNCH TOWNE SQUARE	HWY 79 S AND MAHLON VAIL RD	92592	CIWQS
TEMECULA	S121619556	ALOIA RESIDENCE	DE PORTOLA RD		CIWQS
TEMECULA	S121692037	WINCHESTER SQUARE COMMERCIAL	NEC WINCHESTER RD AND MURRIETA		CIWQS
TEMECULA	S121632244	CROWN VALLEY VILLAGE	SWC OF AULD RD AND POURROY RD		CIWQS
TEMECULA	S121679153	TEMECULA CREEK & REDHAWK	TEMECULA CREEK AND REDHAWK		CIWQS
TEMECULA	S121655624	MIDDLE SCH NO 5	SWC LOMA LINDA AND VIA DEL COR		CIWQS
TEMECULA	S121683737	TRACT 24185	NW DE PORTOLA AND BUTTERFIELD		CIWQS
TEMECULA	S121683720	TRACT 23583	NORTH GENERAL KEARNY AND VALLE		CIWQS
TEMECULA	S121691944	WILLOWS TR 29411 29412	N AND S OF MURIETTA HOT SPRING		CIWQS
TEMECULA	S121660591	OLD SCH HOUSE	MARGARITA RD AND MURRIETA		CIWQS
TEMECULA	S121685053	TRACT NO 29245	N GENERAL KEARNY AND FINBROOK		CIWQS
TEMECULA	S121639870	FRENCH VALLEY III	NW OF THOMPSON RD AND POURROY		CIWQS
TEMECULA	S121631431	COSTCO WHOLESALE	YNEZ RD AND OVERLAND DR		CIWQS
TEMECULA	S121621656	AULD RD & BENTON RD	AULD RD AND BENTON RD		CIWQS
TEMECULA	S121633616	DEODAR LANE	RANCHO VISTA RD AND KAISER PKWY		CIWQS
TEMECULA	S121683958	TRACT 29952 PEBLEY	NWC NEC POURROY AND AIRO RD		CIWQS
TEMECULA	S121633171	DE PORTOLA PROFESSIONAL CENTER	SEC DE PORTOLA & MARGARITA RD		CIWQS
TEMECULA	S121679176	TEMECULA VALLEY HS NO 3	NEC PALA RD AND DEER HOLLOW RD		CIWQS
TEMECULA	S121655623	MIDDLE SCH NO 5	LOMA LINDA AND VIA DEL CORONAD		CIWQS
TEMECULA	S121653965	MARKETPLACE AT VAIL RNCH	SWC HWY 79 AND BUTTERFIELD		CIWQS
TEMECULA	S121684870	TRACT MAP NO 24187 2	SEC SUNNY MEADOWS DR AND MEA		CIWQS
TEMECULA	S121629231	CHURCH OF LATTER DAY SAINTS	W OF CORTE VILLOSA AND PAUBA RD INT		CIWQS
TEMECULA	S121664906	PM 29132	ST HWY 79S AND AVENIDA DE MISS		CIWQS
TEMECULA	S121683918	TRACT 29442	BENTON AND POURROY		CIWQS
UNINCORPORATED AREA	1023296430	ATHERTON PROJECTNA UNINCORPORATED AREA C RIVERSIDE CTY	MONTE VERDE DRIVENA ANZA ROAD AND EL CHIMISAL ROAD	92592	FINDS

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Number of Days to Update: Provides confirmation that EDR is reporting records that have been updated within 90 days from the date the government agency made the information available to the public.

STANDARD ENVIRONMENTAL RECORDS

Lists of Federal NPL (Superfund) sites

NPL: National Priority List

National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 04/27/2022
Date Data Arrived at EDR: 05/05/2022
Date Made Active in Reports: 05/31/2022
Number of Days to Update: 26

Source: EPA
Telephone: N/A
Last EDR Contact: 07/01/2022
Next Scheduled EDR Contact: 10/10/2022
Data Release Frequency: Quarterly

NPL Site Boundaries

Sources:

EPA's Environmental Photographic Interpretation Center (EPIC)
Telephone: 202-564-7333

EPA Region 1
Telephone 617-918-1143

EPA Region 6
Telephone: 214-655-6659

EPA Region 3
Telephone 215-814-5418

EPA Region 7
Telephone: 913-551-7247

EPA Region 4
Telephone 404-562-8033

EPA Region 8
Telephone: 303-312-6774

EPA Region 5
Telephone 312-886-6686

EPA Region 9
Telephone: 415-947-4246

EPA Region 10
Telephone 206-553-8665

Proposed NPL: Proposed National Priority List Sites

A site that has been proposed for listing on the National Priorities List through the issuance of a proposed rule in the Federal Register. EPA then accepts public comments on the site, responds to the comments, and places on the NPL those sites that continue to meet the requirements for listing.

Date of Government Version: 04/27/2022
Date Data Arrived at EDR: 05/05/2022
Date Made Active in Reports: 05/31/2022
Number of Days to Update: 26

Source: EPA
Telephone: N/A
Last EDR Contact: 07/01/2022
Next Scheduled EDR Contact: 10/10/2022
Data Release Frequency: Quarterly

NPL LIENS: Federal Superfund Liens

Federal Superfund Liens. Under the authority granted the USEPA by CERCLA of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner received notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/1991
Date Data Arrived at EDR: 02/02/1994
Date Made Active in Reports: 03/30/1994
Number of Days to Update: 56

Source: EPA
Telephone: 202-564-4267
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: No Update Planned

Lists of Federal Delisted NPL sites

Delisted NPL: National Priority List Deletions

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 04/27/2022
Date Data Arrived at EDR: 05/05/2022
Date Made Active in Reports: 05/31/2022
Number of Days to Update: 26

Source: EPA
Telephone: N/A
Last EDR Contact: 07/01/2022
Next Scheduled EDR Contact: 10/10/2022
Data Release Frequency: Quarterly

Lists of Federal sites subject to CERCLA removals and CERCLA orders

FEDERAL FACILITY: Federal Facility Site Information listing

A listing of National Priority List (NPL) and Base Realignment and Closure (BRAC) sites found in the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) Database where EPA Federal Facilities Restoration and Reuse Office is involved in cleanup activities.

Date of Government Version: 05/25/2021
Date Data Arrived at EDR: 06/24/2021
Date Made Active in Reports: 09/20/2021
Number of Days to Update: 88

Source: Environmental Protection Agency
Telephone: 703-603-8704
Last EDR Contact: 06/27/2022
Next Scheduled EDR Contact: 10/10/2022
Data Release Frequency: Varies

SEMS: Superfund Enterprise Management System

SEMS (Superfund Enterprise Management System) tracks hazardous waste sites, potentially hazardous waste sites, and remedial activities performed in support of EPA's Superfund Program across the United States. The list was formerly know as CERCLIS, renamed to SEMS by the EPA in 2015. The list contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). This dataset also contains sites which are either proposed to or on the National Priorities List (NPL) and the sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 04/27/2022
Date Data Arrived at EDR: 05/05/2022
Date Made Active in Reports: 05/31/2022
Number of Days to Update: 26

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 07/01/2022
Next Scheduled EDR Contact: 10/24/2022
Data Release Frequency: Quarterly

Lists of Federal CERCLA sites with NFRAP

SEMS-ARCHIVE: Superfund Enterprise Management System Archive

SEMS-ARCHIVE (Superfund Enterprise Management System Archive) tracks sites that have no further interest under the Federal Superfund Program based on available information. The list was formerly known as the CERCLIS-NFRAP, renamed to SEMS ARCHIVE by the EPA in 2015. EPA may perform a minimal level of assessment work at a site while it is archived if site conditions change and/or new information becomes available. Archived sites have been removed and archived from the inventory of SEMS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list the site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. The decision does not necessarily mean that there is no hazard associated with a given site; it only means that. based upon available information, the location is not judged to be potential NPL site.

Date of Government Version: 04/27/2022
Date Data Arrived at EDR: 05/05/2022
Date Made Active in Reports: 05/31/2022
Number of Days to Update: 26

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 07/01/2022
Next Scheduled EDR Contact: 10/24/2022
Data Release Frequency: Quarterly

Lists of Federal RCRA facilities undergoing Corrective Action

CORRACTS: Corrective Action Report

CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 06/20/2022
Date Data Arrived at EDR: 06/21/2022
Date Made Active in Reports: 06/28/2022
Number of Days to Update: 7

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 06/21/2022
Next Scheduled EDR Contact: 10/03/2022
Data Release Frequency: Quarterly

Lists of Federal RCRA TSD facilities

RCRA-TSDF: RCRA - Treatment, Storage and Disposal

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Date of Government Version: 06/20/2022
Date Data Arrived at EDR: 06/21/2022
Date Made Active in Reports: 06/28/2022
Number of Days to Update: 7

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 06/21/2022
Next Scheduled EDR Contact: 10/03/2022
Data Release Frequency: Quarterly

Lists of Federal RCRA generators

RCRA-LQG: RCRA - Large Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

Date of Government Version: 06/20/2022
Date Data Arrived at EDR: 06/21/2022
Date Made Active in Reports: 06/28/2022
Number of Days to Update: 7

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 06/21/2022
Next Scheduled EDR Contact: 10/03/2022
Data Release Frequency: Quarterly

RCRA-SQG: RCRA - Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

Date of Government Version: 06/20/2022
Date Data Arrived at EDR: 06/21/2022
Date Made Active in Reports: 06/28/2022
Number of Days to Update: 7

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 06/21/2022
Next Scheduled EDR Contact: 10/03/2022
Data Release Frequency: Quarterly

RCRA-VSQG: RCRA - Very Small Quantity Generators (Formerly Conditionally Exempt Small Quantity Generators)

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Very small quantity generators (VSQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

Date of Government Version: 06/20/2022
Date Data Arrived at EDR: 06/21/2022
Date Made Active in Reports: 06/28/2022
Number of Days to Update: 7

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 06/21/2022
Next Scheduled EDR Contact: 10/03/2022
Data Release Frequency: Quarterly

Federal institutional controls / engineering controls registries

LUCIS: Land Use Control Information System

LUCIS contains records of land use control information pertaining to the former Navy Base Realignment and Closure properties.

Date of Government Version: 02/08/2022
Date Data Arrived at EDR: 02/11/2022
Date Made Active in Reports: 05/10/2022
Number of Days to Update: 88

Source: Department of the Navy
Telephone: 843-820-7326
Last EDR Contact: 05/05/2022
Next Scheduled EDR Contact: 08/22/2022
Data Release Frequency: Varies

US ENG CONTROLS: Engineering Controls Sites List

A listing of sites with engineering controls in place. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.

Date of Government Version: 02/21/2022
Date Data Arrived at EDR: 02/23/2022
Date Made Active in Reports: 05/24/2022
Number of Days to Update: 90

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 05/24/2022
Next Scheduled EDR Contact: 09/05/2022
Data Release Frequency: Varies

US INST CONTROLS: Institutional Controls Sites List

A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

Date of Government Version: 02/21/2022
Date Data Arrived at EDR: 02/23/2022
Date Made Active in Reports: 05/24/2022
Number of Days to Update: 90

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 05/04/2022
Next Scheduled EDR Contact: 09/05/2022
Data Release Frequency: Varies

Federal ERNS list

ERNS: Emergency Response Notification System

Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 06/14/2022
Date Data Arrived at EDR: 06/15/2022
Date Made Active in Reports: 06/21/2022
Number of Days to Update: 6

Source: National Response Center, United States Coast Guard
Telephone: 202-267-2180
Last EDR Contact: 06/15/2022
Next Scheduled EDR Contact: 10/03/2022
Data Release Frequency: Quarterly

Lists of state- and tribal (Superfund) equivalent sites

RESPONSE: State Response Sites

Identifies confirmed release sites where DTSC is involved in remediation, either in a lead or oversight capacity. These confirmed release sites are generally high-priority and high potential risk.

Date of Government Version: 04/25/2022
Date Data Arrived at EDR: 04/26/2022
Date Made Active in Reports: 07/15/2022
Number of Days to Update: 80

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 04/26/2022
Next Scheduled EDR Contact: 08/08/2022
Data Release Frequency: Quarterly

Lists of state- and tribal hazardous waste facilities

ENVIROSTOR: EnviroStor Database

The Department of Toxic Substances Control's (DTSC's) Site Mitigation and Brownfields Reuse Program's (SMBRP's) EnviroStor database identifes sites that have known contamination or sites for which there may be reasons to investigate further. The database includes the following site types: Federal Superfund sites (National Priorities List (NPL)); State Response, including Military Facilities and State Superfund; Voluntary Cleanup; and School sites. EnviroStor provides similar information to the information that was available in CalSites, and provides additional site information, including, but not limited to, identification of formerly-contaminated properties that have been released for reuse, properties where environmental deed restrictions have been recorded to prevent inappropriate land uses, and risk characterization information that is used to assess potential impacts to public health and the environment at contaminated sites.

Date of Government Version: 04/25/2022
Date Data Arrived at EDR: 04/26/2022
Date Made Active in Reports: 07/15/2022
Number of Days to Update: 80

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 04/26/2022
Next Scheduled EDR Contact: 08/08/2022
Data Release Frequency: Quarterly

Lists of state and tribal landfills and solid waste disposal facilities

SWF/LF (SWIS): Solid Waste Information System

Active, Closed and Inactive Landfills. SWF/LF records typically contain an inve ntory of solid waste disposal facilities or landfills. These may be active or i nactive facilities or open dumps that failed to meet RCRA Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 02/07/2022
Date Data Arrived at EDR: 02/08/2022
Date Made Active in Reports: 05/05/2022
Number of Days to Update: 86

Source: Department of Resources Recycling and Recovery
Telephone: 916-341-6320
Last EDR Contact: 05/09/2022
Next Scheduled EDR Contact: 08/22/2022
Data Release Frequency: Quarterly

Lists of state and tribal leaking storage tanks

LUST REG 3: Leaking Underground Storage Tank Database
Leaking Underground Storage Tank locations. Monterey, San Benito, San Luis Obispo, Santa Barbara, Santa Cruz counties.

Date of Government Version: 05/19/2003
Date Data Arrived at EDR: 05/19/2003
Date Made Active in Reports: 06/02/2003
Number of Days to Update: 14

Source: California Regional Water Quality Control Board Central Coast Region (3)
Telephone: 805-542-4786
Last EDR Contact: 07/18/2011
Next Scheduled EDR Contact: 10/31/2011
Data Release Frequency: No Update Planned

LUST REG 4: Underground Storage Tank Leak List
Los Angeles, Ventura counties. For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 09/07/2004
Date Data Arrived at EDR: 09/07/2004
Date Made Active in Reports: 10/12/2004
Number of Days to Update: 35

Source: California Regional Water Quality Control Board Los Angeles Region (4)
Telephone: 213-576-6710
Last EDR Contact: 09/06/2011
Next Scheduled EDR Contact: 12/19/2011
Data Release Frequency: No Update Planned

LUST REG 6L: Leaking Underground Storage Tank Case Listing
For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 09/09/2003
Date Data Arrived at EDR: 09/10/2003
Date Made Active in Reports: 10/07/2003
Number of Days to Update: 27

Source: California Regional Water Quality Control Board Lahontan Region (6)
Telephone: 530-542-5572
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: No Update Planned

LUST REG 7: Leaking Underground Storage Tank Case Listing
Leaking Underground Storage Tank locations. Imperial, Riverside, San Diego, Santa Barbara counties.

Date of Government Version: 02/26/2004
Date Data Arrived at EDR: 02/26/2004
Date Made Active in Reports: 03/24/2004
Number of Days to Update: 27

Source: California Regional Water Quality Control Board Colorado River Basin Region (7)
Telephone: 760-776-8943
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: No Update Planned

LUST REG 8: Leaking Underground Storage Tanks
California Regional Water Quality Control Board Santa Ana Region (8). For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 02/14/2005
Date Data Arrived at EDR: 02/15/2005
Date Made Active in Reports: 03/28/2005
Number of Days to Update: 41

Source: California Regional Water Quality Control Board Santa Ana Region (8)
Telephone: 909-782-4496
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: No Update Planned

LUST: Leaking Underground Fuel Tank Report (GEOTRACKER)
Leaking Underground Storage Tank (LUST) Sites included in GeoTracker. GeoTracker is the Water Boards data management system for sites that impact, or have the potential to impact, water quality in California, with emphasis on groundwater.

Date of Government Version: 05/23/2022
Date Data Arrived at EDR: 05/23/2022
Date Made Active in Reports: 05/24/2022
Number of Days to Update: 1

Source: State Water Resources Control Board
Telephone: see region list
Last EDR Contact: 05/23/2022
Next Scheduled EDR Contact: 09/19/2022
Data Release Frequency: Quarterly

LUST REG 9: Leaking Underground Storage Tank Report
Orange, Riverside, San Diego counties. For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 03/01/2001
Date Data Arrived at EDR: 04/23/2001
Date Made Active in Reports: 05/21/2001
Number of Days to Update: 28

Source: California Regional Water Quality Control Board San Diego Region (9)
Telephone: 858-637-5595
Last EDR Contact: 09/26/2011
Next Scheduled EDR Contact: 01/09/2012
Data Release Frequency: No Update Planned

LUST REG 2: Fuel Leak List

Leaking Underground Storage Tank locations. Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, Sonoma counties.

Date of Government Version: 09/30/2004
Date Data Arrived at EDR: 10/20/2004
Date Made Active in Reports: 11/19/2004
Number of Days to Update: 30

Source: California Regional Water Quality Control Board San Francisco Bay Region (2)
Telephone: 510-622-2433
Last EDR Contact: 09/19/2011
Next Scheduled EDR Contact: 01/02/2012
Data Release Frequency: No Update Planned

LUST REG 1: Active Toxic Site Investigation

Del Norte, Humboldt, Lake, Mendocino, Modoc, Siskiyou, Sonoma, Trinity counties. For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 02/01/2001
Date Data Arrived at EDR: 02/28/2001
Date Made Active in Reports: 03/29/2001
Number of Days to Update: 29

Source: California Regional Water Quality Control Board North Coast (1)
Telephone: 707-570-3769
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: No Update Planned

LUST REG 6V: Leaking Underground Storage Tank Case Listing

Leaking Underground Storage Tank locations. Inyo, Kern, Los Angeles, Mono, San Bernardino counties.

Date of Government Version: 06/07/2005
Date Data Arrived at EDR: 06/07/2005
Date Made Active in Reports: 06/29/2005
Number of Days to Update: 22

Source: California Regional Water Quality Control Board Victorville Branch Office (6)
Telephone: 760-241-7365
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: No Update Planned

LUST REG 5: Leaking Underground Storage Tank Database

Leaking Underground Storage Tank locations. Alameda, Alpine, Amador, Butte, Colusa, Contra Costa, Calveras, El Dorado, Fresno, Glenn, Kern, Kings, Lake, Lassen, Madera, Mariposa, Merced, Modoc, Napa, Nevada, Placer, Plumas, Sacramento, San Joaquin, Shasta, Solano, Stanislaus, Sutter, Tehama, Tulare, Tuolumne, Yolo, Yuba counties.

Date of Government Version: 07/01/2008
Date Data Arrived at EDR: 07/22/2008
Date Made Active in Reports: 07/31/2008
Number of Days to Update: 9

Source: California Regional Water Quality Control Board Central Valley Region (5)
Telephone: 916-464-4834
Last EDR Contact: 07/01/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: No Update Planned

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Iowa, Kansas, and Nebraska

Date of Government Version: 10/12/2021
Date Data Arrived at EDR: 11/15/2021
Date Made Active in Reports: 02/08/2022
Number of Days to Update: 85

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 06/13/2022
Next Scheduled EDR Contact: 10/31/2022
Data Release Frequency: Varies

INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Florida, Mississippi and North Carolina.

Date of Government Version: 05/28/2021
Date Data Arrived at EDR: 06/22/2021
Date Made Active in Reports: 09/20/2021
Number of Days to Update: 90

Source: EPA Region 4
Telephone: 404-562-8677
Last EDR Contact: 06/13/2022
Next Scheduled EDR Contact: 10/31/2022
Data Release Frequency: Varies

INDIAN LUST R1: Leaking Underground Storage Tanks on Indian Land
A listing of leaking underground storage tank locations on Indian Land.

Date of Government Version: 04/28/2021
Date Data Arrived at EDR: 06/11/2021
Date Made Active in Reports: 09/07/2021
Number of Days to Update: 88
Source: EPA Region 1
Telephone: 617-918-1313
Last EDR Contact: 06/13/2022
Next Scheduled EDR Contact: 10/31/2022
Data Release Frequency: Varies

INDIAN LUST R6: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in New Mexico and Oklahoma.

Date of Government Version: 10/12/2021
Date Data Arrived at EDR: 11/15/2021
Date Made Active in Reports: 02/08/2022
Number of Days to Update: 85
Source: EPA Region 6
Telephone: 214-665-6597
Last EDR Contact: 06/13/2022
Next Scheduled EDR Contact: 10/31/2022
Data Release Frequency: Varies

INDIAN LUST R5: Leaking Underground Storage Tanks on Indian Land
Leaking underground storage tanks located on Indian Land in Michigan, Minnesota and Wisconsin.

Date of Government Version: 10/12/2021
Date Data Arrived at EDR: 11/15/2021
Date Made Active in Reports: 02/08/2022
Number of Days to Update: 85
Source: EPA, Region 5
Telephone: 312-886-7439
Last EDR Contact: 06/13/2022
Next Scheduled EDR Contact: 10/31/2022
Data Release Frequency: Varies

INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Alaska, Idaho, Oregon and Washington.

Date of Government Version: 10/12/2021
Date Data Arrived at EDR: 11/15/2021
Date Made Active in Reports: 02/08/2022
Number of Days to Update: 85
Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 06/13/2022
Next Scheduled EDR Contact: 10/31/2022
Data Release Frequency: Varies

INDIAN LUST R9: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Arizona, California, New Mexico and Nevada

Date of Government Version: 10/12/2021
Date Data Arrived at EDR: 11/15/2021
Date Made Active in Reports: 02/08/2022
Number of Days to Update: 85
Source: Environmental Protection Agency
Telephone: 415-972-3372
Last EDR Contact: 06/13/2022
Next Scheduled EDR Contact: 10/31/2022
Data Release Frequency: Varies

INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming.

Date of Government Version: 10/12/2021
Date Data Arrived at EDR: 11/15/2021
Date Made Active in Reports: 02/08/2022
Number of Days to Update: 85
Source: EPA Region 8
Telephone: 303-312-6271
Last EDR Contact: 06/13/2022
Next Scheduled EDR Contact: 10/31/2022
Data Release Frequency: Varies

CPS-SLIC: Statewide SLIC Cases (GEOTRACKER)
Cleanup Program Sites (CPS; also known as Site Cleanups [SC] and formerly known as Spills, Leaks, Investigations, and Cleanups [SLIC] sites) included in GeoTracker. GeoTracker is the Water Boards data management system for sites that impact, or have the potential to impact, water quality in California, with emphasis on groundwater.

Date of Government Version: 05/23/2022
Date Data Arrived at EDR: 05/23/2022
Date Made Active in Reports: 05/24/2022
Number of Days to Update: 1
Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 05/23/2022
Next Scheduled EDR Contact: 09/19/2022
Data Release Frequency: Varies

SLIC REG 1: Active Toxic Site Investigations
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 04/03/2003
Date Data Arrived at EDR: 04/07/2003
Date Made Active in Reports: 04/25/2003
Number of Days to Update: 18

Source: California Regional Water Quality Control Board, North Coast Region (1)
Telephone: 707-576-2220
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: No Update Planned

SLIC REG 2: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 09/30/2004
Date Data Arrived at EDR: 10/20/2004
Date Made Active in Reports: 11/19/2004
Number of Days to Update: 30

Source: Regional Water Quality Control Board San Francisco Bay Region (2)
Telephone: 510-286-0457
Last EDR Contact: 09/19/2011
Next Scheduled EDR Contact: 01/02/2012
Data Release Frequency: No Update Planned

SLIC REG 3: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 05/18/2006
Date Data Arrived at EDR: 05/18/2006
Date Made Active in Reports: 06/15/2006
Number of Days to Update: 28

Source: California Regional Water Quality Control Board Central Coast Region (3)
Telephone: 805-549-3147
Last EDR Contact: 07/18/2011
Next Scheduled EDR Contact: 10/31/2011
Data Release Frequency: No Update Planned

SLIC REG 4: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 11/17/2004
Date Data Arrived at EDR: 11/18/2004
Date Made Active in Reports: 01/04/2005
Number of Days to Update: 47

Source: Region Water Quality Control Board Los Angeles Region (4)
Telephone: 213-576-6600
Last EDR Contact: 07/01/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: No Update Planned

SLIC REG 5: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 04/01/2005
Date Data Arrived at EDR: 04/05/2005
Date Made Active in Reports: 04/21/2005
Number of Days to Update: 16

Source: Regional Water Quality Control Board Central Valley Region (5)
Telephone: 916-464-3291
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: No Update Planned

SLIC REG 6V: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 05/24/2005
Date Data Arrived at EDR: 05/25/2005
Date Made Active in Reports: 06/16/2005
Number of Days to Update: 22

Source: Regional Water Quality Control Board, Victorville Branch
Telephone: 619-241-6583
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: No Update Planned

SLIC REG 6L: SLIC Sites
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 09/07/2004
Date Data Arrived at EDR: 09/07/2004
Date Made Active in Reports: 10/12/2004
Number of Days to Update: 35
Source: California Regional Water Quality Control Board, Lahontan Region
Telephone: 530-542-5574
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: No Update Planned

SLIC REG 7: SLIC List
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 11/24/2004
Date Data Arrived at EDR: 11/29/2004
Date Made Active in Reports: 01/04/2005
Number of Days to Update: 36
Source: California Regional Quality Control Board, Colorado River Basin Region
Telephone: 760-346-7491
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: No Update Planned

SLIC REG 8: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 04/03/2008
Date Data Arrived at EDR: 04/03/2008
Date Made Active in Reports: 04/14/2008
Number of Days to Update: 11
Source: California Region Water Quality Control Board Santa Ana Region (8)
Telephone: 951-782-3298
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: No Update Planned

SLIC REG 9: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 09/10/2007
Date Data Arrived at EDR: 09/11/2007
Date Made Active in Reports: 09/28/2007
Number of Days to Update: 17
Source: California Regional Water Quality Control Board San Diego Region (9)
Telephone: 858-467-2980
Last EDR Contact: 08/08/2011
Next Scheduled EDR Contact: 11/21/2011
Data Release Frequency: No Update Planned

Lists of state and tribal registered storage tanks

FEMA UST: Underground Storage Tank Listing
A listing of all FEMA owned underground storage tanks.

Date of Government Version: 10/14/2021
Date Data Arrived at EDR: 11/05/2021
Date Made Active in Reports: 02/01/2022
Number of Days to Update: 88
Source: FEMA
Telephone: 202-646-5797
Last EDR Contact: 06/29/2022
Next Scheduled EDR Contact: 10/17/2022
Data Release Frequency: Varies

UST: Active UST Facilities
Active UST facilities gathered from the local regulatory agencies

Date of Government Version: 03/07/2022
Date Data Arrived at EDR: 03/08/2022
Date Made Active in Reports: 06/02/2022
Number of Days to Update: 86
Source: SWRCB
Telephone: 916-341-5851
Last EDR Contact: 06/07/2022
Next Scheduled EDR Contact: 09/19/2022
Data Release Frequency: Semi-Annually

MILITARY UST SITES: Military UST Sites (GEOTRACKER)
Military ust sites

Date of Government Version: 05/23/2022
Date Data Arrived at EDR: 05/23/2022
Date Made Active in Reports: 06/02/2022
Number of Days to Update: 10

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 05/23/2022
Next Scheduled EDR Contact: 09/19/2022
Data Release Frequency: Varies

UST CLOSURE: Proposed Closure of Underground Storage Tank (UST) Cases
UST cases that are being considered for closure by either the State Water Resources Control Board or the Executive Director have been posted for a 60-day public comment period. UST Case Closures being proposed for consideration by the State Water Resources Control Board. These are primarily UST cases that meet closure criteria under the decisional framework in State Water Board Resolution No. 92-49 and other Board orders. UST Case Closures proposed for consideration by the Executive Director pursuant to State Water Board Resolution No. 2012-0061. These are cases that meet the criteria of the Low-Threat UST Case Closure Policy. UST Case Closure Review Denials and Approved Orders.

Date of Government Version: 03/07/2022
Date Data Arrived at EDR: 03/08/2022
Date Made Active in Reports: 06/03/2022
Number of Days to Update: 87

Source: State Water Resources Control Board
Telephone: 916-327-7844
Last EDR Contact: 06/09/2022
Next Scheduled EDR Contact: 09/19/2022
Data Release Frequency: Varies

AST: Aboveground Petroleum Storage Tank Facilities
A listing of aboveground storage tank petroleum storage tank locations.

Date of Government Version: 07/06/2016
Date Data Arrived at EDR: 07/12/2016
Date Made Active in Reports: 09/19/2016
Number of Days to Update: 69

Source: California Environmental Protection Agency
Telephone: 916-327-5092
Last EDR Contact: 06/09/2022
Next Scheduled EDR Contact: 09/26/2022
Data Release Frequency: Varies

INDIAN UST R6: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 6 (Louisiana, Arkansas, Oklahoma, New Mexico, Texas and 65 Tribes).

Date of Government Version: 10/12/2021
Date Data Arrived at EDR: 11/15/2021
Date Made Active in Reports: 02/08/2022
Number of Days to Update: 85

Source: EPA Region 6
Telephone: 214-665-7591
Last EDR Contact: 06/13/2022
Next Scheduled EDR Contact: 10/31/2022
Data Release Frequency: Varies

INDIAN UST R5: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 5 (Michigan, Minnesota and Wisconsin and Tribal Nations).

Date of Government Version: 04/06/2021
Date Data Arrived at EDR: 06/11/2021
Date Made Active in Reports: 09/07/2021
Number of Days to Update: 88

Source: EPA Region 5
Telephone: 312-886-6136
Last EDR Contact: 06/13/2022
Next Scheduled EDR Contact: 10/31/2022
Data Release Frequency: Varies

INDIAN UST R10: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 10 (Alaska, Idaho, Oregon, Washington, and Tribal Nations).

Date of Government Version: 10/12/2021
Date Data Arrived at EDR: 11/15/2021
Date Made Active in Reports: 02/08/2022
Number of Days to Update: 85

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 06/13/2022
Next Scheduled EDR Contact: 10/31/2022
Data Release Frequency: Varies

INDIAN UST R1: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 1 (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont and ten Tribal Nations).

Date of Government Version: 10/14/2021
Date Data Arrived at EDR: 11/15/2021
Date Made Active in Reports: 02/08/2022
Number of Days to Update: 85

Source: EPA, Region 1
Telephone: 617-918-1313
Last EDR Contact: 06/13/2022
Next Scheduled EDR Contact: 10/31/2022
Data Release Frequency: Varies

INDIAN UST R9: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 9 (Arizona, California, Hawaii, Nevada, the Pacific Islands, and Tribal Nations).

Date of Government Version: 10/12/2021
Date Data Arrived at EDR: 11/15/2021
Date Made Active in Reports: 02/08/2022
Number of Days to Update: 85

Source: EPA Region 9
Telephone: 415-972-3368
Last EDR Contact: 06/13/2022
Next Scheduled EDR Contact: 10/31/2022
Data Release Frequency: Varies

INDIAN UST R4: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and Tribal Nations)

Date of Government Version: 05/28/2021
Date Data Arrived at EDR: 06/22/2021
Date Made Active in Reports: 09/20/2021
Number of Days to Update: 90

Source: EPA Region 4
Telephone: 404-562-9424
Last EDR Contact: 06/13/2022
Next Scheduled EDR Contact: 10/31/2022
Data Release Frequency: Varies

INDIAN UST R7: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 7 (Iowa, Kansas, Missouri, Nebraska, and 9 Tribal Nations).

Date of Government Version: 10/12/2021
Date Data Arrived at EDR: 11/15/2021
Date Made Active in Reports: 02/08/2022
Number of Days to Update: 85

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 06/13/2022
Next Scheduled EDR Contact: 10/31/2022
Data Release Frequency: Varies

INDIAN UST R8: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 8 (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and 27 Tribal Nations).

Date of Government Version: 10/12/2021
Date Data Arrived at EDR: 11/15/2021
Date Made Active in Reports: 02/08/2022
Number of Days to Update: 85

Source: EPA Region 8
Telephone: 303-312-6137
Last EDR Contact: 06/13/2022
Next Scheduled EDR Contact: 10/31/2022
Data Release Frequency: Varies

Lists of state and tribal voluntary cleanup sites

INDIAN VCP R7: Voluntary Cleanup Priority Lisitng

A listing of voluntary cleanup priority sites located on Indian Land located in Region 7.

Date of Government Version: 03/20/2008
Date Data Arrived at EDR: 04/22/2008
Date Made Active in Reports: 05/19/2008
Number of Days to Update: 27

Source: EPA, Region 7
Telephone: 913-551-7365
Last EDR Contact: 07/08/2021
Next Scheduled EDR Contact: 07/20/2009
Data Release Frequency: Varies

INDIAN VCP R1: Voluntary Cleanup Priority Listing
A listing of voluntary cleanup priority sites located on Indian Land located in Region 1.

Date of Government Version: 07/27/2015
Date Data Arrived at EDR: 09/29/2015
Date Made Active in Reports: 02/18/2016
Number of Days to Update: 142
Source: EPA, Region 1
Telephone: 617-918-1102
Last EDR Contact: 06/15/2022
Next Scheduled EDR Contact: 10/03/2022
Data Release Frequency: Varies

VCP: Voluntary Cleanup Program Properties
Contains low threat level properties with either confirmed or unconfirmed releases and the project proponents have request that DTSC oversee investigation and/or cleanup activities and have agreed to provide coverage for DTSC's costs.

Date of Government Version: 04/25/2022
Date Data Arrived at EDR: 04/26/2022
Date Made Active in Reports: 07/15/2022
Number of Days to Update: 80
Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 04/26/2022
Next Scheduled EDR Contact: 08/08/2022
Data Release Frequency: Quarterly

Lists of state and tribal brownfield sites

BROWNFIELDS: Considered Brownfieds Sites Listing
A listing of sites the SWRCB considers to be Brownfields since these are sites have come to them through the MOA Process.

Date of Government Version: 03/21/2022
Date Data Arrived at EDR: 03/21/2022
Date Made Active in Reports: 06/14/2022
Number of Days to Update: 85
Source: State Water Resources Control Board
Telephone: 916-323-7905
Last EDR Contact: 06/21/2022
Next Scheduled EDR Contact: 10/03/2022
Data Release Frequency: Quarterly

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS: A Listing of Brownfields Sites
Brownfields are real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Cleaning up and reinvesting in these properties takes development pressures off of undeveloped, open land, and both improves and protects the environment. Assessment, Cleanup and Redevelopment Exchange System (ACRES) stores information reported by EPA Brownfields grant recipients on brownfields properties assessed or cleaned up with grant funding as well as information on Targeted Brownfields Assessments performed by EPA Regions. A listing of ACRES Brownfield sites is obtained from Cleanups in My Community. Cleanups in My Community provides information on Brownfields properties for which information is reported back to EPA, as well as areas served by Brownfields grant programs.

Date of Government Version: 02/23/2022
Date Data Arrived at EDR: 03/10/2022
Date Made Active in Reports: 03/10/2022
Number of Days to Update: 0
Source: Environmental Protection Agency
Telephone: 202-566-2777
Last EDR Contact: 06/13/2022
Next Scheduled EDR Contact: 09/26/2022
Data Release Frequency: Semi-Annually

Local Lists of Landfill / Solid Waste Disposal Sites

WMUDS/SWAT: Waste Management Unit Database
Waste Management Unit Database System. WMUDS is used by the State Water Resources Control Board staff and the Regional Water Quality Control Boards for program tracking and inventory of waste management units. WMUDS is composed of the following databases: Facility Information, Scheduled Inspections Information, Waste Management Unit Information, SWAT Program Information, SWAT Report Summary Information, SWAT Report Summary Data, Chapter 15 (formerly Subchapter 15) Information, Chapter 15 Monitoring Parameters, TPCA Program Information, RCRA Program Information, Closure Information, and Interested Parties Information.

Date of Government Version: 04/01/2000
Date Data Arrived at EDR: 04/10/2000
Date Made Active in Reports: 05/10/2000
Number of Days to Update: 30

Source: State Water Resources Control Board
Telephone: 916-227-4448
Last EDR Contact: 07/19/2022
Next Scheduled EDR Contact: 11/07/2022
Data Release Frequency: No Update Planned

SWRCY: Recycler Database
A listing of recycling facilities in California.

Date of Government Version: 03/07/2022
Date Data Arrived at EDR: 03/08/2022
Date Made Active in Reports: 06/02/2022
Number of Days to Update: 86

Source: Department of Conservation
Telephone: 916-323-3836
Last EDR Contact: 06/07/2022
Next Scheduled EDR Contact: 09/19/2022
Data Release Frequency: Quarterly

HAULERS: Registered Waste Tire Haulers Listing
A listing of registered waste tire haulers.

Date of Government Version: 02/15/2022
Date Data Arrived at EDR: 02/24/2022
Date Made Active in Reports: 05/25/2022
Number of Days to Update: 90

Source: Integrated Waste Management Board
Telephone: 916-341-6422
Last EDR Contact: 05/19/2022
Next Scheduled EDR Contact: 08/22/2022
Data Release Frequency: Varies

INDIAN ODI: Report on the Status of Open Dumps on Indian Lands
Location of open dumps on Indian land.

Date of Government Version: 12/31/1998
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 01/24/2008
Number of Days to Update: 52

Source: Environmental Protection Agency
Telephone: 703-308-8245
Last EDR Contact: 04/21/2022
Next Scheduled EDR Contact: 08/08/2022
Data Release Frequency: Varies

DEBRIS REGION 9: Torres Martinez Reservation Illegal Dump Site Locations
A listing of illegal dump sites location on the Torres Martinez Indian Reservation located in eastern Riverside County and northern Imperial County, California.

Date of Government Version: 01/12/2009
Date Data Arrived at EDR: 05/07/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 137

Source: EPA, Region 9
Telephone: 415-947-4219
Last EDR Contact: 07/12/2022
Next Scheduled EDR Contact: 10/31/2022
Data Release Frequency: No Update Planned

ODI: Open Dump Inventory
An open dump is defined as a disposal facility that does not comply with one or more of the Part 257 or Part 258 Subtitle D Criteria.

Date of Government Version: 06/30/1985
Date Data Arrived at EDR: 08/09/2004
Date Made Active in Reports: 09/17/2004
Number of Days to Update: 39

Source: Environmental Protection Agency
Telephone: 800-424-9346
Last EDR Contact: 06/09/2004
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

IHS OPEN DUMPS: Open Dumps on Indian Land
A listing of all open dumps located on Indian Land in the United States.

Date of Government Version: 04/01/2014
Date Data Arrived at EDR: 08/06/2014
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 176

Source: Department of Health & Human Serivces, Indian Health Service
Telephone: 301-443-1452
Last EDR Contact: 04/28/2022
Next Scheduled EDR Contact: 08/08/2022
Data Release Frequency: Varies

Local Lists of Hazardous waste / Contaminated Sites

US HIST CDL: National Clandestine Laboratory Register

A listing of clandestine drug lab locations that have been removed from the DEAs National Clandestine Laboratory Register.

Date of Government Version: 02/22/2022
Date Data Arrived at EDR: 02/23/2022
Date Made Active in Reports: 05/10/2022
Number of Days to Update: 76

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 05/24/2022
Next Scheduled EDR Contact: 09/05/2022
Data Release Frequency: No Update Planned

HIST CAL-SITES: Calsites Database

The Calsites database contains potential or confirmed hazardous substance release properties. In 1996, California EPA reevaluated and significantly reduced the number of sites in the Calsites database. No longer updated by the state agency. It has been replaced by ENVIROSTOR.

Date of Government Version: 08/08/2005
Date Data Arrived at EDR: 08/03/2006
Date Made Active in Reports: 08/24/2006
Number of Days to Update: 21

Source: Department of Toxic Substance Control
Telephone: 916-323-3400
Last EDR Contact: 02/23/2009
Next Scheduled EDR Contact: 05/25/2009
Data Release Frequency: No Update Planned

SCH: School Property Evaluation Program

This category contains proposed and existing school sites that are being evaluated by DTSC for possible hazardous materials contamination. In some cases, these properties may be listed in the CalSites category depending on the level of threat to public health and safety or the environment they pose.

Date of Government Version: 04/25/2022
Date Data Arrived at EDR: 04/26/2022
Date Made Active in Reports: 07/15/2022
Number of Days to Update: 80

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 04/26/2022
Next Scheduled EDR Contact: 08/08/2022
Data Release Frequency: Quarterly

CDL: Clandestine Drug Labs

A listing of drug lab locations. Listing of a location in this database does not indicate that any illegal drug lab materials were or were not present there, and does not constitute a determination that the location either requires or does not require additional cleanup work.

Date of Government Version: 12/31/2019
Date Data Arrived at EDR: 01/20/2021
Date Made Active in Reports: 04/08/2021
Number of Days to Update: 78

Source: Department of Toxic Substances Control
Telephone: 916-255-6504
Last EDR Contact: 07/13/2022
Next Scheduled EDR Contact: 10/17/2022
Data Release Frequency: Varies

TOXIC PITS: Toxic Pits Cleanup Act Sites

Toxic PITS Cleanup Act Sites. TOXIC PITS identifies sites suspected of containing hazardous substances where cleanup has not yet been completed.

Date of Government Version: 07/01/1995
Date Data Arrived at EDR: 08/30/1995
Date Made Active in Reports: 09/26/1995
Number of Days to Update: 27

Source: State Water Resources Control Board
Telephone: 916-227-4364
Last EDR Contact: 01/26/2009
Next Scheduled EDR Contact: 04/27/2009
Data Release Frequency: No Update Planned

CERS HAZ WASTE: CERS HAZ WASTE

List of sites in the California Environmental Protection Agency (CalEPA) Regulated Site Portal which fall under the Hazardous Chemical Management, Hazardous Waste Onsite Treatment, Household Hazardous Waste Collection, Hazardous Waste Generator, and RCRA LQ HW Generator programs.

Date of Government Version: 04/18/2022
Date Data Arrived at EDR: 04/19/2022
Date Made Active in Reports: 07/12/2022
Number of Days to Update: 84

Source: CalEPA
Telephone: 916-323-2514
Last EDR Contact: 07/18/2022
Next Scheduled EDR Contact: 10/31/2022
Data Release Frequency: Quarterly

US CDL: Clandestine Drug Labs

A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 02/22/2022
Date Data Arrived at EDR: 02/23/2022
Date Made Active in Reports: 05/10/2022
Number of Days to Update: 76

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 05/24/2022
Next Scheduled EDR Contact: 09/05/2022
Data Release Frequency: Quarterly

PFAS: PFAS Contamination Site Location Listing

A listing of PFAS contaminated sites included in the GeoTracker database.

Date of Government Version: 03/07/2022
Date Data Arrived at EDR: 03/08/2022
Date Made Active in Reports: 06/02/2022
Number of Days to Update: 86

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 06/07/2022
Next Scheduled EDR Contact: 09/19/2022
Data Release Frequency: Varies

AQUEOUS FOAM: Former Fire Training Facility Assessments Listing

Airports shown on this list are those believed to use Aqueous Film Forming Foam (AFFF), and certified by the Federal Aviation Administration (FAA) under Title 14, Code of Federal Regulations (CFR), Part 139 (14 CFR Part 139). This list was created by SWRCB using information available from the FAA. Location points shown are from the latitude and longitude listed on the FAA airport master record.

Date of Government Version: 02/20/2020
Date Data Arrived at EDR: 12/10/2021
Date Made Active in Reports: 02/25/2022
Number of Days to Update: 77

Source: State Water Resources Control Board
Telephone: 916-341-5455
Last EDR Contact: 06/10/2022
Next Scheduled EDR Contact: 09/19/2022
Data Release Frequency: Varies

Local Lists of Registered Storage Tanks

SWEEPS UST: SWEEPS UST Listing

Statewide Environmental Evaluation and Planning System. This underground storage tank listing was updated and maintained by a company contacted by the SWRCB in the early 1990's. The listing is no longer updated or maintained. The local agency is the contact for more information on a site on the SWEEPS list.

Date of Government Version: 06/01/1994
Date Data Arrived at EDR: 07/07/2005
Date Made Active in Reports: 08/11/2005
Number of Days to Update: 35

Source: State Water Resources Control Board
Telephone: N/A
Last EDR Contact: 06/03/2005
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

HIST UST: Hazardous Substance Storage Container Database

The Hazardous Substance Storage Container Database is a historical listing of UST sites. Refer to local/county source for current data.

Date of Government Version: 10/15/1990
Date Data Arrived at EDR: 01/25/1991
Date Made Active in Reports: 02/12/1991
Number of Days to Update: 18

Source: State Water Resources Control Board
Telephone: 916-341-5851
Last EDR Contact: 07/26/2001
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

SAN FRANCISCO AST: Aboveground Storage Tank Site Listing
Aboveground storage tank sites

Date of Government Version: 02/03/2022
Date Data Arrived at EDR: 02/04/2022
Date Made Active in Reports: 05/02/2022
Number of Days to Update: 87

Source: San Francisco County Department of Public Health
Telephone: 415-252-3896
Last EDR Contact: 04/28/2022
Next Scheduled EDR Contact: 08/15/2022
Data Release Frequency: Varies

CERS TANKS: California Environmental Reporting System (CERS) Tanks
List of sites in the California Environmental Protection Agency (CalEPA) Regulated Site Portal which fall under the Aboveground Petroleum Storage and Underground Storage Tank regulatory programs.

Date of Government Version: 04/18/2022
Date Data Arrived at EDR: 04/19/2022
Date Made Active in Reports: 07/12/2022
Number of Days to Update: 84

Source: California Environmental Protection Agency
Telephone: 916-323-2514
Last EDR Contact: 07/18/2022
Next Scheduled EDR Contact: 10/31/2022
Data Release Frequency: Quarterly

CA FID UST: Facility Inventory Database
The Facility Inventory Database (FID) contains a historical listing of active and inactive underground storage tank locations from the State Water Resource Control Board. Refer to local/county source for current data.

Date of Government Version: 10/31/1994
Date Data Arrived at EDR: 09/05/1995
Date Made Active in Reports: 09/29/1995
Number of Days to Update: 24

Source: California Environmental Protection Agency
Telephone: 916-341-5851
Last EDR Contact: 12/28/1998
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

Local Land Records

LIENS: Environmental Liens Listing
A listing of property locations with environmental liens for California where DTSC is a lien holder.

Date of Government Version: 02/24/2022
Date Data Arrived at EDR: 02/25/2022
Date Made Active in Reports: 03/09/2022
Number of Days to Update: 12

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 05/25/2022
Next Scheduled EDR Contact: 09/12/2022
Data Release Frequency: Varies

LIENS 2: CERCLA Lien Information
A Federal CERCLA ('Superfund') lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties.

Date of Government Version: 04/27/2022
Date Data Arrived at EDR: 05/05/2022
Date Made Active in Reports: 05/31/2022
Number of Days to Update: 26

Source: Environmental Protection Agency
Telephone: 202-564-6023
Last EDR Contact: 07/01/2022
Next Scheduled EDR Contact: 10/10/2022
Data Release Frequency: Semi-Annually

DEED: Deed Restriction Listing

Site Mitigation and Brownfields Reuse Program Facility Sites with Deed Restrictions & Hazardous Waste Management Program Facility Sites with Deed / Land Use Restriction. The DTSC Site Mitigation and Brownfields Reuse Program (SMBRP) list includes sites cleaned up under the program's oversight and generally does not include current or former hazardous waste facilities that required a hazardous waste facility permit. The list represents deed restrictions that are active. Some sites have multiple deed restrictions. The DTSC Hazardous Waste Management Program (HWMP) has developed a list of current or former hazardous waste facilities that have a recorded land use restriction at the local county recorder's office. The land use restrictions on this list were required by the DTSC HWMP as a result of the presence of hazardous substances that remain on site after the facility (or part of the facility) has been closed or cleaned up. The types of land use restriction include deed notice, deed restriction, or a land use restriction that binds current and future owners.

Date of Government Version: 02/28/2022
Date Data Arrived at EDR: 02/28/2022
Date Made Active in Reports: 05/25/2022
Number of Days to Update: 86

Source: DTSC and SWRCB
Telephone: 916-323-3400
Last EDR Contact: 05/31/2022
Next Scheduled EDR Contact: 09/12/2022
Data Release Frequency: Semi-Annually

Records of Emergency Release Reports

HMIRS: Hazardous Materials Information Reporting System

Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 03/21/2022
Date Data Arrived at EDR: 03/21/2022
Date Made Active in Reports: 06/14/2022
Number of Days to Update: 85

Source: U.S. Department of Transportation
Telephone: 202-366-4555
Last EDR Contact: 06/21/2022
Next Scheduled EDR Contact: 10/03/2022
Data Release Frequency: Quarterly

CHMIRS: California Hazardous Material Incident Report System

California Hazardous Material Incident Reporting System. CHMIRS contains information on reported hazardous material incidents (accidental releases or spills).

Date of Government Version: 04/03/2022
Date Data Arrived at EDR: 04/19/2022
Date Made Active in Reports: 07/12/2022
Number of Days to Update: 84

Source: Office of Emergency Services
Telephone: 916-845-8400
Last EDR Contact: 07/18/2022
Next Scheduled EDR Contact: 10/31/2022
Data Release Frequency: Semi-Annually

LDS: Land Disposal Sites Listing (GEOTRACKER)

Land Disposal sites (Landfills) included in GeoTracker. GeoTracker is the Water Boards data management system for sites that impact, or have the potential to impact, water quality in California, with emphasis on groundwater.

Date of Government Version: 05/23/2022
Date Data Arrived at EDR: 05/23/2022
Date Made Active in Reports: 05/24/2022
Number of Days to Update: 1

Source: State Water Qualilty Control Board
Telephone: 866-480-1028
Last EDR Contact: 05/23/2022
Next Scheduled EDR Contact: 09/19/2022
Data Release Frequency: Quarterly

MCS: Military Cleanup Sites Listing (GEOTRACKER)

Military sites (consisting of: Military UST sites; Military Privatized sites; and Military Cleanup sites [formerly known as DoD non UST]) included in GeoTracker. GeoTracker is the Water Boards data management system for sites that impact, or have the potential to impact, water quality in California, with emphasis on groundwater.

Date of Government Version: 05/23/2022
Date Data Arrived at EDR: 05/23/2022
Date Made Active in Reports: 05/24/2022
Number of Days to Update: 1

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 05/23/2022
Next Scheduled EDR Contact: 09/19/2022
Data Release Frequency: Quarterly

SPILLS 90: SPILLS90 data from FirstSearch

Spills 90 includes those spill and release records available exclusively from FirstSearch databases. Typically, they may include chemical, oil and/or hazardous substance spills recorded after 1990. Duplicate records that are already included in EDR incident and release records are not included in Spills 90.

Date of Government Version: 06/06/2012
Date Data Arrived at EDR: 01/03/2013
Date Made Active in Reports: 02/22/2013
Number of Days to Update: 50

Source: FirstSearch
Telephone: N/A
Last EDR Contact: 01/03/2013
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

Other Ascertainable Records

RCRA NonGen / NLR: RCRA - Non Generators / No Longer Regulated

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

Date of Government Version: 06/20/2022
Date Data Arrived at EDR: 06/21/2022
Date Made Active in Reports: 06/28/2022
Number of Days to Update: 7

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 06/21/2022
Next Scheduled EDR Contact: 10/03/2022
Data Release Frequency: Quarterly

FUDS: Formerly Used Defense Sites

The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

Date of Government Version: 12/01/2021
Date Data Arrived at EDR: 02/15/2022
Date Made Active in Reports: 05/10/2022
Number of Days to Update: 84

Source: U.S. Army Corps of Engineers
Telephone: 202-528-4285
Last EDR Contact: 05/17/2022
Next Scheduled EDR Contact: 08/29/2022
Data Release Frequency: Varies

DOD: Department of Defense Sites

This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 06/07/2021
Date Data Arrived at EDR: 07/13/2021
Date Made Active in Reports: 03/09/2022
Number of Days to Update: 239

Source: USGS
Telephone: 888-275-8747
Last EDR Contact: 07/13/2022
Next Scheduled EDR Contact: 10/24/2022
Data Release Frequency: Varies

FEDLAND: Federal and Indian Lands

Federally and Indian administrated lands of the United States. Lands included are administrated by: Army Corps of Engineers, Bureau of Reclamation, National Wild and Scenic River, National Wildlife Refuge, Public Domain Land, Wilderness, Wilderness Study Area, Wildlife Management Area, Bureau of Indian Affairs, Bureau of Land Management, Department of Justice, Forest Service, Fish and Wildlife Service, National Park Service.

Date of Government Version: 04/02/2018
Date Data Arrived at EDR: 04/11/2018
Date Made Active in Reports: 11/06/2019
Number of Days to Update: 574

Source: U.S. Geological Survey
Telephone: 888-275-8747
Last EDR Contact: 07/08/2022
Next Scheduled EDR Contact: 10/17/2022
Data Release Frequency: N/A

SCRD DRYCLEANERS: State Coalition for Remediation of Drycleaners Listing

The State Coalition for Remediation of Drycleaners was established in 1998, with support from the U.S. EPA Office of Superfund Remediation and Technology Innovation. It is comprised of representatives of states with established drycleaner remediation programs. Currently the member states are Alabama, Connecticut, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, Texas, and Wisconsin.

Date of Government Version: 01/01/2017
Date Data Arrived at EDR: 02/03/2017
Date Made Active in Reports: 04/07/2017
Number of Days to Update: 63

Source: Environmental Protection Agency
Telephone: 615-532-8599
Last EDR Contact: 05/06/2022
Next Scheduled EDR Contact: 08/22/2022
Data Release Frequency: Varies

US FIN ASSUR: Financial Assurance Information

All owners and operators of facilities that treat, store, or dispose of hazardous waste are required to provide proof that they will have sufficient funds to pay for the clean up, closure, and post-closure care of their facilities.

Date of Government Version: 03/21/2022
Date Data Arrived at EDR: 03/21/2022
Date Made Active in Reports: 06/14/2022
Number of Days to Update: 85

Source: Environmental Protection Agency
Telephone: 202-566-1917
Last EDR Contact: 06/21/2022
Next Scheduled EDR Contact: 10/03/2022
Data Release Frequency: Quarterly

EPA WATCH LIST: EPA WATCH LIST

EPA maintains a "Watch List" to facilitate dialogue between EPA, state and local environmental agencies on enforcement matters relating to facilities with alleged violations identified as either significant or high priority. Being on the Watch List does not mean that the facility has actually violated the law only that an investigation by EPA or a state or local environmental agency has led those organizations to allege that an unproven violation has in fact occurred. Being on the Watch List does not represent a higher level of concern regarding the alleged violations that were detected, but instead indicates cases requiring additional dialogue between EPA, state and local agencies - primarily because of the length of time the alleged violation has gone unaddressed or unresolved.

Date of Government Version: 08/30/2013
Date Data Arrived at EDR: 03/21/2014
Date Made Active in Reports: 06/17/2014
Number of Days to Update: 88

Source: Environmental Protection Agency
Telephone: 617-520-3000
Last EDR Contact: 04/28/2022
Next Scheduled EDR Contact: 08/15/2022
Data Release Frequency: Quarterly

2020 COR ACTION: 2020 Corrective Action Program List

The EPA has set ambitious goals for the RCRA Corrective Action program by creating the 2020 Corrective Action Universe. This RCRA cleanup baseline includes facilities expected to need corrective action. The 2020 universe contains a wide variety of sites. Some properties are heavily contaminated while others were contaminated but have since been cleaned up. Still others have not been fully investigated yet, and may require little or no remediation. Inclusion in the 2020 Universe does not necessarily imply failure on the part of a facility to meet its RCRA obligations.

Date of Government Version: 09/30/2017
Date Data Arrived at EDR: 05/08/2018
Date Made Active in Reports: 07/20/2018
Number of Days to Update: 73

Source: Environmental Protection Agency
Telephone: 703-308-4044
Last EDR Contact: 05/06/2022
Next Scheduled EDR Contact: 08/15/2022
Data Release Frequency: Varies

TSCA: Toxic Substances Control Act

Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/2016
Date Data Arrived at EDR: 06/17/2020
Date Made Active in Reports: 09/10/2020
Number of Days to Update: 85

Source: EPA
Telephone: 202-260-5521
Last EDR Contact: 06/14/2022
Next Scheduled EDR Contact: 09/26/2022
Data Release Frequency: Every 4 Years

TRIS: Toxic Chemical Release Inventory System

Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/2018
Date Data Arrived at EDR: 08/14/2020
Date Made Active in Reports: 11/04/2020
Number of Days to Update: 82

Source: EPA
Telephone: 202-566-0250
Last EDR Contact: 05/20/2022
Next Scheduled EDR Contact: 08/29/2022
Data Release Frequency: Annually

SSTS: Section 7 Tracking Systems

Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 01/19/2022
Date Data Arrived at EDR: 01/19/2022
Date Made Active in Reports: 04/11/2022
Number of Days to Update: 82

Source: EPA
Telephone: 202-564-4203
Last EDR Contact: 07/18/2022
Next Scheduled EDR Contact: 10/31/2022
Data Release Frequency: Annually

ROD: Records Of Decision

Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 04/27/2022
Date Data Arrived at EDR: 05/05/2022
Date Made Active in Reports: 05/31/2022
Number of Days to Update: 26

Source: EPA
Telephone: 703-416-0223
Last EDR Contact: 07/01/2022
Next Scheduled EDR Contact: 09/12/2022
Data Release Frequency: Annually

RMP: Risk Management Plans

When Congress passed the Clean Air Act Amendments of 1990, it required EPA to publish regulations and guidance for chemical accident prevention at facilities using extremely hazardous substances. The Risk Management Program Rule (RMP Rule) was written to implement Section 112(r) of these amendments. The rule, which built upon existing industry codes and standards, requires companies of all sizes that use certain flammable and toxic substances to develop a Risk Management Program, which includes a(n): Hazard assessment that details the potential effects of an accidental release, an accident history of the last five years, and an evaluation of worst-case and alternative accidental releases; Prevention program that includes safety precautions and maintenance, monitoring, and employee training measures; and Emergency response program that spells out emergency health care, employee training measures and procedures for informing the public and response agencies (e.g the fire department) should an accident occur.

Date of Government Version: 04/27/2022
Date Data Arrived at EDR: 05/04/2022
Date Made Active in Reports: 05/10/2022
Number of Days to Update: 6

Source: Environmental Protection Agency
Telephone: 202-564-8600
Last EDR Contact: 07/14/2022
Next Scheduled EDR Contact: 10/31/2022
Data Release Frequency: Varies

RAATS: RCRA Administrative Action Tracking System

RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/1995
Date Data Arrived at EDR: 07/03/1995
Date Made Active in Reports: 08/07/1995
Number of Days to Update: 35

Source: EPA
Telephone: 202-564-4104
Last EDR Contact: 06/02/2008
Next Scheduled EDR Contact: 09/01/2008
Data Release Frequency: No Update Planned

PRP: Potentially Responsible Parties
A listing of verified Potentially Responsible Parties

Date of Government Version: 01/25/2022
Date Data Arrived at EDR: 02/03/2022
Date Made Active in Reports: 02/25/2022
Number of Days to Update: 22

Source: EPA
Telephone: 202-564-6023
Last EDR Contact: 07/01/2022
Next Scheduled EDR Contact: 08/15/2022
Data Release Frequency: Quarterly

PADS: PCB Activity Database System
PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 01/20/2022
Date Data Arrived at EDR: 01/20/2022
Date Made Active in Reports: 03/25/2022
Number of Days to Update: 64

Source: EPA
Telephone: 202-566-0500
Last EDR Contact: 07/08/2022
Next Scheduled EDR Contact: 10/17/2022
Data Release Frequency: Annually

ICIS: Integrated Compliance Information System
The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

Date of Government Version: 11/18/2016
Date Data Arrived at EDR: 11/23/2016
Date Made Active in Reports: 02/10/2017
Number of Days to Update: 79

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 06/28/2022
Next Scheduled EDR Contact: 10/17/2022
Data Release Frequency: Quarterly

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-566-1667
Last EDR Contact: 08/18/2017
Next Scheduled EDR Contact: 12/04/2017
Data Release Frequency: No Update Planned

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
A listing of FIFRA/TSCA Tracking System (FTTS) inspections and enforcements.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA
Telephone: 202-566-1667
Last EDR Contact: 08/18/2017
Next Scheduled EDR Contact: 12/04/2017
Data Release Frequency: No Update Planned

MLTS: Material Licensing Tracking System
MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 03/11/2022
Date Data Arrived at EDR: 03/15/2022
Date Made Active in Reports: 06/14/2022
Number of Days to Update: 91

Source: Nuclear Regulatory Commission
Telephone: 301-415-7169
Last EDR Contact: 07/13/2022
Next Scheduled EDR Contact: 10/31/2022
Data Release Frequency: Quarterly

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

COAL ASH DOE: Steam-Electric Plant Operation Data
A listing of power plants that store ash in surface ponds.

Date of Government Version: 12/31/2020
Date Data Arrived at EDR: 11/30/2021
Date Made Active in Reports: 02/22/2022
Number of Days to Update: 84
Source: Department of Energy
Telephone: 202-586-8719
Last EDR Contact: 06/02/2022
Next Scheduled EDR Contact: 09/12/2022
Data Release Frequency: Varies

COAL ASH EPA: Coal Combustion Residues Surface Impoundments List
A listing of coal combustion residues surface impoundments with high hazard potential ratings.

Date of Government Version: 01/12/2017
Date Data Arrived at EDR: 03/05/2019
Date Made Active in Reports: 11/11/2019
Number of Days to Update: 251
Source: Environmental Protection Agency
Telephone: N/A
Last EDR Contact: 05/25/2022
Next Scheduled EDR Contact: 09/12/2022
Data Release Frequency: Varies

PCB TRANSFORMER: PCB Transformer Registration Database
The database of PCB transformer registrations that includes all PCB registration submittals.

Date of Government Version: 09/13/2019
Date Data Arrived at EDR: 11/06/2019
Date Made Active in Reports: 02/10/2020
Number of Days to Update: 96
Source: Environmental Protection Agency
Telephone: 202-566-0517
Last EDR Contact: 05/06/2022
Next Scheduled EDR Contact: 08/15/2022
Data Release Frequency: Varies

RADINFO: Radiation Information Database
The Radiation Information Database (RADINFO) contains information about facilities that are regulated by U.S. Environmental Protection Agency (EPA) regulations for radiation and radioactivity.

Date of Government Version: 07/01/2019
Date Data Arrived at EDR: 07/01/2019
Date Made Active in Reports: 09/23/2019
Number of Days to Update: 84
Source: Environmental Protection Agency
Telephone: 202-343-9775
Last EDR Contact: 06/23/2022
Next Scheduled EDR Contact: 10/10/2022
Data Release Frequency: Quarterly

HIST FTTS: FIFRA/TSCA Tracking System Administrative Case Listing
A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40
Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2007
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

HIST FTTS INSP: FIFRA/TSCA Tracking System Inspection & Enforcement Case Listing
A complete inspection and enforcement case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2008
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

DOT OPS: Incident and Accident Data

Department of Transporation, Office of Pipeline Safety Incident and Accident data.

Date of Government Version: 01/02/2020
Date Data Arrived at EDR: 01/28/2020
Date Made Active in Reports: 04/17/2020
Number of Days to Update: 80

Source: Department of Transporation, Office of Pipeline Safety
Telephone: 202-366-4595
Last EDR Contact: 04/26/2022
Next Scheduled EDR Contact: 08/08/2022
Data Release Frequency: Quarterly

CONSENT: Superfund (CERCLA) Consent Decrees

Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: 03/31/2022
Date Data Arrived at EDR: 04/14/2022
Date Made Active in Reports: 07/12/2022
Number of Days to Update: 89

Source: Department of Justice, Consent Decree Library
Telephone: Varies
Last EDR Contact: 06/29/2022
Next Scheduled EDR Contact: 10/17/2022
Data Release Frequency: Varies

BRS: Biennial Reporting System

The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/2019
Date Data Arrived at EDR: 03/02/2022
Date Made Active in Reports: 03/25/2022
Number of Days to Update: 23

Source: EPA/NTIS
Telephone: 800-424-9346
Last EDR Contact: 06/21/2022
Next Scheduled EDR Contact: 10/03/2022
Data Release Frequency: Biennially

INDIAN RESERV: Indian Reservations

This map layer portrays Indian administered lands of the United States that have any area equal to or greater than 640 acres.

Date of Government Version: 12/31/2014
Date Data Arrived at EDR: 07/14/2015
Date Made Active in Reports: 01/10/2017
Number of Days to Update: 546

Source: USGS
Telephone: 202-208-3710
Last EDR Contact: 07/08/2022
Next Scheduled EDR Contact: 10/17/2022
Data Release Frequency: Semi-Annually

FUSRAP: Formerly Utilized Sites Remedial Action Program

DOE established the Formerly Utilized Sites Remedial Action Program (FUSRAP) in 1974 to remediate sites where radioactive contamination remained from Manhattan Project and early U.S. Atomic Energy Commission (AEC) operations.

Date of Government Version: 07/26/2021
Date Data Arrived at EDR: 07/27/2021
Date Made Active in Reports: 10/22/2021
Number of Days to Update: 87

Source: Department of Energy
Telephone: 202-586-3559
Last EDR Contact: 04/28/2022
Next Scheduled EDR Contact: 08/15/2022
Data Release Frequency: Varies

UMTRA: Uranium Mill Tailings Sites

Uranium ore was mined by private companies for federal government use in national defense programs. When the mills shut down, large piles of the sand-like material (mill tailings) remain after uranium has been extracted from the ore. Levels of human exposure to radioactive materials from the piles are low; however, in some cases tailings were used as construction materials before the potential health hazards of the tailings were recognized.

Date of Government Version: 08/30/2019
Date Data Arrived at EDR: 11/15/2019
Date Made Active in Reports: 01/28/2020
Number of Days to Update: 74

Source: Department of Energy
Telephone: 505-845-0011
Last EDR Contact: 05/16/2022
Next Scheduled EDR Contact: 08/29/2022
Data Release Frequency: Varies

LEAD SMELTER 1: Lead Smelter Sites

A listing of former lead smelter site locations.

Date of Government Version: 04/27/2022
Date Data Arrived at EDR: 05/05/2022
Date Made Active in Reports: 05/31/2022
Number of Days to Update: 26

Source: Environmental Protection Agency
Telephone: 703-603-8787
Last EDR Contact: 09/01/2022
Next Scheduled EDR Contact: 10/10/2022
Data Release Frequency: Varies

LEAD SMELTER 2: Lead Smelter Sites

A list of several hundred sites in the U.S. where secondary lead smelting was done from 1931and 1964. These sites may pose a threat to public health through ingestion or inhalation of contaminated soil or dust

Date of Government Version: 04/05/2001
Date Data Arrived at EDR: 10/27/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 36

Source: American Journal of Public Health
Telephone: 703-305-6451
Last EDR Contact: 12/02/2009
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

US AIRS (AFS): Aerometric Information Retrieval System Facility Subsystem (AFS)

The database is a sub-system of Aerometric Information Retrieval System (AIRS). AFS contains compliance data on air pollution point sources regulated by the U.S. EPA and/or state and local air regulatory agencies. This information comes from source reports by various stationary sources of air pollution, such as electric power plants, steel mills, factories, and universities, and provides information about the air pollutants they produce. Action, air program, air program pollutant, and general level plant data. It is used to track emissions and compliance data from industrial plants.

Date of Government Version: 10/12/2016
Date Data Arrived at EDR: 10/26/2016
Date Made Active in Reports: 02/03/2017
Number of Days to Update: 100

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 09/26/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Annually

US AIRS MINOR: Air Facility System Data

A listing of minor source facilities.

Date of Government Version: 10/12/2016
Date Data Arrived at EDR: 10/26/2016
Date Made Active in Reports: 02/03/2017
Number of Days to Update: 100

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 09/26/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Annually

MINES VIOLATIONS: MSHA Violation Assessment Data

Mines violation and assessment information. Department of Labor, Mine Safety & Health Administration.

Date of Government Version: 03/21/2022
Date Data Arrived at EDR: 03/22/2022
Date Made Active in Reports: 03/25/2022
Number of Days to Update: 3

Source: DOL, Mine Safety & Health Admi
Telephone: 202-693-9424
Last EDR Contact: 05/26/2022
Next Scheduled EDR Contact: 09/12/2022
Data Release Frequency: Quarterly

US MINES: Mines Master Index File

Contains all mine identification numbers issued for mines active or opened since 1971. The data also includes violation information.

Date of Government Version: 02/01/2022
Date Data Arrived at EDR: 02/23/2022
Date Made Active in Reports: 05/24/2022
Number of Days to Update: 90

Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959
Last EDR Contact: 05/25/2022
Next Scheduled EDR Contact: 09/05/2022
Data Release Frequency: Semi-Annually

US MINES 2: Ferrous and Nonferrous Metal Mines Database Listing

This map layer includes ferrous (ferrous metal mines are facilities that extract ferrous metals, such as iron ore or molybdenum) and nonferrous (Nonferrous metal mines are facilities that extract nonferrous metals, such as gold, silver, copper, zinc, and lead) metal mines in the United States.

Date of Government Version: 05/06/2020
Date Data Arrived at EDR: 05/27/2020
Date Made Active in Reports: 08/13/2020
Number of Days to Update: 78

Source: USGS
Telephone: 703-648-7709
Last EDR Contact: 05/27/2022
Next Scheduled EDR Contact: 09/05/2022
Data Release Frequency: Varies

US MINES 3: Active Mines & Mineral Plants Database Listing

Active Mines and Mineral Processing Plant operations for commodities monitored by the Minerals Information Team of the USGS.

Date of Government Version: 04/14/2011
Date Data Arrived at EDR: 06/08/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 97

Source: USGS
Telephone: 703-648-7709
Last EDR Contact: 05/27/2022
Next Scheduled EDR Contact: 09/05/2022
Data Release Frequency: Varies

ABANDONED MINES: Abandoned Mines

An inventory of land and water impacted by past mining (primarily coal mining) is maintained by OSMRE to provide information needed to implement the Surface Mining Control and Reclamation Act of 1977 (SMCRA). The inventory contains information on the location, type, and extent of AML impacts, as well as, information on the cost associated with the reclamation of those problems. The inventory is based upon field surveys by State, Tribal, and OSMRE program officials. It is dynamic to the extent that it is modified as new problems are identified and existing problems are reclaimed.

Date of Government Version: 03/10/2022
Date Data Arrived at EDR: 03/10/2022
Date Made Active in Reports: 06/14/2022
Number of Days to Update: 96

Source: Department of Interior
Telephone: 202-208-2609
Last EDR Contact: 06/14/2022
Next Scheduled EDR Contact: 09/19/2022
Data Release Frequency: Quarterly

FINDS: Facility Index System/Facility Registry System

Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 05/13/2022
Date Data Arrived at EDR: 05/18/2022
Date Made Active in Reports: 05/31/2022
Number of Days to Update: 13

Source: EPA
Telephone: (415) 947-8000
Last EDR Contact: 05/18/2022
Next Scheduled EDR Contact: 09/12/2022
Data Release Frequency: Quarterly

ECHO: Enforcement & Compliance History Information

ECHO provides integrated compliance and enforcement information for about 800,000 regulated facilities nationwide.

Date of Government Version: 04/02/2022
Date Data Arrived at EDR: 04/05/2022
Date Made Active in Reports: 06/28/2022
Number of Days to Update: 84

Source: Environmental Protection Agency
Telephone: 202-564-2280
Last EDR Contact: 07/01/2022
Next Scheduled EDR Contact: 10/17/2022
Data Release Frequency: Quarterly

DOCKET HWC: Hazardous Waste Compliance Docket Listing
A complete list of the Federal Agency Hazardous Waste Compliance Docket Facilities.

Date of Government Version: 05/06/2021
Date Data Arrived at EDR: 05/21/2021
Date Made Active in Reports: 08/11/2021
Number of Days to Update: 82
Source: Environmental Protection Agency
Telephone: 202-564-0527
Last EDR Contact: 05/19/2022
Next Scheduled EDR Contact: 09/05/2022
Data Release Frequency: Varies

UXO: Unexploded Ordnance Sites
A listing of unexploded ordnance site locations

Date of Government Version: 12/31/2020
Date Data Arrived at EDR: 01/11/2022
Date Made Active in Reports: 02/14/2022
Number of Days to Update: 34
Source: Department of Defense
Telephone: 703-704-1564
Last EDR Contact: 07/07/2022
Next Scheduled EDR Contact: 10/24/2022
Data Release Frequency: Varies

FUELS PROGRAM: EPA Fuels Program Registered Listing
This listing includes facilities that are registered under the Part 80 (Code of Federal Regulations) EPA Fuels Programs. All companies now are required to submit new and updated registrations.

Date of Government Version: 02/17/2022
Date Data Arrived at EDR: 02/17/2022
Date Made Active in Reports: 05/10/2022
Number of Days to Update: 82
Source: EPA
Telephone: 800-385-6164
Last EDR Contact: 05/17/2022
Next Scheduled EDR Contact: 08/29/2022
Data Release Frequency: Quarterly

CA BOND EXP. PLAN: Bond Expenditure Plan
Department of Health Services developed a site-specific expenditure plan as the basis for an appropriation of Hazardous Substance Cleanup Bond Act funds. It is not updated.

Date of Government Version: 01/01/1989
Date Data Arrived at EDR: 07/27/1994
Date Made Active in Reports: 08/02/1994
Number of Days to Update: 6
Source: Department of Health Services
Telephone: 916-255-2118
Last EDR Contact: 05/31/1994
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

CORTESE: "Cortese" Hazardous Waste & Substances Sites List
The sites for the list are designated by the State Water Resource Control Board (LUST), the Integrated Waste Board (SWF/LS), and the Department of Toxic Substances Control (Cal-Sites).

Date of Government Version: 03/21/2022
Date Data Arrived at EDR: 03/21/2022
Date Made Active in Reports: 06/14/2022
Number of Days to Update: 85
Source: CAL EPA/Office of Emergency Information
Telephone: 916-323-3400
Last EDR Contact: 06/21/2022
Next Scheduled EDR Contact: 10/03/2022
Data Release Frequency: Quarterly

CUPA LIVERMORE-PLEASANTON: CUPA Facility Listing
list of facilities associated with the various CUPA programs in Livermore-Pleasanton

Date of Government Version: 12/07/2021
Date Data Arrived at EDR: 05/09/2022
Date Made Active in Reports: 05/17/2022
Number of Days to Update: 8
Source: Livermore-Pleasanton Fire Department
Telephone: 925-454-2361
Last EDR Contact: 05/09/2022
Next Scheduled EDR Contact: 08/22/2022
Data Release Frequency: Varies

DRYCLEANERS: Cleaner Facilities
A list of drycleaner related facilities that have EPA ID numbers. These are facilities with certain SIC codes: power laundries, family and commercial; garment pressing and cleaner's agents; linen supply; coin-operated laundries and cleaning; drycleaning plants, except rugs; carpet and upholster cleaning; industrial launderers; laundry and garment services.

Date of Government Version: 08/27/2021
Date Data Arrived at EDR: 09/01/2021
Date Made Active in Reports: 11/19/2021
Number of Days to Update: 79

Source: Department of Toxic Substance Control
Telephone: 916-327-4498
Last EDR Contact: 06/01/2022
Next Scheduled EDR Contact: 09/12/2022
Data Release Frequency: Annually

DRYCLEAN AVAQMD: Antelope Valley Air Quality Management District Drycleaner Listing
A listing of dry cleaners in the Antelope Valley Air Quality Management District.

Date of Government Version: 02/24/2022
Date Data Arrived at EDR: 02/25/2022
Date Made Active in Reports: 05/18/2022
Number of Days to Update: 82

Source: Antelope Valley Air Quality Management District
Telephone: 661-723-8070
Last EDR Contact: 05/25/2022
Next Scheduled EDR Contact: 09/12/2022
Data Release Frequency: Varies

DRYCLEAN SOUTH COAST: South Coast Air Quality Management District Drycleaner Listing
A listing of dry cleaners in the South Coast Air Quality Management District

Date of Government Version: 02/17/2022
Date Data Arrived at EDR: 02/24/2022
Date Made Active in Reports: 05/18/2022
Number of Days to Update: 83

Source: South Coast Air Quality Management District
Telephone: 909-396-3211
Last EDR Contact: 05/19/2022
Next Scheduled EDR Contact: 09/05/2022
Data Release Frequency: Varies

EMI: Emissions Inventory Data
Toxics and criteria pollutant emissions data collected by the ARB and local air pollution agencies.

Date of Government Version: 12/31/2019
Date Data Arrived at EDR: 06/10/2021
Date Made Active in Reports: 08/27/2021
Number of Days to Update: 78

Source: California Air Resources Board
Telephone: 916-322-2990
Last EDR Contact: 06/13/2022
Next Scheduled EDR Contact: 09/26/2022
Data Release Frequency: Varies

ENF: Enforcement Action Listing
A listing of Water Board Enforcement Actions. Formal is everything except Oral/Verbal Communication, Notice of Violation, Expedited Payment Letter, and Staff Enforcement Letter.

Date of Government Version: 04/12/2022
Date Data Arrived at EDR: 04/19/2022
Date Made Active in Reports: 05/31/2022
Number of Days to Update: 42

Source: State Water Resoruces Control Board
Telephone: 916-445-9379
Last EDR Contact: 07/18/2022
Next Scheduled EDR Contact: 10/31/2022
Data Release Frequency: Varies

Financial Assurance 1: Financial Assurance Information Listing
Financial Assurance information

Date of Government Version: 04/19/2022
Date Data Arrived at EDR: 04/29/2022
Date Made Active in Reports: 07/15/2022
Number of Days to Update: 77

Source: Department of Toxic Substances Control
Telephone: 916-255-3628
Last EDR Contact: 04/28/2022
Next Scheduled EDR Contact: 08/01/2022
Data Release Frequency: Varies

Financial Assurance 2: Financial Assurance Information Listing
A listing of financial assurance information for solid waste facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

Date of Government Version: 02/23/2022
Date Data Arrived at EDR: 02/24/2022
Date Made Active in Reports: 05/18/2022
Number of Days to Update: 83

Source: California Integrated Waste Management Board
Telephone: 916-341-6066
Last EDR Contact: 05/19/2022
Next Scheduled EDR Contact: 08/22/2022
Data Release Frequency: Varies

HAZNET: Facility and Manifest Data

Facility and Manifest Data. The data is extracted from the copies of hazardous waste manifests received each year by the DTSC. The annual volume of manifests is typically 700,000 - 1,000,000 annually, representing approximately 350,000 - 500,000 shipments. Data are from the manifests submitted without correction, and therefore many contain some invalid values for data elements such as generator ID, TSD ID, waste category, and disposal method. This database begins with calendar year 1993.

Date of Government Version: 12/31/2019
Date Data Arrived at EDR: 04/15/2020
Date Made Active in Reports: 07/02/2020
Number of Days to Update: 78

Source: California Environmental Protection Agency
Telephone: 916-255-1136
Last EDR Contact: 07/05/2022
Next Scheduled EDR Contact: 10/17/2022
Data Release Frequency: Annually

ICE: ICE

Contains data pertaining to the Permitted Facilities with Inspections / Enforcements sites tracked in Envirostor.

Date of Government Version: 02/14/2022
Date Data Arrived at EDR: 02/15/2022
Date Made Active in Reports: 05/12/2022
Number of Days to Update: 86

Source: Department of Toxic Subsances Control
Telephone: 877-786-9427
Last EDR Contact: 05/17/2022
Next Scheduled EDR Contact: 08/29/2022
Data Release Frequency: Quarterly

HIST CORTESE: Hazardous Waste & Substance Site List

The sites for the list are designated by the State Water Resource Control Board [LUST], the Integrated Waste Board [SWF/LS], and the Department of Toxic Substances Control [CALSITES]. This listing is no longer updated by the state agency.

Date of Government Version: 04/01/2001
Date Data Arrived at EDR: 01/22/2009
Date Made Active in Reports: 04/08/2009
Number of Days to Update: 76

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 01/22/2009
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

HWP: EnviroStor Permitted Facilities Listing

Detailed information on permitted hazardous waste facilities and corrective action ("cleanups") tracked in EnviroStor.

Date of Government Version: 02/14/2022
Date Data Arrived at EDR: 02/15/2022
Date Made Active in Reports: 05/12/2022
Number of Days to Update: 86

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 05/17/2022
Next Scheduled EDR Contact: 08/29/2022
Data Release Frequency: Quarterly

HWT: Registered Hazardous Waste Transporter Database

A listing of hazardous waste transporters. In California, unless specifically exempted, it is unlawful for any person to transport hazardous wastes unless the person holds a valid registration issued by DTSC. A hazardous waste transporter registration is valid for one year and is assigned a unique registration number.

Date of Government Version: 04/05/2022
Date Data Arrived at EDR: 04/05/2022
Date Made Active in Reports: 06/27/2022
Number of Days to Update: 83

Source: Department of Toxic Substances Control
Telephone: 916-440-7145
Last EDR Contact: 07/05/2022
Next Scheduled EDR Contact: 10/17/2022
Data Release Frequency: Quarterly

MINES: Mines Site Location Listing

A listing of mine site locations from the Office of Mine Reclamation.

Date of Government Version: 03/07/2022
Date Data Arrived at EDR: 03/08/2022
Date Made Active in Reports: 06/01/2022
Number of Days to Update: 85

Source: Department of Conservation
Telephone: 916-322-1080
Last EDR Contact: 06/07/2022
Next Scheduled EDR Contact: 09/19/2022
Data Release Frequency: Quarterly

MWMP: Medical Waste Management Program Listing

The Medical Waste Management Program (MWMP) ensures the proper handling and disposal of medical waste by permitting and inspecting medical waste Offsite Treatment Facilities (PDF) and Transfer Stations (PDF) throughout the state. MWMP also oversees all Medical Waste Transporters.

Date of Government Version: 02/17/2022
Date Data Arrived at EDR: 02/28/2022
Date Made Active in Reports: 05/25/2022
Number of Days to Update: 86

Source: Department of Public Health
Telephone: 916-558-1784
Last EDR Contact: 05/31/2022
Next Scheduled EDR Contact: 09/12/2022
Data Release Frequency: Varies

NPDES: NPDES Permits Listing

A listing of NPDES permits, including stormwater.

Date of Government Version: 02/07/2022
Date Data Arrived at EDR: 02/08/2022
Date Made Active in Reports: 05/05/2022
Number of Days to Update: 86

Source: State Water Resources Control Board
Telephone: 916-445-9379
Last EDR Contact: 05/09/2022
Next Scheduled EDR Contact: 08/22/2022
Data Release Frequency: Quarterly

PEST LIC: Pesticide Regulation Licenses Listing

A listing of licenses and certificates issued by the Department of Pesticide Regulation. The DPR issues licenses and/or certificates to: Persons and businesses that apply or sell pesticides; Pest control dealers and brokers; Persons who advise on agricultural pesticide applications.

Date of Government Version: 02/28/2022
Date Data Arrived at EDR: 02/28/2022
Date Made Active in Reports: 05/25/2022
Number of Days to Update: 86

Source: Department of Pesticide Regulation
Telephone: 916-445-4038
Last EDR Contact: 05/31/2022
Next Scheduled EDR Contact: 09/12/2022
Data Release Frequency: Quarterly

PROC: Certified Processors Database

A listing of certified processors.

Date of Government Version: 03/07/2022
Date Data Arrived at EDR: 03/08/2022
Date Made Active in Reports: 06/02/2022
Number of Days to Update: 86

Source: Department of Conservation
Telephone: 916-323-3836
Last EDR Contact: 06/07/2022
Next Scheduled EDR Contact: 09/19/2022
Data Release Frequency: Quarterly

NOTIFY 65: Proposition 65 Records

Listings of all Proposition 65 incidents reported to counties by the State Water Resources Control Board and the Regional Water Quality Control Board. This database is no longer updated by the reporting agency.

Date of Government Version: 03/11/2022
Date Data Arrived at EDR: 03/15/2022
Date Made Active in Reports: 06/08/2022
Number of Days to Update: 85

Source: State Water Resources Control Board
Telephone: 916-445-3846
Last EDR Contact: 06/09/2022
Next Scheduled EDR Contact: 09/26/2022
Data Release Frequency: No Update Planned

UIC: UIC Listing

A listing of wells identified as underground injection wells, in the California Oil and Gas Wells database.

Date of Government Version: 03/07/2022
Date Data Arrived at EDR: 03/08/2022
Date Made Active in Reports: 06/02/2022
Number of Days to Update: 86

Source: Deaprtment of Conservation
Telephone: 916-445-2408
Last EDR Contact: 06/07/2022
Next Scheduled EDR Contact: 09/19/2022
Data Release Frequency: Varies

UIC GEO: Underground Injection Control Sites (GEOTRACKER)
Underground control injection sites

Date of Government Version: 05/23/2022
Date Data Arrived at EDR: 05/23/2022
Date Made Active in Reports: 06/02/2022
Number of Days to Update: 10

Source: State Water Resource Control Board
Telephone: 866-480-1028
Last EDR Contact: 05/23/2022
Next Scheduled EDR Contact: 09/19/2022
Data Release Frequency: Varies

WASTEWATER PITS: Oil Wastewater Pits Listing
Water officials discovered that oil producers have been dumping chemical-laden wastewater into hundreds of unlined pits that are operating without proper permits. Inspections completed by the Central Valley Regional Water Quality Control Board revealed the existence of previously unidentified waste sites. The water boards review found that more than one-third of the region's active disposal pits are operating without permission.

Date of Government Version: 02/11/2021
Date Data Arrived at EDR: 07/01/2021
Date Made Active in Reports: 09/29/2021
Number of Days to Update: 90

Source: RWQCB, Central Valley Region
Telephone: 559-445-5577
Last EDR Contact: 07/08/2022
Next Scheduled EDR Contact: 10/17/2022
Data Release Frequency: Varies

WDS: Waste Discharge System
Sites which have been issued waste discharge requirements.

Date of Government Version: 06/19/2007
Date Data Arrived at EDR: 06/20/2007
Date Made Active in Reports: 06/29/2007
Number of Days to Update: 9

Source: State Water Resources Control Board
Telephone: 916-341-5227
Last EDR Contact: 05/12/2022
Next Scheduled EDR Contact: 08/29/2022
Data Release Frequency: No Update Planned

WIP: Well Investigation Program Case List
Well Investigation Program case in the San Gabriel and San Fernando Valley area.

Date of Government Version: 07/03/2009
Date Data Arrived at EDR: 07/21/2009
Date Made Active in Reports: 08/03/2009
Number of Days to Update: 13

Source: Los Angeles Water Quality Control Board
Telephone: 213-576-6726
Last EDR Contact: 06/14/2022
Next Scheduled EDR Contact: 10/03/2022
Data Release Frequency: No Update Planned

MILITARY PRIV SITES: Military Privatized Sites (GEOTRACKER)
Military privatized sites

Date of Government Version: 05/23/2022
Date Data Arrived at EDR: 05/23/2022
Date Made Active in Reports: 06/02/2022
Number of Days to Update: 10

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 05/23/2022
Next Scheduled EDR Contact: 09/19/2022
Data Release Frequency: Varies

PROJECT: Project Sites (GEOTRACKER)
Projects sites

Date of Government Version: 05/23/2022
Date Data Arrived at EDR: 05/23/2022
Date Made Active in Reports: 06/02/2022
Number of Days to Update: 10

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 05/23/2022
Next Scheduled EDR Contact: 09/19/2022
Data Release Frequency: Varies

WDR: Waste Discharge Requirements Listing
In general, the Waste Discharge Requirements (WDRs) Program (sometimes also referred to as the "Non Chapter 15 (Non 15) Program") regulates point discharges that are exempt pursuant to Subsection 20090 of Title 27 and not subject to the Federal Water Pollution Control Act. Exemptions from Title 27 may be granted for nine categories of discharges (e.g., sewage, wastewater, etc.) that meet, and continue to meet, the preconditions listed for each specific exemption. The scope of the WDRs Program also includes the discharge of wastes classified as inert, pursuant to section 20230 of Title 27.

Date of Government Version: 03/07/2022
Date Data Arrived at EDR: 03/08/2022
Date Made Active in Reports: 06/03/2022
Number of Days to Update: 87

Source: State Water Resources Control Board
Telephone: 916-341-5810
Last EDR Contact: 06/07/2022
Next Scheduled EDR Contact: 09/19/2022
Data Release Frequency: Quarterly

CIWQS: California Integrated Water Quality System

The California Integrated Water Quality System (CIWQS) is a computer system used by the State and Regional Water Quality Control Boards to track information about places of environmental interest, manage permits and other orders, track inspections, and manage violations and enforcement activities.

Date of Government Version: 02/28/2022
Date Data Arrived at EDR: 02/28/2022
Date Made Active in Reports: 05/25/2022
Number of Days to Update: 86

Source: State Water Resources Control Board
Telephone: 866-794-4977
Last EDR Contact: 05/31/2022
Next Scheduled EDR Contact: 09/12/2022
Data Release Frequency: Varies

CERS: CalEPA Regulated Site Portal Data

The CalEPA Regulated Site Portal database combines data about environmentally regulated sites and facilities in California into a single database. It combines data from a variety of state and federal databases, and provides an overview of regulated activities across the spectrum of environmental programs for any given location in California. These activities include hazardous materials and waste, state and federal cleanups, impacted ground and surface waters, and toxic materials

Date of Government Version: 04/18/2022
Date Data Arrived at EDR: 04/19/2022
Date Made Active in Reports: 07/12/2022
Number of Days to Update: 84

Source: California Environmental Protection Agency
Telephone: 916-323-2514
Last EDR Contact: 07/18/2022
Next Scheduled EDR Contact: 10/31/2022
Data Release Frequency: Varies

NON-CASE INFO: Non-Case Information Sites (GEOTRACKER)

Non-Case Information sites

Date of Government Version: 05/23/2022
Date Data Arrived at EDR: 05/23/2022
Date Made Active in Reports: 06/02/2022
Number of Days to Update: 10

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 05/23/2022
Next Scheduled EDR Contact: 09/19/2022
Data Release Frequency: Varies

OTHER OIL GAS: Other Oil & Gas Projects Sites (GEOTRACKER)

Other Oil & Gas Projects sites

Date of Government Version: 05/23/2022
Date Data Arrived at EDR: 05/23/2022
Date Made Active in Reports: 06/02/2022
Number of Days to Update: 10

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 05/23/2022
Next Scheduled EDR Contact: 09/19/2022
Data Release Frequency: Varies

PROD WATER PONDS: Produced Water Ponds Sites (GEOTRACKER)

Produced water ponds sites

Date of Government Version: 05/23/2022
Date Data Arrived at EDR: 05/23/2022
Date Made Active in Reports: 06/02/2022
Number of Days to Update: 10

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 05/23/2022
Next Scheduled EDR Contact: 09/19/2022
Data Release Frequency: Varies

SAMPLING POINT: Sampling Point ? Public Sites (GEOTRACKER)

Sampling point - public sites

Date of Government Version: 05/23/2022
Date Data Arrived at EDR: 05/23/2022
Date Made Active in Reports: 06/02/2022
Number of Days to Update: 10

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 05/23/2022
Next Scheduled EDR Contact: 09/19/2022
Data Release Frequency: Varies

WELL STIM PROJ: Well Stimulation Project (GEOTRACKER)

Includes areas of groundwater monitoring plans, a depiction of the monitoring network, and the facilities, boundaries, and subsurface characteristics of the oilfield and the features (oil and gas wells, produced water ponds, UIC wells, water supply wells, etc?) being monitored

Date of Government Version: 05/23/2022
Date Data Arrived at EDR: 05/23/2022
Date Made Active in Reports: 06/02/2022
Number of Days to Update: 10

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 05/23/2022
Next Scheduled EDR Contact: 09/19/2022
Data Release Frequency: Varies

PCS: Permit Compliance System

PCS is a computerized management information system that contains data on National Pollutant Discharge Elimination System (NPDES) permit holding facilities. PCS tracks the permit, compliance, and enforcement status of NPDES facilities.

Date of Government Version: 07/14/2011
Date Data Arrived at EDR: 08/05/2011
Date Made Active in Reports: 09/29/2011
Number of Days to Update: 55

Source: EPA, Office of Water
Telephone: 202-564-2496
Last EDR Contact: 06/28/2022
Next Scheduled EDR Contact: 10/17/2022
Data Release Frequency: Semi-Annually

MINES MRDS: Mineral Resources Data System

Mineral Resources Data System

Date of Government Version: 04/06/2018
Date Data Arrived at EDR: 10/21/2019
Date Made Active in Reports: 10/24/2019
Number of Days to Update: 3

Source: USGS
Telephone: 703-648-6533
Last EDR Contact: 05/27/2022
Next Scheduled EDR Contact: 09/05/2022
Data Release Frequency: Varies

PCS INACTIVE: Listing of Inactive PCS Permits

An inactive permit is a facility that has shut down or is no longer discharging.

Date of Government Version: 11/05/2014
Date Data Arrived at EDR: 01/06/2015
Date Made Active in Reports: 05/06/2015
Number of Days to Update: 120

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 06/28/2022
Next Scheduled EDR Contact: 10/17/2022
Data Release Frequency: Semi-Annually

HWTS: Hazardous Waste Tracking System

DTSC maintains the Hazardous Waste Tracking System that stores ID number information since the early 1980s and manifest data since 1993. The system collects both manifest copies from the generator and destination facility.

Date of Government Version: 04/05/2022
Date Data Arrived at EDR: 04/05/2022
Date Made Active in Reports: 04/26/2022
Number of Days to Update: 21

Source: Department of Toxic Substances Control
Telephone: 916-324-2444
Last EDR Contact: 07/06/2022
Next Scheduled EDR Contact: 10/17/2022
Data Release Frequency: Varies

PCS ENF: Enforcement data

No description is available for this data

Date of Government Version: 12/31/2014
Date Data Arrived at EDR: 02/05/2015
Date Made Active in Reports: 03/06/2015
Number of Days to Update: 29

Source: EPA
Telephone: 202-564-2497
Last EDR Contact: 06/28/2022
Next Scheduled EDR Contact: 10/17/2022
Data Release Frequency: Varies

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP: EDR Proprietary Manufactured Gas Plants

The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oily waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

EDR Hist Auto: EDR Exclusive Historical Auto Stations

EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR Hist Cleaner: EDR Exclusive Historical Cleaners

EDR has searched selected national collections of business directories and has collected listings of potential dry cleaner sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include dry cleaning establishments. The categories reviewed included, but were not limited to dry cleaners, cleaners, laundry, laundromat, cleaning/laundry, wash & dry etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA LF: Recovered Government Archive Solid Waste Facilities List

The EDR Recovered Government Archive Landfill database provides a list of landfills derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Resources Recycling and Recovery in California.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 01/13/2014
Number of Days to Update: 196

Source: Department of Resources Recycling and Recovery
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

RGA LUST: Recovered Government Archive Leaking Underground Storage Tank

The EDR Recovered Government Archive Leaking Underground Storage Tank database provides a list of LUST incidents derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the State Water Resources Control Board in California.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 12/30/2013
Number of Days to Update: 182

Source: State Water Resources Control Board
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

COUNTY RECORDS

ALAMEDA COUNTY:

CS ALAMEDA: Contaminated Sites

A listing of contaminated sites overseen by the Toxic Release Program (oil and groundwater contamination from chemical releases and spills) and the Leaking Underground Storage Tank Program (soil and ground water contamination from leaking petroleum USTs).

Date of Government Version: 01/09/2019
Date Data Arrived at EDR: 01/11/2019
Date Made Active in Reports: 03/05/2019
Number of Days to Update: 53

Source: Alameda County Environmental Health Services
Telephone: 510-567-6700
Last EDR Contact: 06/28/2022
Next Scheduled EDR Contact: 10/17/2022
Data Release Frequency: Semi-Annually

UST ALAMEDA: Underground Tanks

Underground storage tank sites located in Alameda county.

Date of Government Version: 12/28/2021
Date Data Arrived at EDR: 12/28/2021
Date Made Active in Reports: 03/18/2022
Number of Days to Update: 80

Source: Alameda County Environmental Health Services
Telephone: 510-567-6700
Last EDR Contact: 06/29/2022
Next Scheduled EDR Contact: 10/17/2022
Data Release Frequency: Semi-Annually

AMADOR COUNTY:

CUPA AMADOR: CUPA Facility List

Cupa Facility List

Date of Government Version: 02/04/2022
Date Data Arrived at EDR: 02/04/2022
Date Made Active in Reports: 05/02/2022
Number of Days to Update: 87

Source: Amador County Environmental Health
Telephone: 209-223-6439
Last EDR Contact: 05/12/2022
Next Scheduled EDR Contact: 08/15/2022
Data Release Frequency: Varies

BUTTE COUNTY:

CUPA BUTTE: CUPA Facility Listing
Cupa facility list.

Date of Government Version: 04/21/2017
Date Data Arrived at EDR: 04/25/2017
Date Made Active in Reports: 08/09/2017
Number of Days to Update: 106

Source: Public Health Department
Telephone: 530-538-7149
Last EDR Contact: 06/28/2022
Next Scheduled EDR Contact: 10/17/2022
Data Release Frequency: No Update Planned

CALVERAS COUNTY:

CUPA CALVERAS: CUPA Facility Listing
Cupa Facility Listing

Date of Government Version: 03/17/2022
Date Data Arrived at EDR: 03/18/2022
Date Made Active in Reports: 06/08/2022
Number of Days to Update: 82

Source: Calveras County Environmental Health
Telephone: 209-754-6399
Last EDR Contact: 06/14/2022
Next Scheduled EDR Contact: 10/03/2022
Data Release Frequency: Quarterly

COLUSA COUNTY:

CUPA COLUSA: CUPA Facility List
Cupa facility list.

Date of Government Version: 04/06/2020
Date Data Arrived at EDR: 04/23/2020
Date Made Active in Reports: 07/10/2020
Number of Days to Update: 78

Source: Health & Human Services
Telephone: 530-458-0396
Last EDR Contact: 04/28/2022
Next Scheduled EDR Contact: 08/15/2022
Data Release Frequency: Semi-Annually

CONTRA COSTA COUNTY:

SL CONTRA COSTA: Site List
List includes sites from the underground tank, hazardous waste generator and business plan/2185 programs.

Date of Government Version: 04/21/2022
Date Data Arrived at EDR: 04/22/2022
Date Made Active in Reports: 07/12/2022
Number of Days to Update: 81

Source: Contra Costa Health Services Department
Telephone: 925-646-2286
Last EDR Contact: 07/19/2022
Next Scheduled EDR Contact: 11/07/2022
Data Release Frequency: Semi-Annually

DEL NORTE COUNTY:

CUPA DEL NORTE: CUPA Facility List
Cupa Facility list

Date of Government Version: 01/10/2022
Date Data Arrived at EDR: 01/26/2022
Date Made Active in Reports: 04/14/2022
Number of Days to Update: 78

Source: Del Norte County Environmental Health Division
Telephone: 707-465-0426
Last EDR Contact: 07/19/2022
Next Scheduled EDR Contact: 11/07/2022
Data Release Frequency: Varies

EL DORADO COUNTY:

CUPA EL DORADO: CUPA Facility List
CUPA facility list.

Date of Government Version: 02/16/2022
Date Data Arrived at EDR: 02/17/2022
Date Made Active in Reports: 05/10/2022
Number of Days to Update: 82

Source: El Dorado County Environmental Management Department
Telephone: 530-621-6623
Last EDR Contact: 07/20/2022
Next Scheduled EDR Contact: 11/07/2022
Data Release Frequency: Varies

FRESNO COUNTY:

CUPA FRESNO: CUPA Resources List
Certified Unified Program Agency. CUPA's are responsible for implementing a unified hazardous materials and hazardous waste management regulatory program. The agency provides oversight of businesses that deal with hazardous materials, operate underground storage tanks or aboveground storage tanks.

Date of Government Version: 06/28/2021
Date Data Arrived at EDR: 12/21/2021
Date Made Active in Reports: 03/03/2022
Number of Days to Update: 72

Source: Dept. of Community Health
Telephone: 559-445-3271
Last EDR Contact: 07/01/2022
Next Scheduled EDR Contact: 10/10/2022
Data Release Frequency: Semi-Annually

GLENN COUNTY:

CUPA GLENN: CUPA Facility List
Cupa facility list

Date of Government Version: 01/22/2018
Date Data Arrived at EDR: 01/24/2018
Date Made Active in Reports: 03/14/2018
Number of Days to Update: 49

Source: Glenn County Air Pollution Control District
Telephone: 830-934-6500
Last EDR Contact: 07/12/2022
Next Scheduled EDR Contact: 10/31/2022
Data Release Frequency: No Update Planned

HUMBOLDT COUNTY:

CUPA HUMBOLDT: CUPA Facility List
CUPA facility list.

Date of Government Version: 08/12/2021
Date Data Arrived at EDR: 08/12/2021
Date Made Active in Reports: 11/08/2021
Number of Days to Update: 88

Source: Humboldt County Environmental Health
Telephone: N/A
Last EDR Contact: 05/12/2022
Next Scheduled EDR Contact: 08/29/2022
Data Release Frequency: Semi-Annually

IMPERIAL COUNTY:

CUPA IMPERIAL: CUPA Facility List
Cupa facility list.

Date of Government Version: 04/18/2022
Date Data Arrived at EDR: 04/19/2022
Date Made Active in Reports: 07/12/2022
Number of Days to Update: 84

Source: San Diego Border Field Office
Telephone: 760-339-2777
Last EDR Contact: 07/13/2022
Next Scheduled EDR Contact: 10/31/2022
Data Release Frequency: Varies

INYO COUNTY:

CUPA INYO: CUPA Facility List
Cupa facility list.

Date of Government Version: 04/02/2018
Date Data Arrived at EDR: 04/03/2018
Date Made Active in Reports: 06/14/2018
Number of Days to Update: 72

Source: Inyo County Environmental Health Services
Telephone: 760-878-0238
Last EDR Contact: 05/12/2022
Next Scheduled EDR Contact: 08/29/2022
Data Release Frequency: Varies

KERN COUNTY:

CUPA KERN: CUPA Facility List
A listing of sites included in the Kern County Hazardous Material Business Plan.

Date of Government Version: 02/10/2022
Date Data Arrived at EDR: 02/11/2022
Date Made Active in Reports: 05/04/2022
Number of Days to Update: 82

Source: Kern County Public Health
Telephone: 661-321-3000
Last EDR Contact: 04/28/2022
Next Scheduled EDR Contact: 08/15/2022
Data Release Frequency: Varies

UST KERN: Underground Storage Tank Sites & Tank Listing
Kern County Sites and Tanks Listing.

Date of Government Version: 02/10/2022
Date Data Arrived at EDR: 02/11/2022
Date Made Active in Reports: 05/04/2022
Number of Days to Update: 82

Source: Kern County Environment Health Services Department
Telephone: 661-862-8700
Last EDR Contact: 04/28/2022
Next Scheduled EDR Contact: 08/15/2022
Data Release Frequency: Quarterly

KINGS COUNTY:

CUPA KINGS: CUPA Facility List
A listing of sites included in the county's Certified Unified Program Agency database. California's Secretary for Environmental Protection established the unified hazardous materials and hazardous waste regulatory program as required by chapter 6.11 of the California Health and Safety Code. The Unified Program consolidates the administration, permits, inspections, and enforcement activities.

Date of Government Version: 12/03/2020
Date Data Arrived at EDR: 01/26/2021
Date Made Active in Reports: 04/14/2021
Number of Days to Update: 78

Source: Kings County Department of Public Health
Telephone: 559-584-1411
Last EDR Contact: 05/25/2022
Next Scheduled EDR Contact: 08/29/2022
Data Release Frequency: Varies

LAKE COUNTY:

CUPA LAKE: CUPA Facility List
Cupa facility list

Date of Government Version: 02/10/2022
Date Data Arrived at EDR: 02/11/2022
Date Made Active in Reports: 05/04/2022
Number of Days to Update: 82

Source: Lake County Environmental Health
Telephone: 707-263-1164
Last EDR Contact: 07/07/2022
Next Scheduled EDR Contact: 10/24/2022
Data Release Frequency: Varies

LASSEN COUNTY:

CUPA LASSEN: CUPA Facility List
Cupa facility list

Date of Government Version: 07/31/2020
Date Data Arrived at EDR: 08/21/2020
Date Made Active in Reports: 11/09/2020
Number of Days to Update: 80

Source: Lassen County Environmental Health
Telephone: 530-251-8528
Last EDR Contact: 07/12/2022
Next Scheduled EDR Contact: 10/31/2022
Data Release Frequency: Varies

LOS ANGELES COUNTY:

AOCONCERN: Key Areas of Concerns in Los Angeles County
San Gabriel Valley areas where VOC contamination is at or above the MCL as designated by region 9 EPA office. Date of Government Version: 3/30/2009 Exide Site area is a cleanup plan of lead-impacted soil surrounding the former Exide Facility as designated by the DTSC. Date of Government Version: 7/17/2017

Date of Government Version: 03/30/2009
Date Data Arrived at EDR: 03/31/2009
Date Made Active in Reports: 10/23/2009
Number of Days to Update: 206

Source: N/A
Telephone: N/A
Last EDR Contact: 06/09/2022
Next Scheduled EDR Contact: 09/26/2022
Data Release Frequency: No Update Planned

HMS LOS ANGELES: HMS: Street Number List
Industrial Waste and Underground Storage Tank Sites.

Date of Government Version: 04/04/2022
Date Data Arrived at EDR: 04/05/2022
Date Made Active in Reports: 04/13/2022
Number of Days to Update: 8

Source: Department of Public Works
Telephone: 626-458-3517
Last EDR Contact: 06/29/2022
Next Scheduled EDR Contact: 10/17/2022
Data Release Frequency: Semi-Annually

LF LOS ANGELES: List of Solid Waste Facilities
Solid Waste Facilities in Los Angeles County.

Date of Government Version: 04/11/2022
Date Data Arrived at EDR: 04/12/2022
Date Made Active in Reports: 07/05/2022
Number of Days to Update: 84

Source: La County Department of Public Works
Telephone: 818-458-5185
Last EDR Contact: 07/11/2022
Next Scheduled EDR Contact: 10/24/2022
Data Release Frequency: Varies

LF LOS ANGELES CITY: City of Los Angeles Landfills
Landfills owned and maintained by the City of Los Angeles.

Date of Government Version: 01/01/2022
Date Data Arrived at EDR: 01/21/2022
Date Made Active in Reports: 04/11/2022
Number of Days to Update: 80

Source: Engineering & Construction Division
Telephone: 213-473-7869
Last EDR Contact: 07/06/2022
Next Scheduled EDR Contact: 10/24/2022
Data Release Frequency: Varies

LOS ANGELES AST: Active & Inactive AST Inventory
A listing of active & inactive above ground petroleum storage tank site locations, located in the City of Los Angeles.

Date of Government Version: 06/01/2019
Date Data Arrived at EDR: 06/25/2019
Date Made Active in Reports: 08/22/2019
Number of Days to Update: 58

Source: Los Angeles Fire Department
Telephone: 213-978-3800
Last EDR Contact: 06/14/2022
Next Scheduled EDR Contact: 10/03/2022
Data Release Frequency: Varies

LOS ANGELES CO LF METHANE: Methane Producing Landfills

This data was created on April 30, 2012 to represent known disposal sites in Los Angeles County that may produce and emanate methane gas. The shapefile contains disposal sites within Los Angeles County that once accepted degradable refuse material. Information used to create this data was extracted from a landfill survey performed by County Engineers (Major Waste System Map, 1973) as well as historical records from CalRecycle, Regional Water Quality Control Board, and Los Angeles County Department of Public Health

Date of Government Version: 01/10/2022
Date Data Arrived at EDR: 01/12/2022
Date Made Active in Reports: 04/04/2022
Number of Days to Update: 82

Source: Los Angeles County Department of Public Works
Telephone: 626-458-6973
Last EDR Contact: 07/06/2022
Next Scheduled EDR Contact: 10/24/2022
Data Release Frequency: No Update Planned

LOS ANGELES HM: Active & Inactive Hazardous Materials Inventory

A listing of active & inactive hazardous materials facility locations, located in the City of Los Angeles.

Date of Government Version: 01/13/2022
Date Data Arrived at EDR: 03/21/2022
Date Made Active in Reports: 06/15/2022
Number of Days to Update: 86

Source: Los Angeles Fire Department
Telephone: 213-978-3800
Last EDR Contact: 06/24/2022
Next Scheduled EDR Contact: 10/03/2022
Data Release Frequency: Varies

LOS ANGELES UST: Active & Inactive UST Inventory

A listing of active & inactive underground storage tank site locations and underground storage tank historical sites, located in the City of Los Angeles.

Date of Government Version: 01/13/2022
Date Data Arrived at EDR: 03/21/2022
Date Made Active in Reports: 06/15/2022
Number of Days to Update: 86

Source: Los Angeles Fire Department
Telephone: 213-978-3800
Last EDR Contact: 06/24/2022
Next Scheduled EDR Contact: 10/03/2022
Data Release Frequency: Varies

SITE MIT LOS ANGELES: Site Mitigation List

Industrial sites that have had some sort of spill or complaint.

Date of Government Version: 05/26/2021
Date Data Arrived at EDR: 07/09/2021
Date Made Active in Reports: 09/29/2021
Number of Days to Update: 82

Source: Community Health Services
Telephone: 323-890-7806
Last EDR Contact: 07/14/2022
Next Scheduled EDR Contact: 10/24/2022
Data Release Frequency: Annually

UST EL SEGUNDO: City of El Segundo Underground Storage Tank

Underground storage tank sites located in El Segundo city.

Date of Government Version: 01/21/2017
Date Data Arrived at EDR: 04/19/2017
Date Made Active in Reports: 05/10/2017
Number of Days to Update: 21

Source: City of El Segundo Fire Department
Telephone: 310-524-2236
Last EDR Contact: 07/06/2022
Next Scheduled EDR Contact: 10/24/2022
Data Release Frequency: No Update Planned

UST LONG BEACH: City of Long Beach Underground Storage Tank

Underground storage tank sites located in the city of Long Beach.

Date of Government Version: 04/22/2019
Date Data Arrived at EDR: 04/23/2019
Date Made Active in Reports: 06/27/2019
Number of Days to Update: 65

Source: City of Long Beach Fire Department
Telephone: 562-570-2563
Last EDR Contact: 07/12/2022
Next Scheduled EDR Contact: 10/31/2022
Data Release Frequency: Varies

UST TORRANCE: City of Torrance Underground Storage Tank
Underground storage tank sites located in the city of Torrance.

Date of Government Version: 04/20/2022
Date Data Arrived at EDR: 04/21/2022
Date Made Active in Reports: 07/12/2022
Number of Days to Update: 82

Source: City of Torrance Fire Department
Telephone: 310-618-2973
Last EDR Contact: 07/13/2022
Next Scheduled EDR Contact: 10/31/2022
Data Release Frequency: Semi-Annually

MADERA COUNTY:

CUPA MADERA: CUPA Facility List
A listing of sites included in the county's Certified Unified Program Agency database. California's Secretary for Environmental Protection established the unified hazardous materials and hazardous waste regulatory program as required by chapter 6.11 of the California Health and Safety Code. The Unified Program consolidates the administration, permits, inspections, and enforcement activities.

Date of Government Version: 08/10/2020
Date Data Arrived at EDR: 08/12/2020
Date Made Active in Reports: 10/23/2020
Number of Days to Update: 72

Source: Madera County Environmental Health
Telephone: 559-675-7823
Last EDR Contact: 05/12/2022
Next Scheduled EDR Contact: 08/29/2022
Data Release Frequency: Varies

MARIN COUNTY:

UST MARIN: Underground Storage Tank Sites
Currently permitted USTs in Marin County.

Date of Government Version: 09/26/2018
Date Data Arrived at EDR: 10/04/2018
Date Made Active in Reports: 11/02/2018
Number of Days to Update: 29

Source: Public Works Department Waste Management
Telephone: 415-473-6647
Last EDR Contact: 06/22/2022
Next Scheduled EDR Contact: 10/10/2022
Data Release Frequency: Semi-Annually

MENDOCINO COUNTY:

UST MENDOCINO: Mendocino County UST Database
A listing of underground storage tank locations in Mendocino County.

Date of Government Version: 09/22/2021
Date Data Arrived at EDR: 11/18/2021
Date Made Active in Reports: 11/22/2021
Number of Days to Update: 4

Source: Department of Public Health
Telephone: 707-463-4466
Last EDR Contact: 05/19/2022
Next Scheduled EDR Contact: 09/05/2022
Data Release Frequency: Annually

MERCED COUNTY:

CUPA MERCED: CUPA Facility List
CUPA facility list.

Date of Government Version: 02/15/2022
Date Data Arrived at EDR: 02/17/2022
Date Made Active in Reports: 05/11/2022
Number of Days to Update: 83

Source: Merced County Environmental Health
Telephone: 209-381-1094
Last EDR Contact: 07/07/2022
Next Scheduled EDR Contact: 08/29/2022
Data Release Frequency: Varies

MONO COUNTY:

CUPA MONO: CUPA Facility List
CUPA Facility List

Date of Government Version: 02/22/2021
Date Data Arrived at EDR: 03/02/2021
Date Made Active in Reports: 05/19/2021
Number of Days to Update: 78

Source: Mono County Health Department
Telephone: 760-932-5580
Last EDR Contact: 05/19/2022
Next Scheduled EDR Contact: 09/05/2022
Data Release Frequency: Varies

MONTEREY COUNTY:

CUPA MONTEREY: CUPA Facility Listing
CUPA Program listing from the Environmental Health Division.

Date of Government Version: 10/04/2021
Date Data Arrived at EDR: 10/06/2021
Date Made Active in Reports: 12/29/2021
Number of Days to Update: 84

Source: Monterey County Health Department
Telephone: 831-796-1297
Last EDR Contact: 07/19/2022
Next Scheduled EDR Contact: 10/10/2022
Data Release Frequency: Varies

NAPA COUNTY:

LUST NAPA: Sites With Reported Contamination
A listing of leaking underground storage tank sites located in Napa county.

Date of Government Version: 01/09/2017
Date Data Arrived at EDR: 01/11/2017
Date Made Active in Reports: 03/02/2017
Number of Days to Update: 50

Source: Napa County Department of Environmental Management
Telephone: 707-253-4269
Last EDR Contact: 05/19/2022
Next Scheduled EDR Contact: 09/05/2022
Data Release Frequency: No Update Planned

UST NAPA: Closed and Operating Underground Storage Tank Sites
Underground storage tank sites located in Napa county.

Date of Government Version: 09/05/2019
Date Data Arrived at EDR: 09/09/2019
Date Made Active in Reports: 10/31/2019
Number of Days to Update: 52

Source: Napa County Department of Environmental Management
Telephone: 707-253-4269
Last EDR Contact: 05/19/2022
Next Scheduled EDR Contact: 09/05/2022
Data Release Frequency: No Update Planned

NEVADA COUNTY:

CUPA NEVADA: CUPA Facility List
CUPA facility list.

Date of Government Version: 01/25/2022
Date Data Arrived at EDR: 01/26/2022
Date Made Active in Reports: 04/14/2022
Number of Days to Update: 78

Source: Community Development Agency
Telephone: 530-265-1467
Last EDR Contact: 07/19/2022
Next Scheduled EDR Contact: 11/07/2022
Data Release Frequency: Varies

ORANGE COUNTY:

IND_SITE ORANGE: List of Industrial Site Cleanups
Petroleum and non-petroleum spills.

Date of Government Version: 01/14/2022
Date Data Arrived at EDR: 02/03/2022
Date Made Active in Reports: 04/14/2022
Number of Days to Update: 70

Source: Health Care Agency
Telephone: 714-834-3446
Last EDR Contact: 05/02/2022
Next Scheduled EDR Contact: 08/15/2022
Data Release Frequency: Annually

LUST ORANGE: List of Underground Storage Tank Cleanups
Orange County Underground Storage Tank Cleanups (LUST).

Date of Government Version: 01/14/2022
Date Data Arrived at EDR: 02/04/2022
Date Made Active in Reports: 05/02/2022
Number of Days to Update: 87

Source: Health Care Agency
Telephone: 714-834-3446
Last EDR Contact: 05/02/2022
Next Scheduled EDR Contact: 08/15/2022
Data Release Frequency: Quarterly

UST ORANGE: List of Underground Storage Tank Facilities
Orange County Underground Storage Tank Facilities (UST).

Date of Government Version: 04/08/2022
Date Data Arrived at EDR: 05/03/2022
Date Made Active in Reports: 07/20/2022
Number of Days to Update: 78

Source: Health Care Agency
Telephone: 714-834-3446
Last EDR Contact: 05/03/2022
Next Scheduled EDR Contact: 08/15/2022
Data Release Frequency: Quarterly

PLACER COUNTY:

MS PLACER: Master List of Facilities
List includes aboveground tanks, underground tanks and cleanup sites.

Date of Government Version: 05/25/2022
Date Data Arrived at EDR: 05/26/2022
Date Made Active in Reports: 06/01/2022
Number of Days to Update: 6

Source: Placer County Health and Human Services
Telephone: 530-745-2363
Last EDR Contact: 05/25/2022
Next Scheduled EDR Contact: 09/12/2022
Data Release Frequency: Semi-Annually

PLUMAS COUNTY:

CUPA PLUMAS: CUPA Facility List
Plumas County CUPA Program facilities.

Date of Government Version: 03/31/2019
Date Data Arrived at EDR: 04/23/2019
Date Made Active in Reports: 06/26/2019
Number of Days to Update: 64

Source: Plumas County Environmental Health
Telephone: 530-283-6355
Last EDR Contact: 07/12/2022
Next Scheduled EDR Contact: 10/31/2022
Data Release Frequency: Varies

RIVERSIDE COUNTY:

LUST RIVERSIDE: Listing of Underground Tank Cleanup Sites
Riverside County Underground Storage Tank Cleanup Sites (LUST).

Date of Government Version: 03/31/2022
Date Data Arrived at EDR: 03/31/2022
Date Made Active in Reports: 04/08/2022
Number of Days to Update: 8

Source: Department of Environmental Health
Telephone: 951-358-5055
Last EDR Contact: 06/09/2022
Next Scheduled EDR Contact: 09/26/2022
Data Release Frequency: Quarterly

UST RIVERSIDE: Underground Storage Tank Tank List
Underground storage tank sites located in Riverside county.

Date of Government Version: 03/31/2022
Date Data Arrived at EDR: 03/31/2022
Date Made Active in Reports: 04/08/2022
Number of Days to Update: 8

Source: Department of Environmental Health
Telephone: 951-358-5055
Last EDR Contact: 06/09/2022
Next Scheduled EDR Contact: 09/26/2022
Data Release Frequency: Quarterly

SACRAMENTO COUNTY:

CS SACRAMENTO: Toxic Site Clean-Up List
List of sites where unauthorized releases of potentially hazardous materials have occurred.

Date of Government Version: 06/18/2021
Date Data Arrived at EDR: 09/28/2021
Date Made Active in Reports: 12/14/2021
Number of Days to Update: 77

Source: Sacramento County Environmental Management
Telephone: 916-875-8406
Last EDR Contact: 06/30/2022
Next Scheduled EDR Contact: 10/10/2022
Data Release Frequency: Quarterly

ML SACRAMENTO: Master Hazardous Materials Facility List
Any business that has hazardous materials on site - hazardous material storage sites, underground storage tanks, waste generators.

Date of Government Version: 05/04/2022
Date Data Arrived at EDR: 06/30/2022
Date Made Active in Reports: 07/05/2022
Number of Days to Update: 5

Source: Sacramento County Environmental Management
Telephone: 916-875-8406
Last EDR Contact: 06/30/2022
Next Scheduled EDR Contact: 10/10/2022
Data Release Frequency: Quarterly

SAN BENITO COUNTY:

CUPA SAN BENITO: CUPA Facility List
Cupa facility list

Date of Government Version: 04/29/2022
Date Data Arrived at EDR: 04/29/2022
Date Made Active in Reports: 05/05/2022
Number of Days to Update: 6

Source: San Benito County Environmental Health
Telephone: N/A
Last EDR Contact: 04/28/2022
Next Scheduled EDR Contact: 08/15/2022
Data Release Frequency: Varies

SAN BERNARDINO COUNTY:

PERMITS SAN BERNARDINO: Hazardous Material Permits
This listing includes underground storage tanks, medical waste handlers/generators, hazardous materials handlers, hazardous waste generators, and waste oil generators/handlers.

Date of Government Version: 05/12/2022
Date Data Arrived at EDR: 05/12/2022
Date Made Active in Reports: 05/18/2022
Number of Days to Update: 6

Source: San Bernardino County Fire Department Hazardous Materials Division
Telephone: 909-387-3041
Last EDR Contact: 04/28/2022
Next Scheduled EDR Contact: 08/15/2022
Data Release Frequency: Quarterly

SAN DIEGO COUNTY:

HMMD SAN DIEGO: Hazardous Materials Management Division Database

The database includes: HE58 - This report contains the business name, site address, business phone number, establishment 'H' permit number, type of permit, and the business status. HE17 - In addition to providing the same information provided in the HE58 listing, HE17 provides inspection dates, violations received by the establishment, hazardous waste generated, the quantity, method of storage, treatment/disposal of waste and the hauler, and information on underground storage tanks. Unauthorized Release List - Includes a summary of environmental contamination cases in San Diego County (underground tank cases, non-tank cases, groundwater contamination, and soil contamination are included.)

Date of Government Version: 02/28/2022
Date Data Arrived at EDR: 02/28/2022
Date Made Active in Reports: 05/25/2022
Number of Days to Update: 86

Source: Hazardous Materials Management Division
Telephone: 619-338-2268
Last EDR Contact: 05/31/2022
Next Scheduled EDR Contact: 09/12/2022
Data Release Frequency: Quarterly

LF SAN DIEGO: Solid Waste Facilities

San Diego County Solid Waste Facilities.

Date of Government Version: 10/27/2021
Date Data Arrived at EDR: 03/04/2022
Date Made Active in Reports: 05/31/2022
Number of Days to Update: 88

Source: Department of Health Services
Telephone: 619-338-2209
Last EDR Contact: 07/12/2022
Next Scheduled EDR Contact: 10/31/2022
Data Release Frequency: Varies

SAN DIEGO CO LOP: Local Oversight Program Listing

A listing of all LOP release sites that are or were under the County of San Diego's jurisdiction. Included are closed or transferred cases, open cases, and cases that did not have a case type indicated. The cases without a case type are mostly complaints; however, some of them could be LOP cases.

Date of Government Version: 07/22/2021
Date Data Arrived at EDR: 10/19/2021
Date Made Active in Reports: 01/13/2022
Number of Days to Update: 86

Source: Department of Environmental Health
Telephone: 858-505-6874
Last EDR Contact: 07/13/2022
Next Scheduled EDR Contact: 10/31/2022
Data Release Frequency: Varies

SAN DIEGO CO SAM: Environmental Case Listing

The listing contains all underground tank release cases and projects pertaining to properties contaminated with hazardous substances that are actively under review by the Site Assessment and Mitigation Program.

Date of Government Version: 03/23/2010
Date Data Arrived at EDR: 06/15/2010
Date Made Active in Reports: 07/09/2010
Number of Days to Update: 24

Source: San Diego County Department of Environmental Health
Telephone: 619-338-2371
Last EDR Contact: 05/25/2022
Next Scheduled EDR Contact: 09/12/2022
Data Release Frequency: No Update Planned

SAN FRANCISCO COUNTY:

CUPA SAN FRANCISCO CO: CUPA Facility Listing

Cupa facilities

Date of Government Version: 02/03/2022
Date Data Arrived at EDR: 02/04/2022
Date Made Active in Reports: 02/11/2022
Number of Days to Update: 7

Source: San Francisco County Department of Environmental Health
Telephone: 415-252-3896
Last EDR Contact: 04/28/2022
Next Scheduled EDR Contact: 08/15/2022
Data Release Frequency: Varies

LUST SAN FRANCISCO: Local Oversite Facilities

A listing of leaking underground storage tank sites located in San Francisco county.

Date of Government Version: 09/19/2008
Date Data Arrived at EDR: 09/19/2008
Date Made Active in Reports: 09/29/2008
Number of Days to Update: 10

Source: Department Of Public Health San Francisco County
Telephone: 415-252-3920
Last EDR Contact: 04/28/2022
Next Scheduled EDR Contact: 08/15/2022
Data Release Frequency: No Update Planned

UST SAN FRANCISCO: Underground Storage Tank Information
Underground storage tank sites located in San Francisco county.

Date of Government Version: 05/05/2022
Date Data Arrived at EDR: 05/06/2022
Date Made Active in Reports: 07/20/2022
Number of Days to Update: 75

Source: Department of Public Health
Telephone: 415-252-3920
Last EDR Contact: 04/28/2022
Next Scheduled EDR Contact: 08/15/2022
Data Release Frequency: Quarterly

SAN FRANCISO COUNTY:

SAN FRANCISCO MAHER: Maher Ordinance Property Listing
a listing of properties that fall within a Maher Ordinance, for all of San Francisco

Date of Government Version: 01/18/2022
Date Data Arrived at EDR: 01/20/2022
Date Made Active in Reports: 04/27/2022
Number of Days to Update: 97

Source: San Francisco Planning
Telephone: 628-652-7483
Last EDR Contact: 07/05/2022
Next Scheduled EDR Contact: 10/31/2022
Data Release Frequency: Varies

SAN JOAQUIN COUNTY:

UST SAN JOAQUIN: San Joaquin Co. UST
A listing of underground storage tank locations in San Joaquin county.

Date of Government Version: 06/22/2018
Date Data Arrived at EDR: 06/26/2018
Date Made Active in Reports: 07/11/2018
Number of Days to Update: 15

Source: Environmental Health Department
Telephone: N/A
Last EDR Contact: 06/09/2022
Next Scheduled EDR Contact: 09/26/2022
Data Release Frequency: Semi-Annually

SAN LUIS OBISPO COUNTY:

CUPA SAN LUIS OBISPO: CUPA Facility List
Cupa Facility List.

Date of Government Version: 02/15/2022
Date Data Arrived at EDR: 02/16/2022
Date Made Active in Reports: 05/13/2022
Number of Days to Update: 86

Source: San Luis Obispo County Public Health Department
Telephone: 805-781-5596
Last EDR Contact: 05/12/2022
Next Scheduled EDR Contact: 08/29/2022
Data Release Frequency: Varies

SAN MATEO COUNTY:

BI SAN MATEO: Business Inventory
List includes Hazardous Materials Business Plan, hazardous waste generators, and underground storage tanks.

Date of Government Version: 02/20/2020
Date Data Arrived at EDR: 02/20/2020
Date Made Active in Reports: 04/24/2020
Number of Days to Update: 64

Source: San Mateo County Environmental Health Services Division
Telephone: 650-363-1921
Last EDR Contact: 06/10/2022
Next Scheduled EDR Contact: 09/19/2022
Data Release Frequency: Annually

LUST SAN MATEO: Fuel Leak List
A listing of leaking underground storage tank sites located in San Mateo county.

Date of Government Version: 03/29/2019
Date Data Arrived at EDR: 03/29/2019
Date Made Active in Reports: 05/29/2019
Number of Days to Update: 61

Source: San Mateo County Environmental Health Services Division
Telephone: 650-363-1921
Last EDR Contact: 06/02/2022
Next Scheduled EDR Contact: 09/19/2022
Data Release Frequency: Semi-Annually

SANTA BARBARA COUNTY:

CUPA SANTA BARBARA: CUPA Facility Listing
CUPA Program Listing from the Environmental Health Services division.

Date of Government Version: 09/08/2011
Date Data Arrived at EDR: 09/09/2011
Date Made Active in Reports: 10/07/2011
Number of Days to Update: 28

Source: Santa Barbara County Public Health Department
Telephone: 805-686-8167
Last EDR Contact: 05/12/2022
Next Scheduled EDR Contact: 08/29/2022
Data Release Frequency: No Update Planned

SANTA CLARA COUNTY:

CUPA SANTA CLARA: Cupa Facility List
Cupa facility list

Date of Government Version: 02/14/2022
Date Data Arrived at EDR: 02/16/2022
Date Made Active in Reports: 05/12/2022
Number of Days to Update: 85

Source: Department of Environmental Health
Telephone: 408-918-1973
Last EDR Contact: 05/12/2022
Next Scheduled EDR Contact: 08/29/2022
Data Release Frequency: Varies

HIST LUST SANTA CLARA: HIST LUST - Fuel Leak Site Activity Report
A listing of open and closed leaking underground storage tanks. This listing is no longer updated by the county. Leaking underground storage tanks are now handled by the Department of Environmental Health.

Date of Government Version: 03/29/2005
Date Data Arrived at EDR: 03/30/2005
Date Made Active in Reports: 04/21/2005
Number of Days to Update: 22

Source: Santa Clara Valley Water District
Telephone: 408-265-2600
Last EDR Contact: 03/23/2009
Next Scheduled EDR Contact: 06/22/2009
Data Release Frequency: No Update Planned

LUST SANTA CLARA: LOP Listing
A listing of leaking underground storage tanks located in Santa Clara county.

Date of Government Version: 03/03/2014
Date Data Arrived at EDR: 03/05/2014
Date Made Active in Reports: 03/18/2014
Number of Days to Update: 13

Source: Department of Environmental Health
Telephone: 408-918-3417
Last EDR Contact: 05/19/2022
Next Scheduled EDR Contact: 09/05/2022
Data Release Frequency: No Update Planned

SAN JOSE HAZMAT: Hazardous Material Facilities
Hazardous material facilities, including underground storage tank sites.

Date of Government Version: 11/03/2020
Date Data Arrived at EDR: 11/05/2020
Date Made Active in Reports: 01/26/2021
Number of Days to Update: 82

Source: City of San Jose Fire Department
Telephone: 408-535-7694
Last EDR Contact: 04/28/2022
Next Scheduled EDR Contact: 08/15/2022
Data Release Frequency: Annually

SANTA CRUZ COUNTY:

CUPA SANTA CRUZ: CUPA Facility List
CUPA facility listing.

Date of Government Version: 01/21/2017
Date Data Arrived at EDR: 02/22/2017
Date Made Active in Reports: 05/23/2017
Number of Days to Update: 90

Source: Santa Cruz County Environmental Health
Telephone: 831-464-2761
Last EDR Contact: 05/12/2022
Next Scheduled EDR Contact: 08/29/2022
Data Release Frequency: Varies

SHASTA COUNTY:

CUPA SHASTA: CUPA Facility List
Cupa Facility List.

Date of Government Version: 06/15/2017
Date Data Arrived at EDR: 06/19/2017
Date Made Active in Reports: 08/09/2017
Number of Days to Update: 51

Source: Shasta County Department of Resource Management
Telephone: 530-225-5789
Last EDR Contact: 05/12/2022
Next Scheduled EDR Contact: 08/29/2022
Data Release Frequency: Varies

SOLANO COUNTY:

LUST SOLANO: Leaking Underground Storage Tanks
A listing of leaking underground storage tank sites located in Solano county.

Date of Government Version: 06/04/2019
Date Data Arrived at EDR: 06/06/2019
Date Made Active in Reports: 08/13/2019
Number of Days to Update: 68

Source: Solano County Department of Environmental Management
Telephone: 707-784-6770
Last EDR Contact: 05/25/2022
Next Scheduled EDR Contact: 09/12/2022
Data Release Frequency: Quarterly

UST SOLANO: Underground Storage Tanks
Underground storage tank sites located in Solano county.

Date of Government Version: 09/15/2021
Date Data Arrived at EDR: 09/16/2021
Date Made Active in Reports: 12/09/2021
Number of Days to Update: 84

Source: Solano County Department of Environmental Management
Telephone: 707-784-6770
Last EDR Contact: 05/25/2022
Next Scheduled EDR Contact: 09/12/2022
Data Release Frequency: Quarterly

SONOMA COUNTY:

CUPA SONOMA: Cupa Facility List
Cupa Facility list

Date of Government Version: 07/02/2021
Date Data Arrived at EDR: 07/06/2021
Date Made Active in Reports: 07/14/2021
Number of Days to Update: 8

Source: County of Sonoma Fire & Emergency Services Department
Telephone: 707-565-1174
Last EDR Contact: 06/14/2022
Next Scheduled EDR Contact: 10/03/2022
Data Release Frequency: Varies

LUST SONOMA: Leaking Underground Storage Tank Sites
A listing of leaking underground storage tank sites located in Sonoma county.

Date of Government Version: 06/30/2021
Date Data Arrived at EDR: 06/30/2021
Date Made Active in Reports: 09/24/2021
Number of Days to Update: 86

Source: Department of Health Services
Telephone: 707-565-6565
Last EDR Contact: 06/14/2022
Next Scheduled EDR Contact: 10/04/2021
Data Release Frequency: Quarterly

STANISLAUS COUNTY:

CUPA STANISLAUS: CUPA Facility List
Cupa facility list

Date of Government Version: 02/08/2022
Date Data Arrived at EDR: 02/10/2022
Date Made Active in Reports: 05/04/2022
Number of Days to Update: 83

Source: Stanislaus County Department of Ennvironmental Protection
Telephone: 209-525-6751
Last EDR Contact: 07/11/2022
Next Scheduled EDR Contact: 10/24/2022
Data Release Frequency: Varies

SUTTER COUNTY:

UST SUTTER: Underground Storage Tanks
Underground storage tank sites located in Sutter county.

Date of Government Version: 11/23/2021
Date Data Arrived at EDR: 11/29/2021
Date Made Active in Reports: 02/11/2022
Number of Days to Update: 74

Source: Sutter County Environmental Health Services
Telephone: 530-822-7500
Last EDR Contact: 05/25/2022
Next Scheduled EDR Contact: 09/12/2022
Data Release Frequency: Semi-Annually

TEHAMA COUNTY:

CUPA TEHAMA: CUPA Facility List
Cupa facilities

Date of Government Version: 01/13/2021
Date Data Arrived at EDR: 01/14/2021
Date Made Active in Reports: 04/06/2021
Number of Days to Update: 82

Source: Tehama County Department of Environmental Health
Telephone: 530-527-8020
Last EDR Contact: 04/28/2022
Next Scheduled EDR Contact: 08/15/2022
Data Release Frequency: Varies

TRINITY COUNTY:

CUPA TRINITY: CUPA Facility List
Cupa facility list

Date of Government Version: 04/18/2022
Date Data Arrived at EDR: 04/19/2022
Date Made Active in Reports: 07/12/2022
Number of Days to Update: 84

Source: Department of Toxic Substances Control
Telephone: 760-352-0381
Last EDR Contact: 07/13/2022
Next Scheduled EDR Contact: 10/31/2022
Data Release Frequency: Varies

TULARE COUNTY:

CUPA TULARE: CUPA Facility List
Cupa program facilities

Date of Government Version: 04/26/2021
Date Data Arrived at EDR: 04/28/2021
Date Made Active in Reports: 07/13/2021
Number of Days to Update: 76

Source: Tulare County Environmental Health Services Division
Telephone: 559-624-7400
Last EDR Contact: 07/12/2022
Next Scheduled EDR Contact: 08/15/2022
Data Release Frequency: Varies

TUOLUMNE COUNTY:

CUPA TUOLUMNE: CUPA Facility List
Cupa facility list

Date of Government Version: 04/23/2018
Date Data Arrived at EDR: 04/25/2018
Date Made Active in Reports: 06/25/2018
Number of Days to Update: 61

Source: Divison of Environmental Health
Telephone: 209-533-5633
Last EDR Contact: 07/12/2022
Next Scheduled EDR Contact: 10/31/2022
Data Release Frequency: Varies

VENTURA COUNTY:

BWT VENTURA: Business Plan, Hazardous Waste Producers, and Operating Underground Tanks
The BWT list indicates by site address whether the Environmental Health Division has Business Plan (B), Waste Producer (W), and/or Underground Tank (T) information.

Date of Government Version: 03/28/2022
Date Data Arrived at EDR: 04/28/2022
Date Made Active in Reports: 07/15/2022
Number of Days to Update: 78

Source: Ventura County Environmental Health Division
Telephone: 805-654-2813
Last EDR Contact: 07/18/2022
Next Scheduled EDR Contact: 10/31/2022
Data Release Frequency: Quarterly

LF VENTURA: Inventory of Illegal Abandoned and Inactive Sites
Ventura County Inventory of Closed, Illegal Abandoned, and Inactive Sites.

Date of Government Version: 12/01/2011
Date Data Arrived at EDR: 12/01/2011
Date Made Active in Reports: 01/19/2012
Number of Days to Update: 49

Source: Environmental Health Division
Telephone: 805-654-2813
Last EDR Contact: 06/22/2022
Next Scheduled EDR Contact: 10/10/2022
Data Release Frequency: No Update Planned

LUST VENTURA: Listing of Underground Tank Cleanup Sites
Ventura County Underground Storage Tank Cleanup Sites (LUST).

Date of Government Version: 05/29/2008
Date Data Arrived at EDR: 06/24/2008
Date Made Active in Reports: 07/31/2008
Number of Days to Update: 37

Source: Environmental Health Division
Telephone: 805-654-2813
Last EDR Contact: 05/04/2022
Next Scheduled EDR Contact: 08/22/2022
Data Release Frequency: No Update Planned

MED WASTE VENTURA: Medical Waste Program List
To protect public health and safety and the environment from potential exposure to disease causing agents, the Environmental Health Division Medical Waste Program regulates the generation, handling, storage, treatment and disposal of medical waste throughout the County.

Date of Government Version: 03/28/2022
Date Data Arrived at EDR: 04/28/2022
Date Made Active in Reports: 07/15/2022
Number of Days to Update: 78

Source: Ventura County Resource Management Agency
Telephone: 805-654-2813
Last EDR Contact: 07/18/2022
Next Scheduled EDR Contact: 10/31/2022
Data Release Frequency: Quarterly

UST VENTURA: Underground Tank Closed Sites List
Ventura County Operating Underground Storage Tank Sites (UST)/Underground Tank Closed Sites List.

Date of Government Version: 02/28/2022
Date Data Arrived at EDR: 03/08/2022
Date Made Active in Reports: 06/02/2022
Number of Days to Update: 86

Source: Environmental Health Division
Telephone: 805-654-2813
Last EDR Contact: 06/07/2022
Next Scheduled EDR Contact: 09/19/2022
Data Release Frequency: Quarterly

YOLO COUNTY:

UST YOLO: Underground Storage Tank Comprehensive Facility Report
Underground storage tank sites located in Yolo county.

Date of Government Version: 03/24/2022
Date Data Arrived at EDR: 03/31/2022
Date Made Active in Reports: 06/27/2022
Number of Days to Update: 88

Source: Yolo County Department of Health
Telephone: 530-666-8646
Last EDR Contact: 06/22/2022
Next Scheduled EDR Contact: 10/10/2022
Data Release Frequency: Annually

YUBA COUNTY:

CUPA YUBA: CUPA Facility List
CUPA facility listing for Yuba County.

Date of Government Version: 01/26/2022
Date Data Arrived at EDR: 01/27/2022
Date Made Active in Reports: 04/14/2022
Number of Days to Update: 77

Source: Yuba County Environmental Health Department
Telephone: 530-749-7523
Last EDR Contact: 07/19/2022
Next Scheduled EDR Contact: 11/07/2022
Data Release Frequency: Varies

OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

CT MANIFEST: Hazardous Waste Manifest Data
Facility and manifest data. Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a tsd facility.

Date of Government Version: 12/03/2021
Date Data Arrived at EDR: 02/11/2022
Date Made Active in Reports: 05/06/2022
Number of Days to Update: 84

Source: Department of Energy & Environmental Protection
Telephone: 860-424-3375
Last EDR Contact: 05/09/2022
Next Scheduled EDR Contact: 08/22/2022
Data Release Frequency: No Update Planned

NJ MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 12/31/2018
Date Data Arrived at EDR: 04/10/2019
Date Made Active in Reports: 05/16/2019
Number of Days to Update: 36

Source: Department of Environmental Protection
Telephone: N/A
Last EDR Contact: 06/28/2022
Next Scheduled EDR Contact: 10/17/2022
Data Release Frequency: Annually

NY MANIFEST: Facility and Manifest Data
Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a TSD facility.

Date of Government Version: 01/01/2019
Date Data Arrived at EDR: 10/29/2021
Date Made Active in Reports: 01/19/2022
Number of Days to Update: 82

Source: Department of Environmental Conservation
Telephone: 518-402-8651
Last EDR Contact: 04/28/2022
Next Scheduled EDR Contact: 08/08/2022
Data Release Frequency: Quarterly

PA MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 06/30/2018
Date Data Arrived at EDR: 07/19/2019
Date Made Active in Reports: 09/10/2019
Number of Days to Update: 53

Source: Department of Environmental Protection
Telephone: 717-783-8990
Last EDR Contact: 07/06/2022
Next Scheduled EDR Contact: 10/24/2022
Data Release Frequency: Annually

RI MANIFEST: Manifest information
Hazardous waste manifest information

Date of Government Version: 12/31/2020
Date Data Arrived at EDR: 11/30/2021
Date Made Active in Reports: 02/18/2022
Number of Days to Update: 80

Source: Department of Environmental Management
Telephone: 401-222-2797
Last EDR Contact: 05/16/2022
Next Scheduled EDR Contact: 08/29/2022
Data Release Frequency: Annually

WI MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 05/31/2018
Date Data Arrived at EDR: 06/19/2019
Date Made Active in Reports: 09/03/2019
Number of Days to Update: 76

Source: Department of Natural Resources
Telephone: N/A
Last EDR Contact: 06/03/2022
Next Scheduled EDR Contact: 09/19/2022
Data Release Frequency: Annually

Oil/Gas Pipelines
Source: Endeavor Business Media
Petroleum Bundle (Crude Oil, Refined Products, Petrochemicals, Gas Liquids (LPG/NGL), and Specialty Gases (Miscellaneous)) N = Natural Gas Bundle (Natural Gas, Gas Liquids (LPG/NGL), and Specialty Gases (Miscellaneous)). This map includes information copyrighted by Endeavor Business Media. This information is provided on a best effort basis and Endeavor Business Media does not guarantee its accuracy nor warrant its fitness for any particular purpose. Such information has been reprinted with the permission of Endeavor Business Media.

Electric Power Transmission Line Data
Source: Endeavor Business Media
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Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

AHA Hospitals:
Source: American Hospital Association, Inc.
Telephone: 312-280-5991
The database includes a listing of hospitals based on the American Hospital Association's annual survey of hospitals.

Medical Centers: Provider of Services Listing
Source: Centers for Medicare & Medicaid Services
Telephone: 410-786-3000
A listing of hospitals with Medicare provider number, produced by Centers of Medicare & Medicaid Services, a federal agency within the U.S. Department of Health and Human Services.

Nursing Homes
Source: National Institutes of Health
Telephone: 301-594-6248
Information on Medicare and Medicaid certified nursing homes in the United States.

Public Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on elementary and secondary public education in the United States. It is a comprehensive, annual, national statistical database of all public elementary and secondary schools and school districts, which contains data that are comparable across all states.

Private Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on private school locations in the United States.
Daycare Centers: Licensed Facilities
Source: Department of Social Services
Telephone: 916-657-4041

Flood Zone Data: This data was obtained from the Federal Emergency Management Agency (FEMA). It depicts 100-year and 500-year flood zones as defined by FEMA. It includes the National Flood Hazard Layer (NFHL) which incorporates Flood Insurance Rate Map (FIRM) data and Q3 data from FEMA in areas not covered by NFHL.
Source: FEMA
Telephone: 877-336-2627
Date of Government Version: 2003, 2015

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002, 2005 and 2010 from the U.S. Fish and Wildlife Service.

State Wetlands Data: Wetland Inventory
Source: Department of Fish and Wildlife
Telephone: 916-445-0411

STREET AND ADDRESS INFORMATION

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Appendix D

County of Riverside DEH HMMD Records

County of Riverside

DEPARTMENT OF ENVIRONMENTAL HEALTH

Hazardous Materials Management Branch

Change of Status Form

Date: 8/11/2021 Designated Employee: Jessica Zelon Facility ID: FA0052716 CERS ID: 10779811

Enter all information to be changed

	Current/New Information
DBA/Facility Name	RCWD 50 Acre Ranch
Facility Address	37155 De Portola Rd Temecula CA 92592
Facility Phone	
Billing Contact Name	
Billing Contact's Mailing Address	☐ Same
Owner Name	
Owner Phone	

RECD AUG 12 2021

Type of change requested

Additions (New)

☐ Facility ☐ Program ☐ Owner

☐ Billing invoice needed

Deletions

☐ | Facility is OOB | OOB FA ID: _____

OOB Facility DBA/Name: _____

Date Verified: _____

☑ | Remove program PR# 0079698

Other

☐ Change of mailing address only

☐ Change of physical address

☐ Facility moved

☐ DBA/Name Change only

☐ UST: Separate COS form (see attachment)

Program Information

☑ Disclosure: Current level Special Handler
Revised level N/A

☐ Generator: ☐ RCRA-LQG
# of employees _____
EPA ID _____

☐ APSA
Current level N/A
Revised level N/A

☐ CalARP
Current level N/A
Revised level N/A
Assign business surcharge ☐ Yes ☐ No

☐ Tiered Permitting
Current level N/A
Revised level N/A

Enrolled 8/12/21 JG

Comments: Facility is no longer in APSA as they have removed 3 of their older generators from this site. They no longer need an SPCC plan for the site. Only the 250 gallon propane tank remains. Photo evidence will be added to file for OOB of APSA program.

1. Supervisor	2. HAB Admin (OOBs Only)	3. Accounting	4. OA/Ereporting admin	5. File (OA)
MS 8/12/2021	MS 8/12/2021	JG 8-13-21	LW 8/23/2021	KB 8/24/21
Initials Date	Initials Date	Initials Date	Initials Date	Initials Date

EPO-209-18HMMB(Rev07/18)

County of Riverside

DEPARTMENT OF ENVIRONMENTAL HEALTH

Hazardous Materials Management Branch

Change of Status Form

Date: 2/25/2022 **Designated Employee:** Garcia **Facility ID:** FA0052716 **CERS ID:** 10779811

Enter all information to be changed

	Current/New Information
DBA/Facility Name	RCWD 50 Acre Ranch
Facility Address	37155 De Portola Rd
Facility Phone	Temecula, CA 92592
Billing Contact Name	COPY
Billing Contact's * Mailing Address	☐ Same
Owner Name	
Owner Phone *	

Type of change requested

Additions (New)

☐ Facility ☐ Program ☐ Owner

☐ Billing invoice needed

Deletions

☑ Facility is OOB | OOB FA ID: FA0052716

OOB Facility DBA/Name: RCWD 50 Acre Ranch

Date Verified: 2/17/22

☐ Remove program PR# _____

Other

☐ Change of mailing address only

☐ Change of physical address

☐ Facility moved

☐ DBA/Name Change only

☐ UST: Separate COS form (see attachment)

Program Information

☐ Disclosure: Current level N/A
Revised level N/A

☐ Generator: ☐ RCRA-LQG
#of employees _____
EPA ID _____

☐ APSA
Current level N/A
Revised level N/A

☐ CalARP
Current level N/A
Revised level N/A
Assign business surcharge ☐ Yes ☐ No

☐ Tiered Permitting
Current level N/A
Revised level N/A

Comments: Please OOB facility. Chemicals removed from site.

1. Supervisor	2. HAB Admin (OOBs Only)	3. Accounting	4. OA/Ereporting admin	5. File (OA)
MS 2/25/2022	MS 2/25/2022	[illegible] 3/1/22	LRV 3/22/2022	[illegible] 3/31/22
Initials Date	Initials Date	Initials Date	Initials Date	Initials Date

County of Riverside

DEPARTMENT OF ENVIRONMENTAL HEALTH

Hazardous Materials Management Branch
Change of Status Form

Date: 9/23/2020 Designated Employee: Jessica Zelon Facility ID: FA0052716 CERS ID: 10779811

Enter all information to be changed

	Current/New Information
DBA/Facility Name	RCWD 50-Acre Ranch
Facility Address	37115 De Portola Rd.
	Temecula
Facility Phone	
Billing Contact Name	
Billing Contact's Mailing Address	☐ Same
Owner Name	
Owner Phone	

Type of change requested

Additions (New)

☐ Facility ☐ Program ☐ Owner
☐ Billing invoice needed

Deletions

☐ Facility is OOB | OOB FA ID: _____
OOB Facility DBA/Name: _____
Date Verified: _____
☐ Remove program PR# _____

Other

☐ Change of mailing address only
☐ Change of physical address
☐ Facility moved
☐ DBA/Name Change only

RECEIVED
OCT 09 2020
County of Riverside
Department of Environmental Health
EPO Division

☐ UST: Separate COS form (see attachment)

Comments 9/23/20 RG

Program Information

☐ Disclosure: Current level N/A
Revised level N/A

☐ Generator: ☐ RCRA-LQG
#of employees _____
EPA ID _____

☐ APSA
Current level N/A
Revised level N/A

☐ CalARP
Current level N/A
Revised level N/A
Assign business surcharge ☐ Yes ☐ No

☐ Tiered Permitting
Current level N/A
Revised level N/A

Comments: Address is really 37155 De Portola (confirmed through inspection) but it is in Envision as 27115 De Portola. (PR0079698-APSA and PR00763490-Disclosure)

1. Supervisor	2. HAB Admin (OOBs Only)	3. Accounting	4. OA/Ereporting admin	5. File (OA)
EW 9/23/2020	------	SW 9/25/2020	LZP 11/19/2020	10/30/20
Initials Date	Initials Date	Initials Date	Initials Date	Initials Date

County of Riverside

DEPARTMENT OF ENVIRONMENTAL HEALTH

Hazardous Materials Management Branch

Change of Status Form

Date: 8/14/2020 0328 8 1 0VA

Designated Employee: Jessica Zelon

Facility ID: FA0052716

CERS ID: 10779811

Enter all information to be changed

	Current/New Information
DBA/Facility Name	RCWD 50-Acre Ranch
Facility Address	27115 De Portola Rd.
Facility Phone	Temecula CA 92592
Billing Contact Name	951-296-6900
Billing Contact's Mailing Address	Tom Greene ☐ Same
Owner Name	
Owner Phone	

COPY

Type of change requested

Additions (New)

☐ Facility ☑ Program ☐ Owner

☑ Billing invoice needed

Invoice Attached

Deletions

☐ | Facility is OOB | OOB FA ID: _____

OOB Facility DBA/Name: _____

Date Verified: _____

☐ | Remove program PR# _____

Other

☐ Change of mailing address only

☐ Change of physical address

☐ Facility moved

☐ DBA/Name Change only

☐ UST: Separate COS form (see attachment)

Program Information

☐ Disclosure: Current level N/A

Revised level N/A

☐ Generator: ☐ RCRA-LQG

#of employees _____

EPA ID _____

☑ APSA PR79698

Current level Tier I

Revised level N/A

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☐ CalARP

Current level N/A

Revised level N/A

Assign business surcharge ☐ Yes ☐ No

☐ Tiered Permitting

Current level N/A

Revised level N/A

Comments: Facility reported via CERS that they have added diesel generators with 3000 gallons of fuel combined.

ANNIV 12/31 A2/D5 8/14/20 eg

1. Supervisor	2. HAB Admin (OOBs Only)	3. Accounting	4. OA/Ereporting admin	5. File (OA)
CN 8/14/2020	———	SW 8/21/2020	[illegible] 9/1/2020	9/3/20
Initials Date	Initials Date	Initials Date	Initials Date	Initials Date

EPO-209-18HMMB(Rev07/18)

County of Riverside Department of Environmental Health
Certified Unified Program Agency
PO Box 7909, Riverside, CA 92513
Phone: (951) 358-5055

Aboveground Petroleum Storage Act Inspection Report – Tiers I/II/CE

Facility Name: RCWD SO Acre Ranch	Contact Name: —		Inspection Date: 9/2/20
Address: 27115 De Portola Temecula	Telephone: [illegible]		Permit #: PR79698
Inspector Name: Jessica Zelon	Inspection Type: ☒ Routine ☐ Reinspection	Program Level: ☒ Tier I ☐ Tier II ☐ Cond. Exempt	
SPCC Plan Date: 8/4/20	Last Plan Amendment: N/A	Total Storage Capacity: 3000 gal	CERS ID: 10779811

Violations checked below are for section(s) of California Health & Safety Code (HSC), California Code of Regulations (CCR), Code of Federal Regulations (CFR), or Riverside County Ordinance (RCO) indicated in italics. References to CFR are made in accordance with HSC 25270.4.5(a) for this program. Items checked "Y" are in compliance. Items checked "N" are violations and must be corrected. "N/A" is not applicable.

Y	N	VIOL #	VIOLATION DESCRIPTION
			General Requirements (All facility levels)
☑	☐	4010032	Tank facility statement or HMBP submitted annually. *HSC 25270.6(a)(1)-(a)(2)*
☑	☐	4010033	APSA permit fee paid. *HSC 25270.6(b)*
☑	☐	4010034	Active APSA permit. *HSC 25404.1*
☑	☐	4020001	Adequate training provided to personnel as detailed in 40 CFR 112.7(f)(1). *40 CFR 112.7(f)(1)*
N/A	☐	4040001	Spills of 1 barrel (42 gallons) or more reported. *HSC 25270.8*
			Operational Requirements (Tier I/II)
☑	☐	4030010	Sized secondary containment requirements met. *40 CFR 112.8(c)(2)*
☑	☐	4030037	General containment requirements met. *40 CFR 112.7(c)*
☑	☐	4030013	Diked areas sufficiently impervious to oil. *40 CFR 112.8(c)(2)*
☑	☐	4030021	Leaks immediately addressed & oil promptly removed. *40 CFR 112 8(c)(10)*
			Conditionally Exempt Facility Requirements
N/A	☐	4030032	Facility meets all conditional exemption requirements. *HSC 25270.4.5(b)*
			Tanks in Underground Areas
N/A	☐	4030043	Secondary containment & leak detection provided if piping connected to a tank in an underground area cannot be directly viewed on all sides. *HSC 25270.2(o)(1)(C)(iv)(III)*
N/A	☐	4030044	Tanks in underground areas less than 55 gallons meet exclusions. *HSC 25270.2(a)(8)*

Y	N	VIOL #	VIOLATION DESCRIPTION
			SPCC Requirements
			Tier I and II
☑	☐	4010001	SPCC Plan prepared. *40 CFR 112.3, 112.6*
N/A	☐	4010009	5-year review of SPCC Plan or template completed and documented. *40 CFR 112.5(b)*
N/A	☐	4010010	SPCC Plan or template amendments made appropriately within 6 months. *40 CFR 112.5(a)-(b)*
☑	☐	4010021	Written inspection & testing procedures available. Inspections/ testing conducted & records signed & kept for 3 yrs. *40 CFR 112.7(e)*
☑	☐	4010035	Facility meets tier I/II requirements. *40 CFR 112.3(g)*
			Tier I
☑	☐	4010047	SPCC Plan or template certified by management. *40 CFR 112.6(a)(1)*
☑	☐	4010008	SPCC Plan or template available onsite if staffed at least 4 hrs/day or nearest field office if not attended. *40 CFR 112.3(e)(1)*
N/A	☐	4010048	Technical amendments properly certified. *40 CFR 112.6(a)(2)*
			Tiers II
N/A	☐	4010050	PE certified Plan if alternative measures used e.g environmental equivalence, impracticability etc. *40 CFR 112.6(b)(3), 112.6(b)(4)(iii)*
N/A	☐	4010051	PE attestations complete, if necessary. *40 CFR 112.6(b)(4)(i)*
N/A	☐	4010052	Technical amendments properly certified. *40 CFR 112.6(b)(2), 112.6(b)(2)(i)*

Routine inspection conducted following addition of generator to site location.

No violations observed.

☑ No violations observed during inspection

☐ This report shall serve as a notice to comply for minor violations and a notice of violation for all other violations.

You are hereby ordered to correct all noted violations within _____ days, or according to individual correction summaries provided, whichever is less.

Inspector signature: [signature]

Agent signature: Thomas Greene as Agent for RCWD

Agent Name: Thomas A Greene as Agent for RCWD

Agent Title: Operations Analyst

County of Riverside
DEPARTMENT OF ENVIRONMENTAL HEALTH
HAZARDOUS MATERIALS MANAGEMENT BRANCH
CERTIFIED UNIFIED PROGRAM AGENCY

Hazardous Materials Disclosure Inspection Report

FACILITY NAME: RCWD 50-Acre Ranch						DATE: 9/2/2020
FACILITY ADDRESS: 27115 De Portola Rd, Temecula, CA 92592			FACILITY DESCRIPTION: Level II			
BILLING ADDRESS: PO BOX 9017, Temecula, CA 92589-9017			PERMIT HOLDER: Rancho California Water District		E-MAIL:	
PERMIT #: PR0076349	EXPIRATION DATE: 12/31/2020	CONSENT GRANTED BY: Tom Greene - Operations Analyst	SERVICE: Routine inspection	FACILITY PHONE #:	CERS ID: 10779811	INSPECTOR NAME: Jessica Zelon

Violations checked below are for section(s) of California Health & Safety Code (HSC), California Code of Regulations (CCR), Code of Federal Regulations (CFR), or Riverside County Ordinance (RCO).

○ IN = In compliance ○ OUT = Out of compliance ○ COS = Corrected on-site ○ NA = Not Applicable

	IN	OUT	COS	NA
PROGRAM ADMINISTRATION				
1. Current permit issued/posted	(In)	Out	COS	N/A
2. HMBP established and implemented	(In)	Out	COS	N/A
3. HMBP complete and submitted	(In)	Out	COS	N/A
4. HMBP reviewed/recertified annually	(In)	Out	COS	N/A
5. Business plan updated within 30 days when required	In	Out	COS	(N/A)
6. HMBP readily available	(In)	Out	COS	N/A
HMBP COMPONENTS				
7. Hazardous materials inventory complete/submitted	(In)	Out	COS	N/A
8. Emergency response plan and procedures complete/submitted	(In)	Out	COS	N/A
9. Business Activities Page and/or Business Owner/Operator Identification Page complete/submitted	(In)	Out	COS	N/A
10. Site map complete/submitted	(In)	Out	COS	N/A
TRAINING PROGRAM				
11. Training Program not included or is not adequate	(In)	Out	COS	N/A
12. Training program documentation	(In)	Out	COS	N/A
RELEASE REPORTING				
13. Release not reported to CalOES or CUPA	In	Out	COS	(N/A)
REMOTE/UNSTAFFED FACILITIES				
14. Remote unstaffed - HMBP complete/submitted	In	Out	COS	(N/A)
FACILITY OPERATIONS				
15. NFPA 704 sign(s) properly posted	(In)	Out	COS	N/A
16. Hazmat storage area properly posted	(In)	Out	COS	N/A
17. Emergency equipment properly posted, maintained, and accessible	(In)	Out	COS	N/A
18. SDS available or maintained on site	(In)	Out	COS	N/A
19. Pesticide storage area(s) posted	In	Out	COS	(N/A)
20. Materials stored to minimize the possibility of release	(In)	Out	COS	N/A
21. Handling storage area secure	(In)	Out	COS	N/A
22. Separation of incompatible materials	(In)	Out	COS	N/A
23. Container(s) properly labeled	(In)	Out	COS	N/A
24. Emergency contact information posted in a conspicuous location	(In)	Out	COS	N/A
25. Unsafe conditions observed	(In)	Out	COS	N/A

COPY

Overall Inspection Comments

Routine inspection conducted in conjunction with APSA inspection.

RCWD 50 Acre Ranch
37155 De Portola Rd
Temecula CA 92592
PR0079698
APSA

Zelon, Jessica

From: Thomas Greene
Sent: Tuesday, August 3, 2021 2:40 PM
To: Zelon, Jessica
Subject: RCWD's 50 Acres Ranch and VDC changes
Attachments: 20210728_100222.jpg

COPY

Hi Jessica,

We sold off 4 of our older generators so the 3 at 50 acres have been removed and we don't need a SPCC plan for the site anymore. Only the 250-gal. propane tank remains. Attached photo of the three empty pvc containment berms.

At the nearby VDC we removed 3 of the newer generators to greener pastures so it also is out of the SPCC business. Just one left at this location.

The fourth older generator was at our treatment plant, which I will work on next.

Have a great day!

Tom Greene | Operations Analyst
Working for Our Community
970 (Working out of office during COVID19 Crisis)
353
m | ranchowater.com

Zelon, Jessica

From: Thomas Greene <
Sent: Tuesday, August 3, 2021 4:33 PM
To: Zelon, Jessica
Subject: RE: RCWD's 50 Acres Ranch and VDC changes

We sold them at auction to buyers who cannot use them in the state. They had to sign documents attesting to the fact that they know that they should check with their air district prior to sale, to ensure they can get permitted. I don't know who the buyers are, personally.

This was to save the earth from greenhouse gases and other pollutants, since these emergency generators, which were perfectly legal 5 years ago, now are a menace to society. They have an average of 8 hours per year for each engine, less than 400 hours total, so they are basically brand new. So the state can say we are cleaner. BUT, now they will be taken, probably overseas, where they will possibly be used 24x7 and cause more CO2, but that won't affect our air district's numbers. Kind of ironic, isn't it? Cost $250K each new and sold for $20K, which is higher than we expected. At least it might help some third world town, or possibly China, light up their houses or pump water, which is a good thing.

Tom Greene

-----Original Message-----
From: Zelon, Jessica <
Sent: Tuesday, August 3. 2021 4:19 PM
To: Thomas Greene <
Subject: Re: RCWD's 50 Acres Ranch and VDC changes

Ok so two site out of APSA correct. Did you sell them in county or out?

Sent from my iPhone

> On Aug 3, 2021, at 2:40 PM, Thomas Green wrote:
>
> Hi Jessica,
>
> We sold off 4 of our older generators so the 3 at 50 acres have been removed and we don't need a SPCC plan for the site anymore. Only the 250-gal. propane tank remains. Attached photo of the three empty pvc containment berms.
>
> At the nearby VDC we removed 3 of the newer generators to greener pastures so it also is out of the SPCC business. Just one left at this location.
>
> The fourth older generator was at our treatment plant, which I will work on next.
>
> Have a great day!
>
> [cid:image001.png@01D59EC4.303E8540]<https://urldefense.com/v3/__http:
> //https://urldefense.com/v3/__http://www.ranchowater.com/__;!!JTyGX330
> HN5x6Ko!XUMNwuXQRCOpZjnDN1alMFY2syC__;!!JTyGX330HN5x6Ko!RISXCVtxc1QAcs
> UjdOXluOe7ikOBxJUoN2u83ASBfXNr8S-JguFTOteK0DRc-A$
> 8xNkhwtV-e9uFn__2qi17KyOc7SE2-hO-WA$>

> Tom Greene | Operations Analyst
> RANCHO WATER | Working for Our Community

0

'0 (Working out of office during COVID19

> Crisis)

;3

> Gr

> https://urldefense.com/v3/__http://ranchowater.com__;!!JTyGX330HN5x6Ko
> !RISXCVtxc1QAcsUjd0XluOe7ikOBxJUoN2u83ASBfXNr8S-JguFTOtcl1PTMTw$
> <https://urldefense.com/v3/__http://www.ranchowater.com
> /__;!!JTyGX330HN5x6Ko!XUMNwuXQRCOpZjnDN1alMFY2syC8xNkhwtV-e9uFn__2qi17
> KyOc7SE2-hO-WA$>
> [cid:image002.png@01D59EC4.303E8540]<https://urldefense.com/v3/__https
> ://https://urldefense.com/v3/__http://www.facebook.com/ranchowater__;!
> !JTyGX330HN5x6Ko!XUMNwuXQRCOpZjnDN1__;!!JTyGX330HN5x6Ko!RISXCVtxc1QAcs
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> alMFY2syC8xNkhwtV-e9uFn__2qi17KyOc7SF770oeCA$>[cid:image003.png@01D59E
> C4.303E8540]<https://urldefense.com/v3/__https://twitter.com/RanchoWat
> er__;!!JTyGX330HN5x6Ko!XUMNwuXQRCOpZjnDN1alMFY2syC8xNkhwtV-e9uFn__2qi1
> 7KyOc7SHqes2TOA$>[cid:image004.png@01D59EC4.303E8540]<https://urldefen
> se.com/v3/__https://urldefen__;!!JTyGX330HN5x6Ko!RISXCVtxc1QAcsUjd0Xlu
> Oe7ikOBxJUoN2u83ASBfXNr8S-JguFTOtdZ9ZybBQ$
> https://urldefense.com/v3/__http://se.com/v3/__https:/*www.instagram.c
> om/ranchowaterdistrict/__;!!JTyGX33__;Lw!!JTyGX330HN5x6Ko!RISXCVtxc1QA
> csUjd0XluOe7ikOBxJUoN2u83ASBfXNr8S-JguFTOtdcTX9HMw$
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> w$>
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County of Riverside California
<https://urldefense.com/v3/__http://www.countyofriverside.us/__;!!JTyGX330HN5x6Ko!RISXCVtxc1QAcsUjd0XluOe7ikOBxJUoN2u83ASBfXNr8S-JguFTOteki__31Q$ >

County of Riverside
DEPARTMENT OF ENVIRONMENTAL HEALTH

HAZARDOUS MATERIALS MANAGEMENT BRANCH
CERTIFIED UNIFIED PROGRAM AGENCY

Hazardous Materials Disclosure Inspection Report

FACILITY NAME						DATE
RCWD 50-Acre Ranch						2/17/2022
FACILITY ADDRESS			FACILITY DESCRIPTION			
37155 De Portola Rd, Temecula, CA 92592			Level II			
BILLING ADDRESS		PERMIT HOLDER		E-MAIL		
PO BOX 9017, Temecula, CA 92589-9017		Rancho California Water District				
PERMIT #	EXPIRATION DATE	CONSENT GRANTED BY	SERVICE	FACILITY PHONE #	CERS ID	INSPECTOR
PR0076349	12/31/2021	Tom Green - Ops Analyst	Routine inspection		10779811	Jonathan Lance

Violations checked below are for section(s) of California Health & Safety Code (HSC), California Code of Regulations (CCR), Code of Federal Regulations (CFR), or Riverside County Ordinance (RCO).

○ IN = In compliance ○ OUT = Out of compliance ○ COS = Corrected on-site ○ NA = Not Applicable

	IN	OUT	COS	NA
PROGRAM ADMINISTRATION				
1. Current permit issued/posted	In	Out	COS	(N/A)
2. HMBP established and implemented	In	Out	COS	(N/A)
3. HMBP complete and submitted	In	Out	COS	(N/A)
4. HMBP reviewed/recertified annually	In	Out	COS	(N/A)
5. Business plan updated within 30 days when required	In	Out	COS	(N/A)
6. HMBP readily available	In	Out	COS	(N/A)
HMBP COMPONENTS				
7. Hazardous materials inventory complete/submitted	In	Out	COS	(N/A)
8. Emergency response plan and procedures complete/submitted	In	Out	COS	(N/A)
9. Business Activities Page and/or Business Owner/Operator Identification Page complete/submitted	In	Out	COS	(N/A)
10. Site map complete/submitted	In	Out	COS	(N/A)
TRAINING PROGRAM				
11. Training Program not included or is not adequate	In	Out	COS	(N/A)
12. Training not provided and/or documented	In	Out	COS	(N/A)
RELEASE REPORTING				
13. Release not reported to CalOES or CUPA	In	Out	COS	(N/A)
REMOTE/UNSTAFFED FACILITIES				
14. Remote unstaffed - HMBP complete/submitted	In	Out	COS	(N/A)
FACILITY OPERATIONS				
15. NFPA 704 sign(s) properly posted	In	Out	COS	(N/A)
16. Emergency contact information posted in a conspicuous location	In	Out	COS	(N/A)
17. Hazmat storage area properly posted	In	Out	COS	(N/A)
18. Emergency equipment properly posted, maintained, and accessible	In	Out	COS	(N/A)
19. SDS available or maintained on site	In	Out	COS	(N/A)
20. Materials stored to minimize the possibility of release	In	Out	COS	(N/A)
21. Handling storage area secure	In	Out	COS	(N/A)
22. Separation of incompatible materials	In	Out	COS	(N/A)
23. Container(s) properly labeled	In	Out	COS	(N/A)
24. Unsafe conditions observed	In	Out	COS	(N/A)
25. Pesticide storage area(s) posted	In	Out	COS	(N/A)

COPY

County of Riverside
DEPARTMENT OF ENVIRONMENTAL HEALTH
HAZARDOUS MATERIALS MANAGEMENT BRANCH
CERTIFIED UNIFIED PROGRAM AGENCY

Hazardous Materials Disclosure Inspection Report

FACILITY NAME	DATE	PR #
RCWD 50-Acre Ranch	2/17/2022	PR0076349

Overall Inspection Comments

Facility removed the propane and diesel generators from the site. Facility will be taken out of permit.

Signatures

Tom Greene
Ops Analyst
02/17/2022

Jonathan Lance
Environmental Health Specialist
02/17/2022

Note: If at time of re-inspection all violations have not been corrected, this facility may be billed for additional inspections at the current hourly rate per Riverside County Ordinance 640.

Appendix E

Qualifications of Environmental Professional

JESSICA HIMEBAUCH

SENIOR GEOLOGIST
LA METRO REGION

AREAS OF EXPERTISE

Phase I and II Environmental Site Assessments/Project Management

Technical Review/Quality Control

EDUCATION

BS, Geological Sciences, University of Southern California

YEARS OF EXPERIENCE

With Firm	25
With Other Firms	0

SUMMARY

Ms. Himebauch has over 25 years of environmental due diligence experience working for clients in the government and private sector. As an environmental due diligence consultant, Jessica's experience encompasses project management, report preparation, technical editing, quality control, and client interaction. She has worked with various regulatory agencies including the Regional Water Quality Control Board, the Department of Toxic Substances Control, local fire departments, and various city and county departments. A summary of past selected work experience is provided below.

EXPERIENCE

Due Diligence, Northern & Southern California, Multiple Projects, City and County of Los Angeles, TA Realty, TH Real Estate, The New Home Company, Toll Brothers, Rockefeller Group, Nuveen Real Estate, Cornerstone Real Estate Advisers LLC, Lincoln Property Company, Regency Centers, MetLife Real Estate Investments, Bixby Land Company, Pacific Harbor Line, and other private real estate investment/management firms. Senior Geologist providing project management, client interaction, reviewing and assisting with Phase I ESA report writing for various projects including industrial, manufacturing, agricultural, health care, commercial, and retail properties.

Hazardous Materials Lead Technical Resource, City of Los Angeles Department of Public Works, Bureau of Engineering, Homeless Bridge Housing Project in the City of Los Angeles, CA. Prepared hazardous materials technical memorandums and environmental site assessment reports in support of the Los Angeles City Mayor's Homeless Bridge Housing Project throughout the City's council districts.

Due Diligence, City of Irvine and Tierra Verde Industries at Orange County Great Park, Irvine, CA. Prepared Phase I ESA reports for City-leased property at the Orange County Great Park (former Marine Corps Air Station El Toro) to meet City of Irvine lease requirements.

Caltrans Initial Site Assessment; Long Beach Freeway (I-710) Corridor, Los Angeles County, CA; Los Angeles County Metropolitan Transportation Authority (Metro) and Partner Agencies. Managed and conducted a California Department of Transportation (Caltrans) Initial Site Assessment (ISA) for the properties associated with the proposed Long Beach Freeway (I-710) Corridor Project, which project involved 19 miles of I-710 between Long Beach and State Route 60 (SR-60). Purpose of the ISA was to evaluate the potential presence of hazardous materials prior to design and construction within the proposed project so that liability issues could be identified relating to site clean-up and construction impacts.

Caltrans ISA; The Old Road over Santa Clara River and Southern Pacific Transportation Company (SPT Co.) Bridge Project, County of Los Angeles Department of Public Works in Cooperation with Caltrans and City of Santa Clarita. Conducted a Caltrans ISA for The Old Road Improvement Project. The project consisted of 2.12 miles of The Old Road from Henry Mayo Drive and Magic Mountain Parkway in the unincorporated Castaic Junction in western Los Angeles County. The purpose of the ISA was to evaluate the potential for the presence of

hazardous materials prior to design and construction within the proposed improvements to Colima Road so that liability issues can be identified relating to site cleanup and construction impacts.

Caltrans ISA; Interstate 405 (I-405) Auxiliary Lanes Improvement Project, Los Angeles County, CA; Los Angeles County Metropolitan Transportation Authority (Metro), California Department of Transportation (Caltrans) District 7, and South Bay Cities Council of Governments (SBCCOG). Managed and conducted a Caltrans ISA for the proposed I-405 Auxiliary Lanes Project from Redondo Beach Boulevard to El Segundo Boulevard. Objective of the ISA was to evaluate the potential for the presence of hazardous materials prior to design and construction within the proposed project right-of-way so that liability issues can be identified relating to site clean-up and construction impacts.

Caltrans ISA; Colima Road Improvement Project; Los Angeles County, CA; County of Los Angeles Department of Public Works in Cooperation with the City of Industry and Caltrans. Conducted a Caltrans ISA for the Colima Road Improvement Project. The project consisted of Colima Road, extending 4.8 miles from the City of Whittier Boundary through unincorporated Hacienda Heights. Purpose of the ISA was to evaluate the potential for the presence of hazardous materials prior to design and construction within the proposed improvements to Colima Road so that liability issues can be identified relating to site cleanup and construction impacts.

Caltrans ISA; State Route 47 (SR-47) Interchange Project; City of Los Angeles, CA; Port of Los Angeles in cooperation with the City of Los Angeles and Caltrans. Conducted a Caltrans ISA for the SR-47 Interchange Project. The project included the proposed reconfiguration of the existing interchange at State Route 47/Vincent Thomas Bridge and Harbor Boulevard/Front Street. Purpose of the ISA was to identify sites that have the potential to affect the proposed project with hazardous materials and/or wastes from current and historical environmental conditions.

Principal Investigator and Project Manager, Phase I Environmental Site Assessments throughout the United States; Canada, and Colombia, Major Media and Entertainment Company (Confidential). Scope of work included a standard Phase I and the addition of a limited compliance and environmental health and safety audit of various facilities.

Other Projects include:

Lead Technical Resource of the PEA Program for the Los Angeles Unified School District (LAUSD). Directed the background research efforts for multiple proposed new schools and school additions for LAUSD. Assisted the project director in the preparation of work plans for LAUSD proposed school sites pursuant to California regulatory requirements and attended meetings with regulatory agencies on behalf of the LAUSD.

Assisted with the Palmdale to Burbank Section of the California High Speed (HSR) System, Hazardous Materials and Wastes Technical Report for the California High-Speed Rail Authority and US Department of Transportation (DOT) Federal Railroad Administration including technical review and QA/QC.

Assisted with the Westside Subway Extension Hazardous Materials Technical Report for Metro including report preparation/writing, QA/QC, and technical review.

Managed Phase I Investigations for the Alameda Corridor Transportation Authority (ACTA) including technical review, report preparation/writing, QA/QC, and client correspondence.

Performed environmental assessments for cellular telephone antenna installations for a major cellular operator. Tasks included inspections of numerous buildings, installations, additions, collocations, and vacant land, and asbestos and lead sampling at these facilities throughout Southern California.

Principal Investigator and participant in various Phase II Investigations including soil sampling, groundwater sampling, and soil-vapor sampling through Geoprobe

drilling techniques. Activities included review of historical documents, analysis of previous reports, scheduling and overseeing subcontractors, site reconnaissance, preparation of work plans and health and safety plans, regulatory agency interaction, data analysis, and technical report preparation.

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APPENDIX G

PALEONTOLOGICAL RESOURCES REPORT

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PALEONTOLOGICAL RESOURCES ASSESSMENT

VAIL DAM SEISMIC AND HYDROLOGIC REMEDIATION PROJECT

COUNTY OF RIVERSIDE, CALIFORNIA

LSA

August 2022

PALEONTOLOGICAL RESOURCES ASSESSMENT

VAIL DAM SEISMIC AND HYDROLOGIC REMEDIATION PROJECT

COUNTY OF RIVERSIDE, CALIFORNIA

Submitted to:

Rancho California Water District
42135 Winchester Road
Temecula, California 92590

Prepared by:

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LSA
20 Executive Park, Suite 200
Irvine, California 92614

Project No. RCW1902

LSA

August 2022

EXECUTIVE SUMMARY

LSA is under contract to Rancho California Water District (RCWD) to prepare a Paleontological Resources Assessment for the Vail Dam Seismic and Hydrologic Remediation Project (project) in the County of Riverside (County), California. This assessment was conducted pursuant to all applicable federal, State, and County regulations and policies regarding paleontological resources, as well as guidelines established by the Society of Vertebrate Paleontology. RCWD is the Lead Agency responsible for compliance with the California Environmental Quality Act (CEQA). The Federal Emergency Management Agency (FEMA) is the National Environmental Policy Act (NEPA) Lead Agency.

The project proposes to remediate seismic and hydrologic hazards associated with the existing Vail Dam, an arch dam, by constructing a new gravity concrete dam immediately downstream of the existing dam. A reinforced concrete outlet tower would be constructed on the upstream side of the proposed dam. Downstream control facilities would provide for releases to Temecula Creek and valves and meters would control and measure reservoir inflows and outflows. These facilities include an energy dissipater valve vault, an energy dissipater stilling basin and outlet channel for the creek releases, and a meter vault to measure reservoir inflows and outflows. During construction, the existing water pipelines would be replaced with a temporary single 60-inch diameter pipeline that would connect to energy dissipater valves temporarily located downstream of the dam foundation excavation. A concrete apron would be installed to armor the area below the ogee and overpour weirs within the spillway. The existing dam spillway will serve as the spillway for the proposed dam and no change in maximum water levels or maximum inundation area for Vail Lake would occur. The project site would need to be further developed to support construction and operation of the proposed dam. This development would include improvements to access roads, provision for construction staging and material disposal areas, and partial demolition of the existing dam.

Geologic mapping indicates the project site contains Artificial Fill, Wash Deposits, Landslide Deposits, Young Alluvial Channel Deposits, Old Alluvial Flood Plain Deposits, Old Landslide Deposits, Basalt of Temecula Area, the Temecula Arkose, Plutonic Rocks of the Peninsular Ranges Batholith (Granodiorite, Gabbro, and Heterogeneous Granitic Rocks) and Metamorphic Rocks of the Peninsular Ranges Batholith (Metasedimentary Rocks).

These geologic units vary in their paleontological sensitivity, ranging from no to low and high paleontological sensitivity. Artificial Fill, the Basalt of Temecula Area, the Plutonic Rocks of the Peninsular Ranges Batholith (Granodiorite, Gabbro, and Heterogeneous Granitic Rocks), and the Metamorphic Rocks of the Peninsular Ranges Batholith (Metasedimentary Rocks) have no paleontological sensitivity. The Landslide Deposits and Old Landslide Deposits have low paleontological sensitivity. The Wash Deposits, and Young Alluvial Channel Deposits have low paleontological sensitivity from the surface to a depth of 10 feet (ft) and high paleontological sensitivity below that mark. Lastly, the Old Alluvial Flood Plain Deposits and Temecula Arkose have high paleontological sensitivity. No excavation is anticipated for the Secondary Entry Road. Excavation associated with the Primary Entry Road (50 Acre Parcel), Pond Access Road, Canyon Access Road, and South Access Road, as well as the associated staging areas and turnouts, is

expected to be shallow and remain in geologic units that have no to low paleontological sensitivity. The majority of excavation is expected to occur in the vicinity of the proposed dam, spillway, and associated facilities, all of which are in areas mapped with no, low, or high paleontological sensitivity. Lastly, excavation for the North Access Road will occur in geologic units that have no, low, and high paleontological sensitivity. Although most excavation associated with this project will remain in geologic units that have no or low paleontological sensitivity, there is some excavation in high sensitivity deposits, specifically at the dam demolition access and staging area, the base of the proposed dam, and near the beginning and end of the North Access Road. Therefore, there is a potential for the project to impact scientifically significant paleontological resources. As such, LSA recommends the following mitigation measures for the project:

Mitigation Measure PAL-1 A qualified, professional paleontologist who meets the standards set by the Society of Vertebrate Paleontology (SVP) shall be retained by RCWD to develop a Paleontological Resources Impact Mitigation Program (PRIMP) for this project. The PRIMP shall be consistent with the guidelines of the SVP and shall include the methods that will be used to protect paleontological resources that may exist within the project site, as well as procedures for monitoring, fossil preparation and identification, curation into a repository, and preparation of a report at the conclusion of ground disturbance.

Mitigation Measure PAL-2 Ground-disturbing activities in deposits with high paleontological sensitivity (i.e., Wash Deposits, Young Alluvial Channel Deposits below a depth of 10 ft; Old Alluvial Flood Plain Deposits; and the Temecula Arkose) shall be monitored by a qualified paleontological monitor following a PRIMP. No monitoring is required for excavations in geologic units with low or no paleontological sensitivity (i.e., Wash Deposits or Young Alluvial Channel Deposits from the surface to a depth of 10 ft; Landslide Deposits; Old Landslide Deposits; Artificial Fill; Basalt of Temecula Area; and Granodiorite; Gabbro; Heterogeneous Granitic Rocks; Metasedimentary Rocks). If paleontological resources are encountered during the course of ground disturbance, the paleontological monitor shall have the authority to temporarily redirect construction away from the area of the find in order to assess its significance. In the event that paleontological resources are encountered when a paleontological monitor is not present, work in the immediate area of the find shall be redirected and the paleontologist or paleontological monitor shall be contacted to assess the find for scientific significance. If determined to be scientifically significant, the fossil shall be collected from the field.

Mitigation Measure PAL-3 Collected resources shall be prepared to the point of identification, identified to the lowest taxonomic level possible, cataloged, and curated into the permanent collections of a museum repository. At

the conclusion of the monitoring program, a report of findings shall be prepared to document the results of the monitoring program.

By following the aforementioned mitigation measures, project impacts to scientifically significant paleontological resources would be reduced to a less than significant level.

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APPENDIX

A: FOSSIL LOCALITY SEARCH RESULTS FROM THE NATURAL HISTORY MUSEUM OF LOS ANGELES COUNTY

LIST OF ACRONYMS

ac-ft	acre-feet
CEQA	California Environmental Quality Act
County	County of Riverside
cy	cubic yards
DSOD	Division of Safety of Dams
FEMA	Federal Emergency Management Agency
ft	foot/feet
H:V	horizontal to vertical
Ma	million years ago
MCE	Maximum Credible Earthquake
NALMA	North American Land Mammal Age
NAVD88	North American Vertical Datum of 1988
NEPA	National Environmental Policy Act
NHMLAC	Natural History Museum of Los Angeles County
PMF	Probable Maximum Flood
PMP	Probable Maximum Precipitation
PRC	Public Resources Code
PRIMP	Paleontological Resources Impact Mitigation Program
project	Vail Dam Seismic and Hydrologic Remediation Project
RCC	roller compacted concrete
RCWD	Rancho California Water District
SCE	Southern California Edison
SR-79	State Route 79
SVP	Society of Vertebrate Paleontology
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VDC	Valle de los Caballos

INTRODUCTION

The Rancho California Water District (RCWD) proposes to remediate seismic and hydrologic hazards associated with the existing Vail Dam, an arch dam, by constructing a new straight-axis gravity concrete dam[1] immediately downstream of the existing dam. Hydrologic and seismic evaluations of the existing dam, conducted by the California Department of Water Resources Division of Safety of Dams (DSOD), indicate that the existing dam's spillway is insufficient to pass the Probable Maximum Flood (PMF)[2] without overtopping the dam and that the existing concrete arch dam would not resist the stresses induced by the Maximum Credible Earthquake (MCE). Dam failure would result in downstream flooding and the loss of Vail Lake, which would adversely affect water supply throughout RCWD's service area. The project has multiple benefits, including enhanced regional water supply reliability, groundwater recharge, passive flood protection, and improved water supply reliability. The project is needed to protect residents, structures, transportation infrastructure, and other downstream resources from potential dam failure.

RCWD is the Lead Agency pursuant to the California Environmental Quality Act (CEQA). The Federal Emergency Management Agency (FEMA) will be the federal Lead Agency for compliance with the National Environmental Policy Act (NEPA) as part of its Hazard Mitigation Grant Program. In addition, the project would affect endangered species and waters of the U.S., and would require permits from the U.S. Army Corps of Engineers (USACE) and the U.S. Fish and Wildlife Service (USFWS).

This assessment was conducted pursuant to all applicable federal, State, and County regulations and policies regarding paleontological resources, as well as guidelines established by the Society of Vertebrate Paleontology (SVP, 2010). This assessment documents the potential for encountering paleontological resources during project development and makes recommendations on how to mitigate impacts to those resources. It is not, and should not be used as, a geological assessment.

PROJECT BACKGROUND

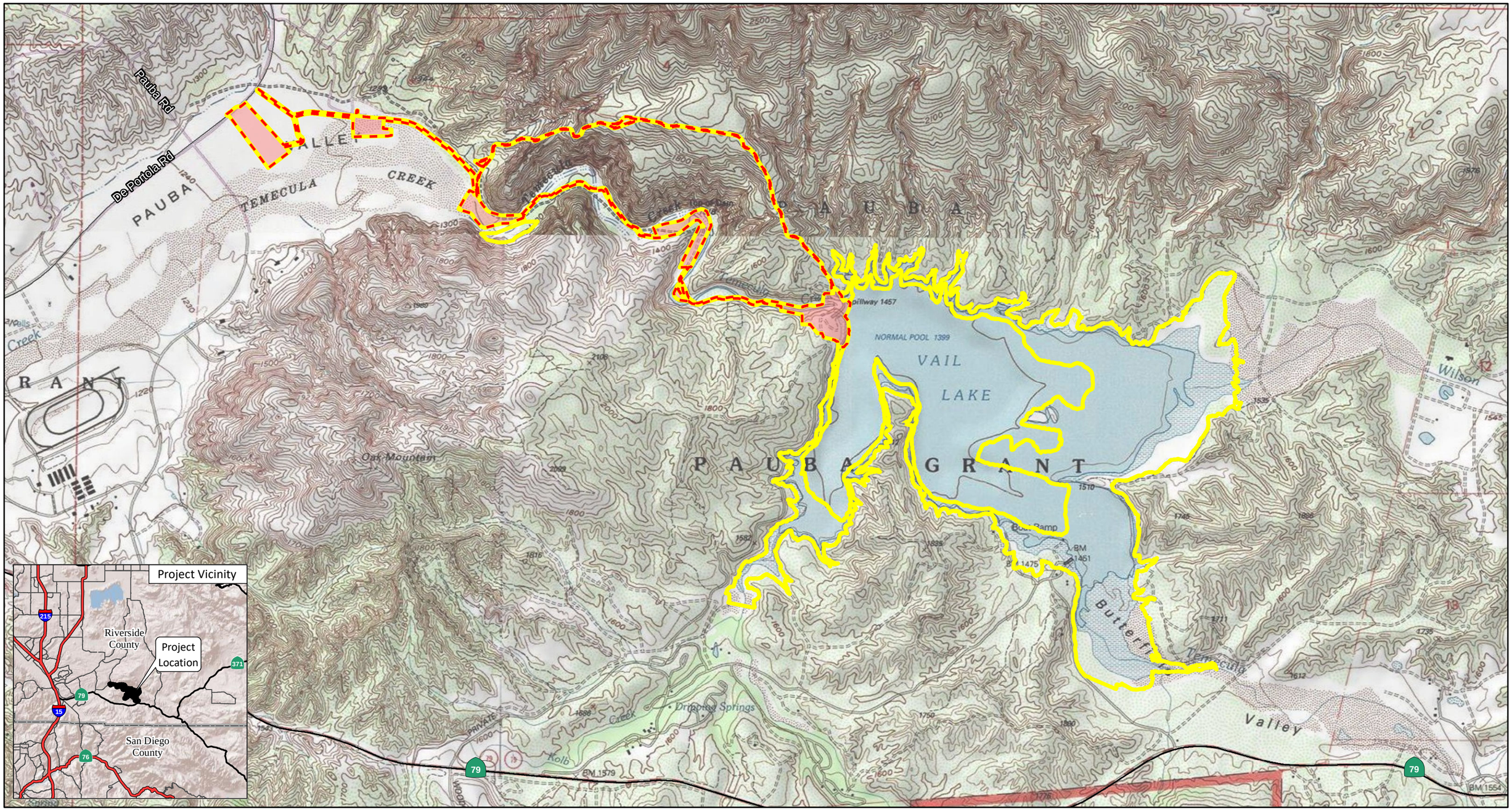
Regional and Project Location

Vail Dam and Vail Lake are located in unincorporated southwestern Riverside County, east of the City of Temecula, in Southern California. Vail Dam spans Temecula Creek, a northwesterly draining tributary of the Santa Margarita River that drains the north side of Palomar Mountain. The watershed for Vail Lake is approximately 318 square miles and the lake is fed by Temecula Creek, Wilson Creek, Kolb Creek, and Arroyo Seco. Figure 1 (Project Location and Vicinity) depicts the project site on the *Bachelor Mountain, California*; *Pechanga, California; Sage, California;* and *Vail*

---

1 A gravity dam is a designed to hold back water by primarily using the weight of the dam material to resist the horizontal water pressure. Gravity dams are designed for each section of the dam to be stable and independent of any other dam section.

2 The PMF is the flood that may be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible in the drainage basin under study (FEMA 2004).



LSA

LEGEND

- Paleontological Survey Area
- Project Site

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FIGURE 1

Vail Dam Seismic and Hydrologic Remediation Project

Project Location and Vicinity

SOURCE: USGS 7.5' Quad - *Bachelor Mtn, CA* (1978), *Pechanga, CA* (1988), *Sage, CA* (1954), and *Vail Lake, CA* (1988); AECOM (6/2022)

I:\RCW1902\GIS\MXD\Paleo\ProjectLocation_USGS.mxd (7/15/2022)

Lake, California 7.5-minute United States Geological Survey (USGS) topographic maps in unsectioned land of the Pauba Land Grant (USGS, 1954, 1978, 1988a, 1988b).

Vail Dam and Reservoir

Vail Dam is a concrete arch dam spanning between concrete and rock abutments, approximately 120 feet (ft) high in the middle. The dam has a maximum height of 152 ft from the dam crest to the lowest point in the foundation and has a 3.5 ft high concrete parapet wall extending above the upstream dam crest. The dam has eight outlets, including a low-level outlet. An at-grade meter vault is located approximately 100 ft downstream, and a stream release valve building is located about 200 ft downstream of the dam. The spillway[3] is located beyond the left abutment and connects to the left abutment[4] gravity block at a right angle. The spillway is comprised of a 119 ft long ogee[5] weir[6], a 343 ft long flat-crested weir, and a 65 ft long concrete overpour weir. Access to the dam is currently available from De Portola Road via the Upper Valle de los Caballos (VDC) Pond Access Road, and from that point, along the Canyon Access Road to access the left side of the dam or the North Access Road to access the right side of the dam. The left side of the dam can also be accessed from State Route 79 (SR-79) at Vail Lake Road, then via the campground area to Vail Dam Road (a gated access road) and then to the South Access Road.

Vail Lake impounds up to 42,680 acre-feet (ac-ft) of water with the reservoir at the spillway crest. The reservoir is currently used primarily for water supply but historically has been utilized for recreation also. The reservoir has a 318-square-mile drainage area, which rapidly fills the reservoir in wet years. Water released from Vail Lake is typically re-stored in the Pauba Valley groundwater basin via the Upper VDC Recharge Basins. The average water level from 1978 (the year during which RCWD took ownership of Vail Dam) through May 2020 has been 1,445.1 ft NAVD88.[7] The operating level of the reservoir is dependent on a variety of factors, including restrictions on pumping into the reservoir to prevent introduction of quagga mussel,[8] requirements to recharge groundwater to reduce evaporation of stored water, mandated releases between May and October to maintain the water flow in the creek, and the amount of precipitation. Typical operations include maintaining approximately 1,457.6 ft NAVD88 (15 ft below the spillway crest) as the maximum level (e.g., if the lake level exceeds 1,457.6 ft, water is released to return the lake to that water level or below as soon as possible) to allow capacity for rainfall inflow. At times, there is insufficient rainfall to

3 A spillway is a structure used to provide the controlled release of flows from a dam or levee into a downstream area.
4 Abutment refers to the substructure at each end of the dam. Left or right side refers to the side when looking downstream.
5 Ogee refers to the weir shape. An ogee is a curve shaped similar to the letter S, consisting of two arcs that curve in opposite directions.
6 A weir is a dam across the width of a river or stream to raise the water level or divert its flow.
7 NAVD88 = North American Vertical Datum of 1988
8 The quagga mussel is an aquatic invasive species, which is known to clog water intake structures (e.g. pipes and screens), disrupt native ecosystems, and inhibit recreational activities.

maintain water levels at the lower level restriction of 1,437.6 ft NAVD88 and still comply with existing obligations.

PROJECT DESCRIPTION

The project includes construction of a straight-axis concrete gravity dam structure immediately downstream of the existing arch dam. The proposed dam would connect to the existing abutments. The parapet wall of the new gravity dam would extend to an elevation of 1,492.0 ft NAVD88, and the existing gravity blocks and parapet walls along the existing abutments would also be raised to this elevation. A downstream parapet wall would be constructed to serve primarily as a guardrail for vehicles traversing the crest. The downstream face of the dam would be stepped concrete. The proposed dam would include new outlet works that would be designed to meet the emergency reservoir drawdown requirements. The maximum water level in the reservoir would remain at the spillway elevation of 1,472.6 NAVD88 and no changes to typical dam operations are proposed. The existing dam spillway will serve as the spillway for the proposed dam and thus no change in maximum water levels or maximum inundation area for Vail Lake will occur.

Construction materials and methods used for the project would take into account local seismic activity. The added straight-axis concrete gravity structure would be constructed of roller compacted concrete (RCC), which would be vertical at the upstream face of the structure and at a slope of approximately 0.8 horizontal to 1 vertical (H:V) on the downstream side. The downstream face would be constructed using 4 ft high lifts and the crest would be 10 ft wide. These improvements would protect against catastrophic dam failure during an MCE.

Dam Layout

The new gravity dam would be constructed immediately downstream of the existing arch dam and abut the existing gravity abutments. The new gravity dam would be 6.8 ft higher than the original dam and route the PMF entirely through the existing spillway system. A 3.5 ft high parapet wall would be located on both sides of the crest. Reservoir water would not normally be against the upstream parapet wall, but the parapet wall would prevent overtopping of the dam during the PMF.

The width of the dam crest (between parapet walls) would be 16 ft in most locations and up to 20 ft near the outlet tower. The crest width would allow vehicular access for construction and maintenance of the dam structure. Vehicular access would be provided by wrapping the dam around the existing right gravity abutment and providing access from the North Access Road. The existing left gravity abutment downstream of the proposed dam would also need to be raised. The surface area of the lake would increase slightly (approximately 0.66 acre) with the addition of the area between the existing arch dam and the proposed straight-axis gravity dam.

As stated above, the upstream face of the new gravity dam would be vertical. The downstream face of the dam would generally be inclined at 0.8:1 H:V, extending from the upstream edge at the crest elevation down to the downstream toe. This inclination would be steeper in the upper part of the dam. The downstream face would be formed using steps with vertical faces of 4 ft.

Inlet/Outlet Facilities

As stated previously, the existing arch dam has eight outlets, including a low-level outlet. A reinforced concrete outlet tower would be constructed on the upstream side of the proposed dam. The tower would have nine intake gates and one outlet gate. The new facilities would retain RCWD's capability to store imported water in the reservoir through filling with the existing 48-inch diameter transmission pipeline that comes up the canyon from the Upper VDC Recharge Basins. The new outlet facilities would also have the capability for emergency releases that meet regulatory requirements.

Downstream control facilities would provide for releases to Temecula Creek and valves and meters would control and measure reservoir inflows and outflows. These facilities include an energy dissipater valve vault, an energy dissipater stilling basin and outlet channel for the creek releases, and a meter vault to measure reservoir inflows and outflows.

Modifications to Existing Facilities

Relocation of Pipelines and Energy Dissipater Valves. There are a number of pipelines that currently service the existing dam that cross the footprint of the proposed dam foundation excavation. The water pipelines would be replaced with a temporary header and a single 54-inch-diameter pipeline that would connect to energy dissipater valves temporarily located downstream of the dam foundation excavation. The temporary header and pipelines between the dams would be removed upon completion of construction. The temporary 54-inch pipeline through the new dam would be capped and filled at the end of construction.

Existing Dam Demolition. Demolition of the existing gravity abutments would occur where the proposed dam contacts those abutments. This would consist of hydroblasting and removing 2–3 inches of concrete on the sloping downstream faces of the abutments and removing the upper 6 inches of the crests of both the right and left gravity abutments.

Portions of the existing arch dam would be partially demolished after the new dam and outlet works are functional to allow for hydraulic connection of the reservoir with the new outlet tower. The remainder of the existing arch dam would remain in place. The three central monoliths would be partially removed. The demolition would likely include saw cutting the arch monoliths into manageable sizes that can be removed with a barge-supported crane. Auxiliary barges would transport the demolition debris to the shoreline, likely to the spillway staging area. All the demolition debris will be removed from the site for off-site disposal via the Canyon Access Road.

It is anticipated that the contractor would support the demolition equipment on a modular pontoon system that would be trucked to the site and then assembled to form a larger barge. Multiple barges may be required to transport equipment and demolition debris to/from the shoreline and the dam. The barges could be launched from the existing launch ramp (in the southeast part of the reservoir) or lofted into the reservoir with a crane located in the staging area planned in the spillway area. Use of the existing launch ramp will not be feasible if the water level in the reservoir is too low. No improvements are planned to the existing launch ramp, Vail Lake Road (the access road to the ramp), or Vail Dam Road south of the ramp. Any grading performed in the vicinity of the staging area

to prepare a flat area for crane access will use on-site materials (e.g. dam foundation excavation materials) and will be restored with native vegetation at the end of the demolition.

Spillway Modifications. The existing spillway would be used as the spillway for the new gravity dam. Concrete aprons would be installed to armor the area below the ogee and overpour weirs.

Dam Foundation

Preparation of the new gravity dam foundation includes excavation to slightly weathered or fresh rock and then treatment of the excavated surface. Shallow consolidation grouting of the rock would increase the stiffness of the foundation. Dewatering of the excavation would also be required.

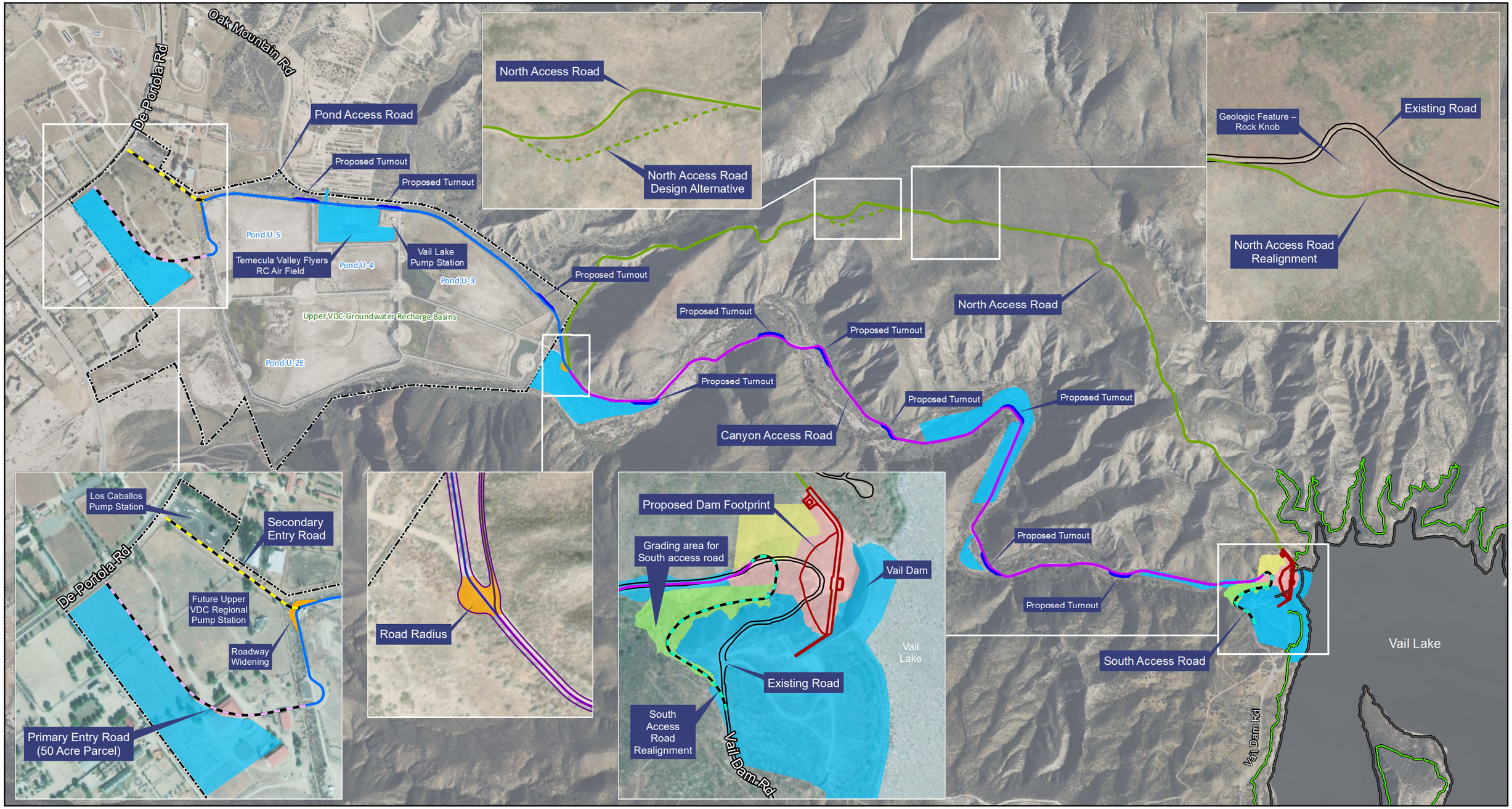
Seepage Control

Seepage through the dam foundation would be controlled by foundation grouting, which would include a grout curtain, possibly stitch grouting, and foundation drains. Seepage through the dam would be controlled by the upstream facing of the dam, the internal dam drains, and water stops at the concrete joints.

RCC Mix Plant

The RCC mix would be produced on the project site using a concrete batch plant, which would be located within the Upper VDC area north of Pond U-4 that is currently leased to the Temecula Valley Flyers (referred to herein as the Flyers Field). Prior to dam construction, the RCC mix, which is comprised of aggregate, cement, and fly ash, would be tested on the project site by placing a sample of RCC within the staging area used for the RCC batch plant or the staging and laydown area on the 50 Acre Parcel near De Portola Road. Off-site materials testing has been conducted to evaluate potential aggregate and water sources to develop the proposed RCC mix (Figure 2, Staging and Disposal Areas and Access Roads). The objective of the RCC mix design is to develop an efficient mix that does not segregate, is easy to compact, and provides engineering properties that are consistent with the design loading.

It is currently estimated that dam construction would require approximately 93,100 cubic yards (cy) of RCC, which would utilize approximately 195,500 tons of aggregate that would need to be imported and stored on site prior to use. However, this volume would increase if additional foundation excavation is required to enhance the seismic response of the dam. Potential quarries for aggregate include a quarry located in the community of Fallbrook as well as a quarry



LSA

LEGEND

- Canyon Access Road
- North Access Road
- North Access Road Design Alternative
- Primary Entry Road (50 Acre Parcel)
- Secondary Entry Road
- Pond Access Road
- Realigned South Access Road
- Proposed Truck Turnout
- Roadway Radius
- Proposed Dam Footprint
- Property Boundary
- Dam Construction Area
- South Access Road Construction Area
- Staging and Laydown Area
- Temporary Construction Area
- Spillway Crest Elevation (1472.6' NAVD88)
- Current Water Level (1428.2' NAVD88)

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SOURCE: Bing Maps (2020); AECOM (6/2022)

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FIGURE 2

Vail Dam Seismic and Hydrologic Remediation Project

Staging/Laydown Areas and Access Roads

located in the City of Corona. Cement would also be imported from the City of Victorville. Fly ash, a byproduct of coal power generation, would be imported from out of state.

Electrical, Mechanical, and Instrumentation for the Dam

The existing dam facilities have overhead electrical service provided by Southern California Edison (SCE). The existing overhead service would need to be rerouted to accommodate the footprint of the proposed dam and outlet works facilities. New power poles would be provided to route the existing service up the downstream side of the right abutment to the proposed Dam Control Building. All new electrical utility facilities would be designed per SCE standards. Improvements would take place within the identified impact areas for the Project. Power is used for lighting, security cameras, gate actuators, trash rack hoists, and monitoring and control systems.

Site Development

The project site would need to be further developed to support construction and operation of the proposed dam. This would include improvements to access roads, provision for construction staging and material disposal areas, and partial demolition of the existing dam.

Construction Access Roads. Existing on-site roadways that provide access from De Portola Road to the dam include the Secondary Entry Road (the existing, unpaved access road from De Portola Road to the Pond Access Road), the Pond Access Road, the Canyon Access Road, and the North Access Road. The South Access Road connects to Vail Dam Road, providing access to Vail Lake Road (which connects to SR-79) via the campground area. Construction access from SR-79 is limited to delivery of modular barges to Vail Lake; improvements to the South Access Road would consist of realigning the existing road, and no improvements are proposed to Vail Dam Road or Vail Lake Road. Oak Mountain Road, an existing private dirt road accessed off De Portola Road, would not be used for construction access. Improvements would be required to existing access roads to accommodate construction traffic. Refer to Figure 2 for a depiction of the construction areas as well as the Project access.

One new road segment would be constructed. The Primary Entry Road (50 Acre Parcel) is a proposed access point from De Portola Road that would connect to the Pond Access Road at the edge of the Upper VDC Recharge Basins. Once the Primary Entry Road (50 Acre Parcel) has been completed, the majority of construction access for the project site would be provided along that route. The existing Secondary Entry Road at De Portola Road would provide a secondary access point when required. RCWD intends to maintain both the Primary Entry Road (50 Acre Parcel) and the Secondary Entry Road after completion of the proposed Project. Improvements are described in more detail below.

> ***Primary Entry Road (50 Acre Parcel).*** The proposed Primary Entry Road (50 Acre Parcel) is a short segment across the RCWD's 50- acre parcel that would connect the Pond Access Road to De Portola Road (an existing, paved roadway) and would be constructed within property owned by RCWD, south of the future Upper VDC Regional Pump Station and Chlorine Contact Tank Project (RCWD Project No. D1903) to avoid conflict with that project. The Primary Entry Road (50 Acre Parcel) would provide two travel lanes (25 ft total width) and include gravel surfacing, and it would also provide access to one of the construction staging areas. RCWD would demolish

one unused building, formerly a horse stable, to allow construction of the Primary Entry Road (50 Acre Parcel).

Secondary Entry Road. Initially, for approximately the first 4 weeks of construction, site access to the north side of the Upper VDC Recharge Basins would be provided via an existing unpaved access road from De Portola Road. This unpaved roadway is 25 ft wide in its existing condition; improvements would be limited to scraping the surface and placing a 4-inch gravel wear surface within the existing road limits. This road would be used during daytime hours for equipment delivery and worker access and for delivery of road aggregate for use in constructing the Primary Entry Road (50 Acre Parcel). Upon completion of the Primary Entry Road (50 Acre Parcel), the Secondary Entry Road would no longer be used for routine construction access.

North Access Road. There is an existing unimproved North Access Road that traverses about 2 miles from the northeast corner of the Upper VDC percolation ponds to the right abutment of the existing dam. The existing connection between the North Access Road and the Pond Access Road would be improved to facilitate the turning radius of a truck with a 40 ft wheelbase. The details of the proposed improvement to this area are shown on Figure 2. The existing North Access Road would be improved to provide vehicular access to the crest of the proposed dam. The North Access Road would be the primary vehicular access route to the crest of the proposed dam after Project completion. Vehicular access is not feasible from the left abutment due to the height of the existing left gravity abutment. Project improvements would include gravel surfacing and improvements in drainage. The road would remain a single-lane road. As shown on Figure 2, realignment would be needed where the road is outside of the property boundary and where excavation through a rock knob would be required. In addition, RCWD identified a design alternative, which is not the preferred option but has been retained in project plans pending coordination with the applicable resource agencies. The North Access Road realignment design alternative is also shown on Figure 2.

Canyon Access Road. The existing unpaved access road through the canyon below the dam is approximately 2 miles long. It is currently a single-lane road bound on both sides by vegetation with limited sight lines. This access road would need to be widened to two lanes (25 ft total width) for construction traffic, with several turnouts to allow vehicles to pass. Widening would be accomplished through removal of the existing vegetation on both sides of the existing road. This widening is only for construction purposes and the sides of the access road would be revegetated and restored to its existing single-lane configuration after construction of the dam is complete. Other improvements to the Canyon Access Road would include gravel surfacing, which would remain within the single-lane road following construction. The existing five Arizona-type crossings of the creek would remain; however, temporary culverts or placement of clean rock may be required during construction at the five Arizona crossings to provide adequate support for construction vehicle crossings. Any temporary culverts or fill would be removed following completion of construction. Within approximately 550 ft of the new dam, the elevation of the Canyon Access Road would be raised by up to 7 ft to avoid overtopping during

high-volume lake water release. Vegetated riprap would be placed within the Temecula Creek channel along the southern side of the raised road portion to reduce potential erosion.

Pond Access Road. The Pond Access Road is an existing unpaved road providing access to the Upper VDC Recharge Basins and connecting to the North Access Road and Canyon Access Road. The existing Pond Access Road is 20–25 ft wide in the existing condition. The roadway surface would be scraped or lightly graded to smooth the roadway surface, and vegetation that has encroached onto the roadway from the slopes of the road would be removed as part of the proposed Project. Vegetated slopes on the sides of the roadway would not be scraped or graded. The Pond Access Road would not be widened as part of the proposed Project with the exception of three turnouts to allow trucks to pass and a small area near the northeast corner of the ponds where there is insufficient turning radius for the larger trucks turning onto the North Access Road. At the maximum curve, this area would be widened from approximately 25 ft (including shoulders) to 50 ft as part of the proposed Project; the location of the widening is shown on Figure 2. The Pond Access Road would provide two travel lanes for light utility vehicles and one travel lane for heavy hauling trucks. During construction, on-site construction flag persons may be required to facilitate heavy hauling truck use of the Pond Access Road.

South Access Road. The existing South Access Road connects to Vail Dam Road, which is a gravel one-lane roadway used by RCWD service vehicles that connects to Vail Lake Road via the campground (this route would not be used except as a possible delivery route for the modular barge system). The current South Access Road would need to be relocated as it is within the footprint of the foundation excavation of the proposed dam. A new roadway embankment would be constructed along the north-facing slope of the canyon, approximately 150 ft downstream of the existing access road. The proposed realignment of the South Access Road is shown on Figure 2. This location was selected to provide access from the spillway area and to provide a construction staging area immediately downstream of the proposed dam. After relocation, the South Access Road would maintain a connection to Vail Dam Road for use by RCWD service vehicles. Following construction, the graded slopes on the side of the South Access Road would be revegetated with appropriate native vegetation. Vegetated riprap would be placed at the foot of the embankment along Temecula Creek to reduce potential erosion. It is anticipated that the South Access Road embankment would be constructed using materials excavated from the new dam foundation. This road would also have gravel surfacing and drainage improvements. The South Access Road would be inundated in the event the reservoir spills; therefore, during operation, major erosion would need to be repaired on this road after spill events.

Construction Staging and Disposal Areas. The site development would include staging areas to support construction and demolition activities. Material disposal areas are also planned for placement of excess foundation excavation spoils.

Staging Areas. Limited area is available immediately adjacent to the proposed dam and downstream due to the narrow width of this portion of the canyon. Therefore, staging areas have been identified in various locations, including the relatively level area downstream of the spillway, wider portions of the canyon downstream of the dam, within a vacant portion of RCWD's property adjacent to De Portola Road and the Primary Entry Road (50 Acre Parcel), and

within the Flyers field, which is currently leased to the Temecula Flyers for remote-controlled aircraft use. The proposed staging areas are shown on Figure 2**.** Staging areas include aggregate stockpile areas, laydown areas, and access and staging areas. It is anticipated that the contractor would determine the optimal locations within the staging areas for each activity. Staging areas would be required to provide the following:

1. **RCC Mix Plant Area:** This area would contain a portable concrete mix plant with silos of cement and fly ash and stockpiles of aggregate in 3 to 4 sizes. This mix plant area is anticipated to be located at the Flyers Field. The RCC would be hauled from the mix plant to the dam site with off-road trucks.

2. **Foundation Grout Mix Plant:** This area would contain a small mix plant for the grout used in the foundation grouting. This grout mix plant would be located adjacent to the dam site.

3. **Crushing Plant:** This area would contain a portable rock crushing plant for crushing materials excavated from the dam foundation. Because of the limited space available adjacent to the dam, it is likely that the crushing plant would be located in a mid-canyon area.

4. **Contractor Trailers:** Both the contractor's and engineer's field offices would be located within staging areas.

5. **Laydown Areas:** These areas would provide material laydown/storage areas and space for activities such as fabricating rebar and assembling concrete forms, etc.

6. **Crane Access Areas:** Portions of the staging and laydown area near the dam spillway may be graded to provide flat areas for crane access during the partial demolition of the existing arch dam. Cranes may be used to lift modular barge components from flatbed trucks into the lake and to move demolition debris from barges onto trucks for disposal.

7. **Topsoil Stockpile Areas:** Topsoil from areas within the impact limits that support native vegetation will be salvaged and stockpiled during construction. Following construction, the salvaged topsoil will be spread onto areas to be restored to native habitat.

Disposal Areas. Approximately 64,900 cy of materials (including the previous foundation spoils, alluvium, fill, and moderately weathered rock) would be generated for excavation for the dam foundation. Most of this material would be used to grade the new alignment of the South Access Road and to provide flat areas near Vail Dam to support crane access for demolition activities. The balance of the excavation materials would require removal from the dam area and subsequent disposal. RCWD currently plans to keep the excess materials on its property for possible future re-use. Disposal areas are anticipated to be located within the staging and

laydown area near De Portola Road on RCWD's 50 acre parcel, as shown on Figure 2. Off-site disposal, if needed, would be at a nearby licensed landfill.

Construction Schedule

Construction of the proposed dam is anticipated to be initiated in the fall of 2023 and completed in late 2025. It is anticipated that the proposed dam and outlet works would be substantially complete in approximately 23 months. The existing dam would then be partially demolished after completion of the tower, and it is expected that construction would be complete in approximately 31 months (AECOM, 2019). The project would be completed in 14 phases, as shown in Table A. Overlapping phases are shown in Table B.

Table A: Construction Phases for the Vail Dam Seismic and Hydrologic Remediation Project

Phase Number	Description	Duration
1	Mobilization	16 Weeks (Months 1–4)
2	Access Roads and Staging Areas	24 Weeks (Months 2-8)
3	Demolition of Facilities at Proposed Dam	10 Weeks (Months 5-9)
4	Foundation Excavation	48 Weeks (Months 5-16)
5	Temporary Energy Dissipation Vault	18 Weeks (Months 5-9)
6	Armor Spillway	6 Weeks (Months 8-10)
7	Foundation Treatment and Grouting	20 Weeks (Months 10-15)
8	Roller-Compacted Concrete Placement	31 Weeks (Months 13-20)
9	Outlet Tower	28 Weeks (Months 17-23)
10	Dam Drainage	19 Weeks (Months 18-22)
11	Dam Instrumentation	10 Weeks (Months 22-24)
12	Permanent Energy Dissipation Vault	8 Weeks (Months 23-25)
13	Demolition of Existing Facilities	19 Weeks (Months 25-29)
14	Site Reclamation and Demobilization	6 Weeks (Months 30-31)

Source: Construction information memorandum (AECOM 2020). Adjusted to account for 90% Design.

Table B: Overlapping Construction Phases for the Vail Dam Seismic and Hydrologic Remediation Project

Overlapping Phases	Duration
1 and 2	10 Weeks (Months 2-4)
3, 4, and 5	6 Weeks (Months 5-6)
7 and 8	8 Weeks (Months 13-15)
8 and 9	4 Weeks (Months 17-18)
8, 9, and 10	11 Weeks (Months 18-20)
9 and 10	5 Weeks (Months 21-22)
9, 10, and 11	2 Weeks (Month 22)
9 and 11	4 Weeks (Months 22-23)
11 and 12	7 Weeks (Months 23-24)

Source: Construction information memorandum (AECOM 2020). Adjusted to account for 90% Design.

Excavation Parameters

Based on the current design plans and personal communication with AECOM[9], maximum depths of excavation for the various components of this project range from approximately 1 ft for some of the access roads and staging areas to 55 ft for the proposed dam foundation. The typical and maximum depths of excavation for the various components of the project are detailed below in Table C. With the exception of blasting for part of the dam foundation, excavation is expected to be conducted with standard methods and equipment (e.g., excavators, bulldozers, and backhoes).

[9] Personal communication, Leo Handfelt, AECOM, April 7, 2020.

Table C: Anticipated Maximum Excavation Depths for Components of the Vail Dam Seismic and Hydrologic Remediation Project

Project Component	Typical Depth (ft)	Maximum Depth (ft)	Remarks
Primary Entry Road (50 Acre Parcel)	0–1	1	Areas will only be scraped to create a level pad.
Secondary Entry Road	N/A	N/A	Per the project description, no paving or widening is required.
Pond Access Road	0–1	1	Existing road will be graded level and gravel surfacing added.
North Access Road	0–1	8	Existing road will be graded level and gravel surfacing added. Deepest excavation is at end of road where it ties into dam abutment (at approximately Station 103+00).
Canyon Access Road	0–1	1	Existing road will be graded level and gravel surfacing added.
Canyon Staging Areas	0–1	1	Areas will only be scraped to create a level pad.
South Access Road	1–3	3	New road will be constructed out of fill. Excavation is only to remove near surface vegetation before placing fill.
Removal of Existing Piping and Vaults	2–5	8	Excavation in previous backfill of the installed piping or vaults.
Temporary Inlet/Outlet Piping	10–15	20	Deepest excavation at meter vault.
Temporary Emergency Dissipater Valve Vault	2–3	3	
Temporary Riprap Apron	4–5	5	
Proposed Dam Foundation	10–20	55	Variable depths throughout foundation. Deepest excavation in area of existing dam foundation spoils.
Emergency Dissipater Basin	4–6	6	Excavation to occur in backfill placed for the proposed dam foundation after it is constructed.
Outlet Channel	3–4	4	
Outlet Conduit	10–12	15	Deepest excavation at meter vault.
Spillway Modifications	4–5	5	

Source: Personal communication, Leo Handfelt (AECOM, April 7, 2020) and project description above.
ft = foot/feet

REGULATORY ENVIRONMENT

This project is subject to federal, State, and County regulations and requirements regarding paleontological resources. A discussion of these regulations and requirements is provided below.

FEDERAL

A project must comply with one or more federal regulations concerning paleontological resources if (1) the project involves land under the jurisdiction of a federal agency, (2) a federal agency has oversight on the project, and/or (3) a permit, license, authorization, or funding from a federal agency is required to complete the project. Because FEMA has oversight on this project, compliance with National Environmental Policy Act (NEPA) regulations is required.

National Environmental Policy Act of 1969 (42 United States Code 4321-4375)

NEPA established a national policy for the protection, promotion, enhancement, and understanding of the environment and created the Council on Environmental Quality. As part of this act, Section 101(b)(4) (42 United States Code 4331) seeks to "preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity and variety of individual choice." NEPA requires that the environmental effects of a proposed federal project or action be evaluated, and regulations for implementing this evaluation are found in Title 40 of the Code of Federal Regulations Sections 1500–1508.

STATE OF CALIFORNIA

Under State law, paleontological resources are protected by the California Environmental Quality Act (CEQA) and Public Resources Code (PRC) Section 5097.5.

California Environmental Quality Act (Public Resources Code 21000 et seq.)

The purpose of CEQA is to provide a statewide policy of environmental protection. As part of this protection, State and local agencies are required to analyze, disclose, and, when feasible, mitigate the environmental impacts of, or find alternatives to, proposed projects. The *State CEQA Guidelines* (California Code of Regulations 15000 et seq.) provide regulations for the implementation of CEQA and include more specific direction on the process of documenting, analyzing, disclosing, and mitigating environmental impacts of a project. To assist in this process, Appendix G of the *State CEQA Guidelines* provides a sample checklist form that may be used to identify and explain the degree of impact a project will have on a variety of environmental aspects, including paleontological resources (Section VII[f]). As stated in Section 15002(b)(1–3) of the *State CEQA Guidelines*, CEQA applies to governmental action, including activities that are undertaken by, financed by, or require approval from a governmental agency. Because this project requires approval by a governmental agency, CEQA regulations apply.

California Public Resources Code, Section 5097.5

This law protects historic, archaeological, and paleontological resources on public lands within California and establishes criminal and civil penalties for violations. Specifically, PRC Section 5097.5 states:

> "(a) No person shall knowingly and willfully excavate upon, or remove, destroy, injure or deface any historic or prehistoric ruins, burial grounds, archaeological or vertebrate paleontological site, including fossilized footprints, inscriptions made by human agency, or any other archaeological, paleontological or historical feature, situated on public lands, except with the express permission of the public agency having jurisdiction over such lands. Violation of this section is a misdemeanor.
>
> (b) As used in this section, "public lands" means lands owned by, or under the jurisdiction of, the state, or any city, county, district, authority, or public corporation, or any agency thereof."

Because this project involves public lands as defined in PRC Section 5097.5(b), the project is required to comply with this regulation.

COUNTY OF RIVERSIDE

The County General Plan (County of Riverside, 2015) sets forth the goals, policies, and programs the County uses to manage future growth and land uses. Chapter 5, Multipurpose Open Space Element, of the General Plan contains the following policies designed to protect paleontological resources:

> **OS 19.6.** Whenever existing information indicates that a site proposed for development has high paleontological sensitivity as shown on Figure OS-8, a paleontological resource impact mitigation program (PRIMP) shall be filed with the County Geologist prior to site grading. The PRIMP shall specify the steps to be taken to mitigate impacts to paleontological resources.
>
> **OS 19.7.** Whenever existing information indicates that a site proposed for development has low paleontological sensitivity as shown on Figure OS-8, no direct mitigation is required unless a fossil is encountered during site development. Should a fossil be encountered, the County Geologist shall be notified and a paleontologist shall be retained by the project proponent. The paleontologist shall document the extent and potential significance of the paleontological resources on the site and establish appropriate mitigation measures for further site development.
>
> **OS 19.8.** Whenever existing information indicates that a site proposed for development has undetermined paleontological sensitivity as shown on Figure OS-8, a report shall be filed with the County Geologist documenting the extent and potential significance of the paleontological resources on site and identifying mitigation measures for the fossil and for impacts to significant paleontological resources prior to approval of that department.

OS 19.9. Whenever paleontological resources are found, the County Geologist shall direct them to a facility within Riverside County for their curation, including the Western Science Center in the City of Hemet.

SCIENTIFIC SIGNIFICANCE AND SENSITIVITY

SCIENTIFIC SIGNIFICANCE

The SVP (2010) provides the following definitions of significance:

- **Significant Nonrenewable Paleontological Resources** are fossils and fossiliferous deposits, here defined as consisting of identifiable vertebrate fossils, large or small; uncommon invertebrate, plant, and trace fossils; and other data that provide taphonomic, taxonomic, phylogenetic, paleoecologic, stratigraphic, and/or biochronologic information. Paleontological resources are considered to be older than recorded human history and/or older than the middle Holocene (i.e., older than approximately 4,200 years ago [Cohen et al., 2022]).

Eisentraut and Cooper (2002) developed a useful set of criteria for judging whether fossils are scientifically significant. Using their method, fossils can be judged scientifically significant if they meet any of the criteria within the following categories:

- **Taxonomy:** Assemblages that contain rare or unknown taxa, such as defining new (previously unknown to science) species or that represent a species that is the first or has very limited occurrence within the area or formation.

- **Evolution:** Fossils that represent important stages or links in evolutionary relationships or that fill gaps or enhance underrepresented intervals in the stratigraphic record.

- **Biostratigraphy:** Fossils that are important for determining or confining relative geologic (stratigraphic) ages or for use in defining regional to interregional stratigraphic associations. These fossils are often known as biostratigraphic markers and represent plants or animals that existed for only a short and restricted period in the geologic past.

- **Paleoecology:** Fossils that are important for reconstructing ancient organism community structure and interpretation of ancient sedimentary environments. Depending on which fossils are found, much can be learned about the ancient environment from water depth, temperature, and salinity to what the substrate was like (muddy, sandy, or rocky) to even whether the area was in a high- energy location like a beach or a low-energy location like a bay. Even terrestrial animals can contain information about the ancient environment. For example, an abundance of grazing animals such as horse, bison, and mammoth suggest more of a grassland environment, while an abundance of browsing animals such as deer, mastodon, and camel suggest more of a brushy environment. Preserved parts of plants can also lend insight into what was growing in the area at a particular time. In addition, by studying the ratios of different species to each other's population densities, relationships between predator and prey can be determined.

  There is a complex but vital interrelationship among evolution, biostratigraphy, and paleoecology. Biostratigraphy (the record of fossil succession and progression) is the expression of evolution (change in populations of organisms through time), which in turn is driven by natural selection pressures exerted by changing environments (paleoecology).

- **Taphonomy:** Fossils that are exceptionally well or unusually/uniquely preserved or are relatively rare in the fossil record. This could include preservation of soft tissues such as hair, skin, or feathers from animals or the leaves/stems of plants that are not commonly fossilized.

Summary of Scientific Significance

All vertebrate fossils that have contextual information, such as the location and geologic unit from which they were recovered, are considered a scientifically significant, nonrenewable paleontological resource. Invertebrate and plant fossils, as well as other environmental indicators associated with vertebrate fossils, are considered scientifically significant. Certain invertebrate and plant fossils that are regionally rare or uncommon or help to define stratigraphy, age, or taxonomic relationships are considered scientifically significant.

SENSITIVITY

Paleontological sensitivity is a ranking that describes the potential to find scientifically significant fossils in a given geologic unit based on an evaluation of several factors, including the composition, age, depositional environment, and known importance of fossils from, or suspected to be in, that geologic unit. The sensitivity ranking provides the basis for determining which mitigation measures, if any, are appropriate for a particular project.

The *Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources* (SVP, 2010) has four categories for paleontological sensitivity: High, Low, No, and Undetermined. Each of these categories is described in more detail below.

- **High Potential:** Rock units from which vertebrate or scientifically significant invertebrate, plant, or trace fossils have been recovered are considered to have a High Potential for containing additional scientifically significant paleontological resources. Rock units classified as having High Potential for producing paleontological resources include, but are not limited to, sedimentary formations and some volcaniclastic formations (e.g., ashes or tephras), some low-grade metamorphic rocks that contain scientifically significant paleontological resources anywhere within their geographical extent, and sedimentary rock units temporally or lithologically suitable for the preservation of fossils (e.g., middle Holocene and older, fine-grained fluvial sandstones, argillaceous and carbonate-rich paleosols, cross-bedded point bar sandstones, and fine-grained marine sandstones). Paleontological potential consists of both (1) the potential for yielding abundant or scientifically significant vertebrate fossils or for yielding a few scientifically significant fossils, large or small, vertebrate, invertebrate, plant, or trace fossils, and (2) the importance of recovered evidence for new and scientifically significant taxonomic, phylogenetic, paleoecologic, taphonomic, biochronologic, or stratigraphic data. Rock units that contain potentially datable organic remains older than late Holocene, including deposits associated with animal nests or middens, and rock units which may contain new vertebrate deposits, traces, or trackways, are also classified as having High Potential.

- **Low Potential:** Reports in the paleontological literature or field surveys by a qualified professional paleontologist may allow determination that some rock units have a Low Potential for yielding scientifically significant fossils. Such rock units will be poorly represented by fossil

specimens in institutional collections, or based on general scientific consensus, fossils are only preserved in rare circumstances; the presence of fossils is the exception, not the rule (e.g., basalt flows or Recent colluvium). Rock units with Low Potential typically will not require impact mitigation measures to protect fossils.

- **No Potential:** Some rock units have No Potential to contain scientifically significant paleontological resources (e.g., high-grade metamorphic rocks [such as gneisses and schists] and plutonic igneous rocks [such as granites and diorites]). Rock units with No Potential require no protection or impact mitigation measures relative to paleontological resources.

- **Undetermined Potential:** Rock units for which little information is available concerning their paleontological content, geologic age, and depositional environment are considered to have Undetermined Potential. Further study is necessary to determine whether these rock units have High, Low, or No Potential to contain scientifically significant paleontological resources. A field survey by a qualified professional to specifically determine the paleontological resource potential of these rock units is required before a paleontological mitigation plan can be developed. In cases where no subsurface data are available, paleontological potential can sometimes be determined by strategically located excavations into subsurface stratigraphy.

Summary of Sensitivity

A formation or rock unit has paleontological sensitivity or the potential for scientifically significant paleontological resources if it has previously produced, or has lithologies conducive to the preservation of, vertebrate fossils and associated or regionally uncommon invertebrate and plant fossils. All sedimentary rocks, except those younger than 4,200 years, certain extrusive volcanic rocks, and mildly metamorphosed rocks are considered to have potential for paleontological resources.

METHODS

LITERATURE REVIEW

The literature review included an examination of geologic maps of the project site and a review of relevant geological and paleontological literature to determine which geologic units are present in the project site, and whether fossils have been recovered from those geologic units elsewhere in the region. As geologic units may extend over large geographic areas and contain similar lithologies and fossils, the literature review includes areas well beyond the project site. The results of this literature review include an overview of the geology of the project site and a discussion of the paleontological sensitivity (or potential) of the geologic units in the project site.

LOCALITY SEARCHES

The purpose of a locality search is to establish the status and extent of previously recorded paleontological resources within and adjacent to the study area for a given project. In February and April 2020, locality searches were conducted through the Natural History Museum of Los Angeles County (NHMLAC). These searches identified any fossil localities in the NHMLAC records that exist within the project site or near the project site in the same or similar deposits. Copies of the locality search results from the NHMLAC are provided in Appendix A of this report.

FIELD SURVEYS

The purpose of a field survey is to note the sediments at the surface; relocate any known paleontological localities, if present; and identify any unrecorded paleontological resources exposed on the surface of a project site. In this way, impacts to existing, unrecorded paleontological material may be mitigated prior to the beginning of ground-disturbing activities, and portions of the project site that are more likely to contain paleontological resources may be identified. Given the steep terrain and substantial vegetation within the project site, not all portions of the project site could be safely accessed. LSA conducted pedestrian surveys of safely accessible portions of the project site between April 20 and May 5, 2020; on September 17 and 18, 2020; on February 26, 2021; on August 30, 2021; on April 15, 2022; and on July 21, 2022. In safely accessible areas, the surveys were conducted by walking linear transects where more open, flatter ground allowed for easier movement, and opportunistically where vegetation or terrain limited access.

The paleontological survey area includes the project site and the area surrounding Vail Lake, as it was initially thought that lowering the lake level would be required during demolition of the existing dam. Based on the identification of alternative construction/demolition methods, lowering the lake level is no longer proposed and no changes to dam operations are proposed. As such, the project site is limited to approximately 83 acres.

RESULTS

LITERATURE REVIEW

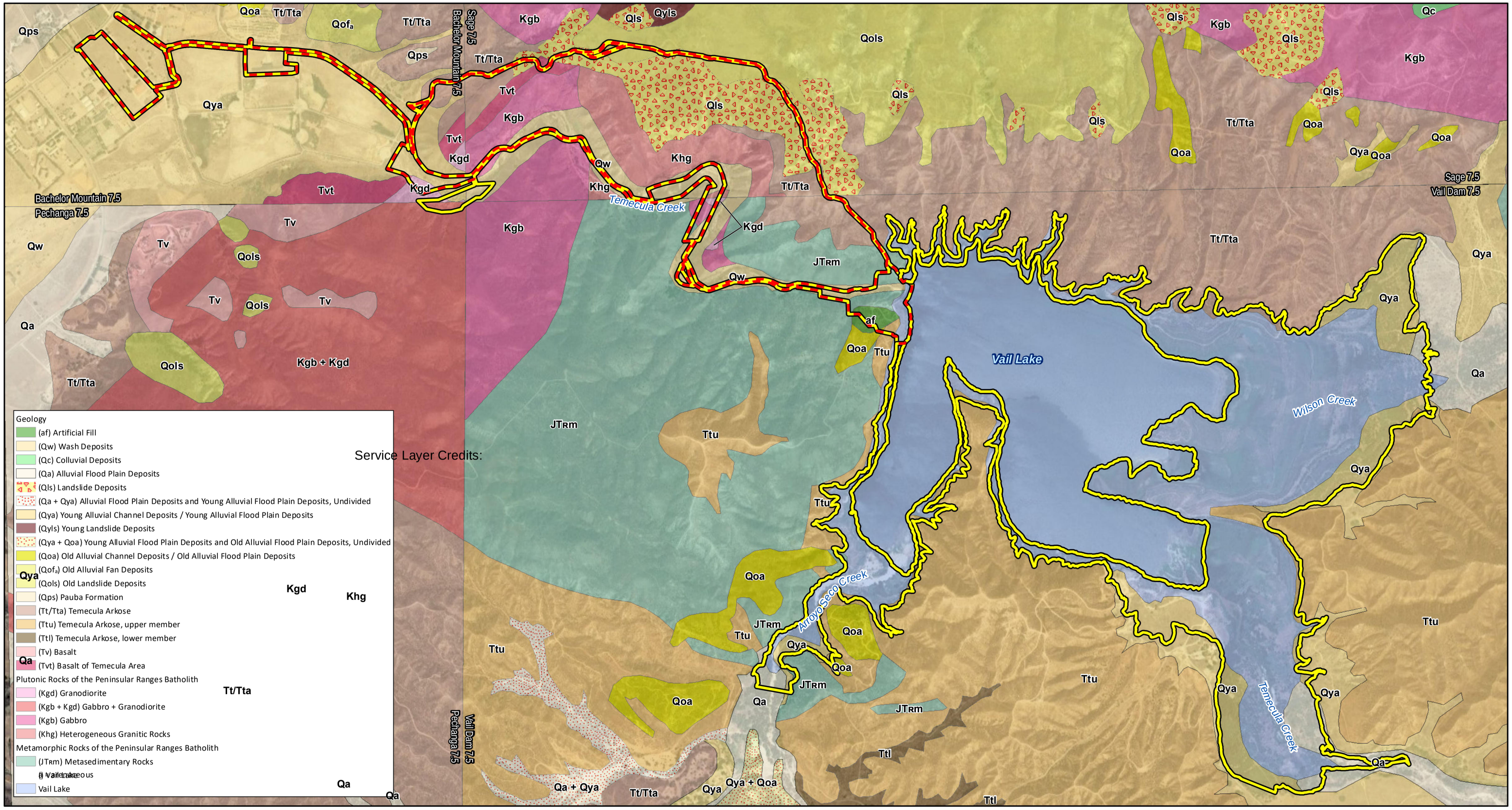
The project site is located at the northern end of the Peninsular Ranges Geomorphic Province, a 900-mile-long northwest-southeast trending structural block that extends from the Transverse Ranges in the north to the tip of Baja California in the south (California Geological Survey, 2002; Norris and Webb, 1976). This province is characterized by mountains and valleys that trend in a northwest-southeast direction, roughly parallel to the San Andreas Fault Zone (Norris and Webb, 1976; Sharp, 1976). The total width of the province is approximately 225 miles, extending from the Colorado Desert in the east, across the continental shelf, to the southern Channel Islands (i.e., Santa Barbara, San Nicolas, Santa Catalina, and San Clemente) (Sharp, 1976). It contains extensive pre-Cenozoic (more than 66 million years ago [Ma]) igneous and metamorphic rock covered by Cenozoic (less than 66 Ma) sedimentary deposits (Norris and Webb, 1976). Within this province, the project site is located on the southern portion of the Perris Block, a fault-bounded structural block that extends from the southern foot of the San Gabriel and San Bernardino Mountains, southeast to the vicinity of Bachelor Mountain and Polly Butte (Morton and Miller, 2006; Kenney, 1999). It is bounded on the northeast by the San Jacinto Fault and on the southwest by the Elsinore Fault Zone (Morton and Miller, 2006).

Geologic mapping by Kennedy (2000, 2014) and Morton and Kennedy (2003, 2005) indicates the project site contains Artificial Fill, Wash Deposits, Landslide Deposits, Young Alluvial Channel Deposits, Old Alluvial Flood Plain Deposits, Old Landslide Deposits, Basalt of Temecula Area, the Temecula Arkose, Plutonic Rocks of the Peninsular Ranges Batholith (Granodiorite, Gabbro, and Heterogeneous Granitic Rocks) and Metamorphic Rocks of the Peninsular Ranges Batholith (Metasedimentary Rocks). These geologic units and the respective paleontological sensitivities are discussed in more detail below, and the geology of the project site and vicinity is depicted in Figure 3, Geology. The dates for the geologic time intervals are based on the *International Chronostratigraphic Chart* prepared by the International Commission on Stratigraphy (Cohen et al., 2022).

Artificial Fill

Artificial Fill consists of sediments that have been removed from one location and transported to another by human activity rather than by natural means. The transportation distance can vary from a few feet to many miles, and composition is dependent on the source and purpose. Artificial Fill will sometimes contain modern debris such as asphalt, wood, bricks, concrete, metal, glass, plastic, and even plant material. Artificial Fill is mapped in the project site in a small area just south of the old dam (Kennedy, 2014), whereas the geotechnical report prepared for this project noted additional areas of Artificial Fill consisting of spoils from the excavation for the existing dam at the bottom of Temecula Creek in the vicinity of the proposed dam (AECOM, 2017).

While Artificial Fill may contain fossils, these fossils have been removed from their original location and are thus out of stratigraphic context. Therefore, they are not considered important for scientific study, and Artificial Fill has no paleontological sensitivity.


Bachelor Mountain 7.5
Pechanga 7.5
Sage 7.5
Vail Dam 7.5
Temecula Creek
Vail Lake
Wilson Creek
Arroyo Seco Creek
Tenecula Creek
Service Layer Credits:
Geology
(af) Artificial Fill
(Qw) Wash Deposits
(Qc) Colluvial Deposits
(Qa) Alluvial Flood Plain Deposits
(Qls) Landslide Deposits
(Qa + Qya) Alluvial Flood Plain Deposits and Young Alluvial Flood Plain Deposits, Undivided
(Qya) Young Alluvial Channel Deposits / Young Alluvial Flood Plain Deposits
(Qyls) Young Landslide Deposits
(Qya + Qoa) Young Alluvial Flood Plain Deposits and Old Alluvial Flood Plain Deposits, Undivided
(Qoa) Old Alluvial Channel Deposits / Old Alluvial Flood Plain Deposits
(Qof$_a$) Old Alluvial Fan Deposits
(Qols) Old Landslide Deposits
(Qps) Pauba Formation
(Tt/Tta) Temecula Arkose
(Ttu) Temecula Arkose, upper member
(Ttl) Temecula Arkose, lower member
(Tv) Basalt
(Tvt) Basalt of Temecula Area
Plutonic Rocks of the Peninsular Ranges Batholith
(Kgd) Granodiorite
(Kgb + Kgd) Gabbro + Granodiorite
(Kgb) Gabbro
(Khg) Heterogeneous Granitic Rocks
Metamorphic Rocks of the Peninsular Ranges Batholith
(JTrm) Metasedimentary Rocks
(I) Undifferentiated
Vail Lake
Qya
Kgd
Khg
Qa
Tt/Tta
Qa
Qa + Qya
Tt/Tta
Qya
Qya + Qoa
Ttl
Ttl
Qoa
Ttu
JTrm
Qoa
Ttu
Qya
Qoa
Qya
Qoa
Ttu
Qya
Tenecula Creek
Qya
Qa
Ttu
Qa
Qa
Qa

Wash Deposits

The Wash Deposits represent deposition in active and recently active washes (Kennedy, 2014; Morton and Kennedy, 2005). They accumulated during the late Holocene (Present–4,200 years ago) and consist of unconsolidated sand and boulders (Kennedy, 2014; Morton and Kennedy, 2005). These deposits are mapped in the project site along the central portion of the Temecula Creek channel (Kennedy, 2014; Morton and Kennedy, 2005).

Although Holocene (Present–11,700 years ago) deposits can contain remains of plants and animals, only those from the middle to early Holocene (4,200 to 11,700 years ago) are considered scientifically important (SVP, 2010), and fossils from this time interval are not very common. These Holocene deposits likely overlie older, Pleistocene deposits, which have produced scientifically important fossils elsewhere in the region (Jefferson 1991a, 1991b; Miller 1971; Reynolds and Reynolds 1991; Springer et al. 2009). These older, Pleistocene deposits span the end of the Rancholabrean North American Land Mammal Age (NALMA), which dates from 11,000 to 240,000 years ago (Sanders et al., 2009) and was named for the Rancho La Brea fossil site in central Los Angeles. The presence of *Bison* defines the beginning of the Rancholabrean NALMA (Bell et al. 2004), but fossils from this time also include other large and small mammals, reptiles, fish, invertebrates, and plants (Jefferson 1991a, 1991b; Miller 1971; Reynolds and Reynolds 1991; Springer et al. 2009). There is a potential to find these types of fossils in older sediments, which may be encountered below a depth of approximately 10 ft. Therefore, these deposits are assigned a low paleontological sensitivity above a depth of 10 ft and a high sensitivity below that mark.

Landslide Deposits

The Landslide Deposits are active landslides that show movement within the late Holocene (Present–4,200 years ago) (Morton and Kennedy, 2005). They may be highly fragmented or largely coherent and range from unconsolidated to consolidated mixtures of soil, rubble, and displaced blocks of bedrock (Morton and Kennedy, 2005). Lithology varies and is dependent on the underlying and surrounding bedrock, which in the project site is most likely Temecula Arkose, Gabbro from the Peninsular Ranges Batholith, and other landslide deposits. These deposits are mapped on the surface in the northern portion of the project site along the North Access Road at the base of Oak Mountain (Morton and Kennedy, 2005).

Whereas there is no potential to find scientifically significant fossils in the Landslide Deposits derived from the Gabbro of the Peninsular Ranges Batholith (see discussion on Gabbro below), there is a potential to encounter fossils in Landslide Deposits derived from the Temecula Arkose (see the discussion on the Temecula Arkose below). However, because the Landslide Deposits have been transported from their original location and context, fossils recovered from these deposits lack scientific significance. Because the exact source, composition, and transport distance of sediments in this geologic unit may vary and are unknown, the Landslide Deposits are considered to have low paleontological sensitivity.

Young Alluvial Channel Deposits

The Young Alluvial Channel Deposits, as mapped by Morton and Kennedy (2003), are Holocene to late Pleistocene in age (less than 126,000 years ago) and consist of unconsolidated and poorly sorted sand, silt, and clay. These deposits represent fluvial deposition along canyon floors and formed as streams carried sediment down from higher elevations in the Black Hills and Oak Mountain areas. These deposits are mapped at the western end of the project site within the outflow of Temecula Creek in the Pauba Valley.

As noted above, only deposits similar to the older, Pleistocene deposits in these geologic units have produced scientifically important fossils elsewhere in the region (Jefferson 1991a, 1991b; Miller 1971; Reynolds and Reynolds 1991; Springer et al. 2009). There is a potential to find similar fossils in the older sediments of this geologic unit, which may be encountered below a depth of approximately 10 ft. Therefore, the Young Alluvial Channel Deposits are assigned a low paleontological sensitivity above a depth of 10 ft and a high sensitivity below that mark.

Old Alluvial Flood Plain Deposits

The Old Alluvial Flood Plain Deposits are late to middle Pleistocene in age (11,700–781,000 years ago). They are composed of moderately well consolidated, poorly sorted mixtures of gravel, sand, silt, and clay that are often dissected by erosional gullies (Kennedy, 2014). These deposits are generally found adjacent to stream and river channels and represent fluvial deposition on canyon floors (Kennedy, 2014). They are mapped in the project site in a very small area along the western side of Vail Lake south of the dam (Kennedy, 2014). Based on the age and description, these deposits are inferred to be the same as the Quaternary Terrace deposits mapped by AECOM (2017) in the geotechnical report prepared for this project. As identified by AECOM (2017), the Quaternary Terrace deposits (i.e., Old Alluvial Flood Plain Deposits), are much more extensive, reaching farther north and closer to the spillway than the deposits as mapped by Kennedy (2014).

These deposits span the latest two NALMAs: the Rancholabrean (11,700–240,000 years ago) and the Irvingtonian (240,000–1.8 million years ago) (Bell et al., 2004; Sanders et al., 2009). Fossils are known in similar Rancholabrean and Irvingtonian deposits from excavations for roads, housing developments, and quarries, as well as scientific investigations in the County and the southern California area (Jefferson, 1991a, 1991b; Miller, 1971; Pajak et al., 1996; Reynolds and Reynolds, 1991; Springer et al., 2009). These fossils include mammoths, mastodons, horses, bison, camels, saber-toothed cats, coyotes, deer, and sloths, as well as smaller animals like rodents, rabbits, birds, reptiles, and fish. Because there is a potential to find similar fossils in the deposits within the project site, the Old Alluvial Flood Plain are considered to have high paleontological sensitivity.

Old Landslide Deposits

The Old Landslide Deposits formed during the late to middle Pleistocene (11,700–781,000 years ago) and consist of fragmented gabbro debris (Morton and Kennedy, 2005). These deposits are mapped on the surface in the northern portion of the project site on the slopes of Oak Mountain (Morton and Kennedy, 2005). There is no potential to find scientifically significant fossils in the Old Landslide

Deposits derived from the Gabbro of the Peninsular Ranges Batholith (see discussion on the Gabbro of the Peninsular Ranges Batholith below).

Basalt of Temecula Area

The Basalt of Temecula Area is Miocene in age (5.333–23.03 Ma) and consists of vesicular basalt (Morton and Kennedy, 2003, 2005). This geologic unit forms scattered exposures across the Temecula area, and within the project site is only mapped in the northwestern portion in a section of the North Access Road (Morton and Kennedy, 2005). This fine-grained, extrusive igneous rock formed as lava cooled rapidly at or very near the surface, and therefore, does not have the potential to preserve scientifically significant fossils. As such, the Basalt of Temecula Area has no paleontological sensitivity.

Temecula Arkose

The Temecula Arkose is only known from around the Temecula Basin and has been inferred to represent both high-energy fluvial and quiet lacustrine environments that existed during the Pliocene (1.81–5.33 Ma) (Golz et al., 1977). This geologic unit has been divided into two informal members, one upper member and one lower member, or left undivided where the two members cannot be distinguished (Kennedy, 2014, Morton and Kennedy, 2005). Within the project site, the undivided Temecula Arkose is mapped on the north side of Vail Lake and along the North Access Road, while the upper member is mapped on the western side of the lake just south of the dam (Kennedy, 2014; Morton and Kennedy, 2005). The upper member consists of pale to dark yellowish-brown and olive-gray fine- to coarse-grained sandstone, siltstone, and claystone with prominent yellowish-gray tuff beds (Kennedy, 2014). Where undivided, the Temecula Arkose also includes white to very light gray, poorly sorted, medium- to coarse-grained sandstone with some conglomerate and tuffaceous beds (Kennedy, 2014; Morton and Kennedy, 2005).

The Temecula Arkose is locally fossiliferous and contains terrestrial vertebrate specimens that are referred to the Blancan (1.81–4.75 Ma) NALMA (Pajak et al., 1996). A wide variety of vertebrates have been described from this geologic unit, including horse (*Equus*), ground sloth (Xenarthra), badger (*Taxidea*), camel (*Camelops*), dog (*Canis*), deer (*Odocoileus*), cat (*Felis*), and pronghorn (*Tetrameryx*), as well as smaller animals such as rodents, rabbits, and reptiles (Golz et al., 1977; Pajak et al., 1996); Reynolds and Reynolds, 1993). These vertebrate fossils have been used in multiple attempts to correlate and date the various geologic units across the Temecula Basin area and elsewhere in the Peninsular Ranges (Golz et al., 1977; Pajak et al., 1996; Reynolds and Reynolds, 1993). Given the limited aerial distribution of this formation and the abundant, biostratigraphically significant fossils it has produced, the Temecula Arkose is considered to have high paleontological sensitivity.

Plutonic Rocks of the Peninsular Ranges Batholith

Granodiorite

The Granodiorite formed during the Cretaceous (66.0–145.0 Ma) and consists of light-gray to white, medium-to-very-coarse, heterogeneous biotite granodiorite with minor amounts of monzogranite and tonalite (Kennedy, 2000, 2014; Morton and Kennedy, 2003, 2005). This geologic unit is mapped

in the project site in two small places along the Canyon Access Road in both staging and laydown areas (Kennedy, 2000, 2014; Morton and Kennedy, 2003). The Granodiorite formed as magma intruded the surrounding rocks and cooled below the surface. Therefore, it will not contain fossils and has no paleontological sensitivity.

Gabbro

The Gabbro formed during the Cretaceous (66.0–145.0 Ma) and consists of dark gray to black, coarse-grained, locally pegmatitic hornblende gabbro (Kennedy, 2000, 2014; Morton and Kennedy, 2003, 2005). This geologic unit is mapped in the project site along the Canyon Access Road and in both staging and laydown areas (Kennedy, 2000, 2014; Morton and Kennedy, 2003, 2005). Because the Gabbro formed from magma that intruded the surrounding rocks and cooled below the surface, it will not contain fossils. Therefore, these rocks have no paleontological sensitivity.

Heterogeneous Granitic Rocks

The Heterogeneous Granitic Rocks formed during the Cretaceous (66.0–145.0 Ma) and include a mixture of monzogranite, granodiorite, tonalite, schist, gneiss, and gabbro (Kennedy, 2000, 2014; Morton and Kennedy, 2003, 2005). Heterogeneous Granitic Rocks are mapped in a small area along the Canyon Access Road at the eastern staging and laydown area (Kennedy, 2014). All of these different igneous rocks formed from magma that intruded the surrounding rocks and cooled below the surface. As such, they will not contain fossils and have no paleontological sensitivity.

Metamorphic Rocks of the Peninsular Ranges Batholith

Metasedimentary Rocks

The Metasedimentary Rocks formed during the Jurassic to Triassic (145.0–251.0 Ma) and consist mostly of quartzofeldspathic schist, pelitic schist, quartzite, and metabreccia (Kennedy, 2014). These rocks are mapped in the project site on the west side of Vail Lake to the north and south of the Temecula Creek channel (Kennedy, 2014). Citing a geologic map of the *Vail Lake* 7.5-minute quadrangle by Kennedy but without a date, the geotechnical report prepared for this project mapped these rocks as gneiss belonging to Cretaceous and Jurassic metasedimentary rocks (AECOM, 2017). The geotechnical report noted that these rocks are exposed along the canyon walls of the Temecula Creek channel and comprise the bedrock upon which the proposed dam will be constructed (AECOM, 2017). It is possible that an earlier version of the geologic map was used for the geotechnical report, but without a date or a reference and no explanation provided, the origin of this discrepancy is unclear, and the mapping by Kennedy (2014) is used in this report.

Regardless of whether these rocks are gneiss or schist that formed earlier or later in the Mesozoic, these metasedimentary rocks formed as extreme heat and pressure altered the characteristics of the original sedimentary rocks. As such, they are very unlikely to contain scientifically significant paleontological resources, and are considered to have no paleontological sensitivity.

LOCALITY SEARCHES

According to the locality searches conducted by the NHMLAC, there are no known fossil localities within the project site. However, the locality searches noted many vertebrate fossil localities near

the project site from sediments similar to those mapped within the project site. The NHMLAC has fossil localities from the older sediments in what it calls younger Quaternary Alluvium (i.e., Young Alluvial Channel Deposits and sediments that may lie below the Wash Deposits), as well as the Temecula Arkose.

The closest vertebrate fossil localities from sediments similar to the Young Alluvial Channel Deposits are LACM 6967 and LACM 7456, located west-southwest of the project site, further down Pauba Valley near Temecula Creek. These localities produced specimens of tree frog (*Hyla*), legless lizard (*Anniella*), garter snake (*Thamnophis*), pocket gopher (*Thomomys*), and pocket mouse (*Peromyscus*). The next closest locality is LACM 5904, west-northwest of the project site, south of Long Canyon. This locality produced specimens of rabbit (Leporidae) and pocket gopher (*Thomomys*).

The closest vertebrate fossil localities from the Temecula Arkose are LACM 3269 and LACM 4043-4047, located southeast of the project site in the elevated terrain just south of Vail Lake. These localities produced specimens of turtle (Testudinata), horses (*Nannippus* and *Equus*), and camel (Camelidae). Copies of the fossil locality search results through the NHMLAC are provided in Appendix A.

FIELD SURVEYS

Given the variable geology and large scale of the paleontological survey area, the results of the field survey are divided into sections, including, from west to east, the Primary Entry Road (50 Acre Parcel), Secondary Entry Road, and Pond Access Road; the North Access Road; the Canyon Access Road; the Proposed Dam Area; and the Inundation Area. Any associated or adjacent staging and laydown areas, turnouts, or disposal areas are included in their respective sections.

Primary Entry Road (50 Acre Parcel), Secondary Entry Road, and Pond Access Road – Visibility along the Primary Entry Road (50 Acre Parcel), Secondary Entry Road, and Pond Access Road varied from 20 to 100 percent, depending on the amount of vegetation cover. Small portions of the Entry Roads are paved, and other portions Entry Roads and Pond Access Road have imported gravel overlying the native sediments. Where visible, native sediments along these roads and the staging and laydown area consisted of loose, poorly sorted, fine- to coarse-grained, sand with pebbles and cobbles, consistent with the Young Alluvial Channel Deposits mapped by Morton and Kennedy (2003).

North Access Road – Visibility along the North Access Road ranged from 75 to 100 percent, with moderate to low vegetation cover consisting of grasses and flowers in some areas. At the western end of the North Access Road, fine- to coarse-grained, poorly sorted sand was noted along the road, consistent with the Young Alluvial Channel Deposits mapped by Morton and Kennedy (2003). Farther east along the North Access Road, poorly sorted arkosic sand with pebble- and cobble-size igneous clasts was noted, consistent with the Temecula Arkose as mapped in that area (Morton and Kennedy, 2005). To the south of that area, in the cliffs on the southern side of the North Access Road and along the road itself to the east, the surveys noted dark gray to black basalt, consistent with the Basalt of Temecula Area, as mapped by Morton and Kennedy (2003, 2005). From that area and along the majority of the North Access Road, the surveys noted brownish-reddish silty clay with

pebble- to boulder-sized clasts of gabbro, consistent with the Landslide Deposits and Old Landslide Deposits mapped by Morton and Kennedy (2005). At the eastern side of the North Access Road, beige-colored siltstone with calcite stringers was noted, likely a siltstone bed of the Temecula Arkose mapped by Morton and Kennedy (2005). At the easternmost end of the North Access Road, the surveys noted weathered schist with some surficial debris from the Temecula Arkose and Landslide Deposits upslope, consistent with the Metasedimentary Rocks mapped by Morton and Kennedy (2005).

Canyon Access Road – The Canyon Access Road section includes multiple proposed turnouts, as well as staging and laydown areas and a disposal area along its length (see Figure 2), all of which were surveyed where safe access was possible. Visibility ranged from 20 to 100 percent, with excellent visibility along the road and generally poor visibility in the turnouts, staging and laydown areas, and disposal area. The majority of this section contained poorly sorted, fine- to coarse-sand with pebbles, cobbles, and boulders, consistent with the Wash Deposits mapped by Morton and Kennedy (2003, 2005). Clasts consisted of granite, metagranite, phyllite, schist, and gneiss, consistent with the rocks mapped in the surrounding hills on either side of the creek (e.g., Granodiorite, Gabbro, Heterogeneous Granitic Rocks, and Metasedimentary Rocks) (Kennedy, 2014; Morton and Kennedy, 2003, 2005).

Proposed Dam Area – In the area of the proposed dam, including the dam construction area, temporary construction area, associated staging and laydown areas, and the South Access Road (see Figure 2), visibility ranged from none to 100 percent. Visibility was excellent on the dirt roads leading up to the dam and spillway, but was poor to negligible elsewhere due to vegetation cover. Where exposures were present, this area contained gneiss and schist of the Metasedimentary Rocks, either as (1) in situ rocks; (2) as eroded boulders, cobbles, and pebbles near the edge of the lake; or (3) as boulders, cobbles, and pebbles, mixed with fine- to coarse-grained sand as local artificial fill produced from excavation for the existing dam. The geology is partly consistent with mapping Kennedy (2014), with the additional presence of gneiss and the distribution and location consistent with the more recent, smaller-scale mapping by AECOM (2017).

Inundation Area – With the exception of the shoreline, the majority of the inundation area was covered in substantial vegetation or underwater, limiting visibility. Where safe access was possible and sediments exposed, the surveys noted medium to coarse-grained sandstone, with local interlayered tuffaceous beds around most of the lake perimeter, consistent with the Temecula Arkose, either the upper member or undivided as mapped by Kennedy (2014). A few places on the west side also contained large cobbles to boulders of metasedimentary rocks, likely eroded downslope from the Metasedimentary Rocks mapped upslope from the shoreline (Kennedy, 2014).

No fossils were noted within any of these sections of the paleontological survey area during the field surveys.

RECOMMENDATIONS

The project site contains a variety of geologic units, with no, low, and high paleontological sensitivity. Artificial Fill, the Basalt of Temecula Area, the Plutonic Rocks of the Peninsular Ranges Batholith (Granodiorite, Gabbro, and Heterogeneous Granitic Rocks), and the Metamorphic Rocks of the Peninsular Ranges Batholith (Metasedimentary Rocks) have no paleontological sensitivity. The Landslide Deposits and Old Landslide Deposits have low paleontological sensitivity. The Wash Deposits and Young Alluvial Channel Deposits have low paleontological sensitivity from the surface to a depth of 10 ft and high paleontological sensitivity below that mark. Lastly, the Old Alluvial Flood Plain Deposits and Temecula Arkose have high paleontological sensitivity. No excavation is anticipated in the inundation area or the Secondary Entry Road. Excavation associated with the Primary Entry Road (50 Acre Parcel), Pond Access Road, Canyon Access Road, and South Access Road, as well as the associated staging areas, turnouts, and disposal area, is expected to be shallow and remain in geologic units that have no to low paleontological sensitivity. The majority of excavation is expected to occur in the vicinity of the proposed dam, spillway, and associated facilities, all of which are in areas mapped with no, low, or high paleontological sensitivity. Specifically, excavation in high sensitivity units will occur at the dam demolition access and staging area in the Old Alluvial Flood Plain Deposits and Temecula Arkose and in the dam construction area in the Wash Deposits. Lastly, excavation for the North Access Road will also occur in geologic units that have no, low, and high paleontological sensitivity. Specifically, excavation in high sensitivity units will occur near each end of the North Access Road in the Temecula Arkose. Although most excavation associated with this project will remain in geologic units that have no or low paleontological sensitivity, there is some excavation in high sensitivity deposits. Therefore, there is a potential for the project to impact scientifically significant paleontological resources. As such, LSA recommends the following mitigation measures for the project:

Mitigation Measure PAL-1 A qualified, professional paleontologist who meets the standards set by the Society of Vertebrate Paleontology (SVP) shall be retained by RCWD to develop a Paleontological Resources Impact Mitigation Program (PRIMP) for this project. The PRIMP shall be consistent with the guidelines of the SVP and shall include the methods that will be used to protect paleontological resources that may exist within the project site, as well as procedures for monitoring, fossil preparation and identification, curation into a repository, and preparation of a report at the conclusion of ground disturbance.

Mitigation Measure PAL-2 Ground-disturbing activities in deposits with high paleontological sensitivity (i.e., Wash Deposits, Young Alluvial Channel Deposits below a depth of 10 ft; Old Alluvial Flood Plain Deposits; and the Temecula Arkose) shall be monitored by a qualified paleontological monitor following a PRIMP. No monitoring is required for excavations in geologic units with low or no paleontological sensitivity (i.e., Wash Deposits or Young Alluvial Channel Deposits from the surface to a depth of 10 ft; Landslide Deposits; Old

Landslide Deposits; Artificial Fill; Basalt of Temecula Area; Granodiorite; Gabbro; Heterogeneous Granitic Rocks; and Metasedimentary Rocks). If paleontological resources are encountered during the course of ground disturbance, the paleontological monitor shall have the authority to temporarily redirect construction away from the area of the find in order to assess its significance. In the event that paleontological resources are encountered when a paleontological monitor is not present, work in the immediate area of the find shall be redirected and the paleontologist or paleontological monitor shall be contacted to assess the find for scientific significance. If determined to be scientifically significant, the fossil shall be collected from the field.

Mitigation Measure PAL-3 Collected resources shall be prepared to the point of identification, identified to the lowest taxonomic level possible, cataloged, and curated into the permanent collections of a museum repository. At the conclusion of the monitoring program, a report of findings shall be prepared to document the results of the monitoring program.

By following the aforementioned mitigation measures, project impacts to scientifically significant paleontological resources would be reduced to a less than significant level.

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APPENDIX A

FOSSIL LOCALITY SEARCH RESULTS FROM THE NATURAL HISTORY MUSEUM OF LOS ANGELES COUNTY

Natural History Museum
of Los Angeles County
900 Exposition Boulevard
Los Angeles, CA 90007

tel 213.763.DINO
www.nhm.org

NATURAL HISTORY MUSEUM
LOS ANGELES COUNTY

Vertebrate Paleontology Section
Telephone: (213) 763-3325

e-mail: smcleod@nhm.org

18 February 2020

LSA Associates, Inc.
20 Executive Park, Suite 200
Irvine, California 92614

Attn: Emily Chebul, Paleontological Intern

re: Paleontological Resources Records Check for the proposed Vail Dam Seismic and Hydrologic Remediation Project, LSA Project # RCW1902, near Vail Lake, Riverside County, project area

Dear Emily:

I have thoroughly searched our paleontology collection records for the locality and specimen data for the proposed Vail Dam Seismic and Hydrologic Remediation Project, LSA Project # RCW1902, near Vail Lake, Riverside County, project area as outlined on the portions of the Bachelor Mountain, Pechanga, Sage, and Vail Lake USGS topographic quadrangle maps that you sent to me via e-mail on 3 February 2020. We do not have any vertebrate fossil localities that lie directly within the proposed project area, but we do have vertebrate fossil localities nearby from sedimentary deposits similar to those that occur in the proposed project area, either at the surface or at depth.

The elevated terrain in most of the proposed project area has bedrock of metamorphic rock and igneous rocks that will be not contain recognizable fossils. The less elevated terrain of the proposed project area, in the very northern Pauba Valley and Temecula Creek, has surface deposits composed of younger Quaternary Alluvium, derived as alluvial fan deposits from the surrounding more elevated terrain. The younger Quaternary Alluvium deposits typically do not contain significant vertebrate fossils, at least in the uppermost layers, but at depth older sedimentary deposits may well contain significant fossil vertebrate remains. Our closest vertebrate fossil localities from similar deposits, LACM 6967 and 7456, occur west-southwest of

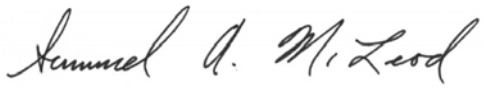
the proposed project area further down Pauba Valley. These Quaternary alluvial sediments near Temecula Creek produced small fossil specimens of tree frog, *Hyla*, lizard, *Anniella*, garter snake, *Thamnophis*, pocket gopher, *Thomomys*, and pocket mouse, *Peromyscus*. At nearly the same distance but west-northwest of the proposed project area south of Long Canyon, our older Quaternary locality LACM 5904 produced fossil specimens of undetermined rabbit, Leporidae, and pocket gopher, *Thomomys*.

In the elevated terrain in the northeastern portions of the proposed project area there are exposures of the Plio-Pleistocene Temucula Arkose. Our closest Temecula Arkose localities, LACM 3269, and 4043-4047, occur to the southeast of the proposed project area in the elevated terrain just south of Vail Lake. These localities have produced fossil specimens of turtle, Testudinata, horses, *Nannippus* and *Equus*, and camel, Camelidae.

Excavations in the metamorphic and igneous rocks exposed in elevated terrain in most of the proposed project area will not uncover any recognizable fossils. Shallow excavations in the younger Quaternary Alluvium exposed in the less elevated terrain in the proposed project area probably will not encounter significant vertebrate fossils. Deeper excavations in those areas that extend down into older sedimentary deposits, and any excavations in the exposures of the Temecula Arkose in the more elevated terrain, however, may well uncover significant fossil vertebrate remains. Any substantial excavations in the sedimentary deposits exposed in the proposed project area, therefore, should be closely monitored to quickly and professionally collect any specimens without impeding development. Also, sediment samples should be collected and processed to determine the small fossil potential in the proposed project area. Any fossils recovered during mitigation should be deposited in an accredited and permanent scientific institution for the benefit of current and future generations.

This records search covers only the vertebrate paleontology records of the Natural History Museum of Los Angeles County. It is not intended to be a thorough paleontological survey of the proposed project area covering other institutional records, a literature survey, or any potential on-site survey.

Sincerely,



Samuel A. McLeod, Ph.D.
Vertebrate Paleontology

enclosure: invoice

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of Los Angeles County
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20 April 2020

LSA Associates, Inc.
20 Executive Park, Suite 200
Irvine, California 92614

Attn: Sarah Rieboldt, Ph.D., Associate / Senior Paleontologist

re: Paleontological Resources Records Check for the proposed Vail Dam Seismic and Hydrologic Remediation Project, LSA Project # RCW1902, near Temecula, Riverside County, project area

Dear Sarah:

I have thoroughly searched our paleontology collection records for the locality and specimen data for the proposed Vail Dam Seismic and Hydrologic Remediation Project, LSA Project # RCW1902, near Temecula, Riverside County, project area as outlined on the portion of the Vail Lake USGS topographic quadrangle map that you sent to me via e-mail on 5 April 2020. We do not have any vertebrate fossil localities that lie directly within the proposed project area, but we do have vertebrate fossil localities nearby from sedimentary deposits similar to those that occur in the proposed project area, either at the surface or at depth.

In the western to southwestern portion of the proposed project area the elevated terrain has exposures of metamorphic bedrock that will be not contain recognizable fossils. The less elevated terrain of the non-submerged portions of the proposed project area has surface deposits composed of younger Quaternary Alluvium, derived as alluvial fan deposits from the surrounding more elevated terrain. The younger Quaternary Alluvium deposits typically do not contain significant vertebrate fossils, at least in the uppermost layers, but at depth older sedimentary deposits may well contain significant fossil vertebrate remains. Our closest vertebrate fossil localities from similar deposits, LACM 6967 and 7456, occur directly west of the proposed project area in Pauba Valley. These Quaternary alluvial sediments near Temecula Creek

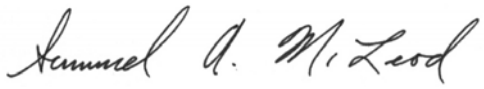
produced small fossil specimens of tree frog, *Hyla*, lizard, *Anniella*, garter snake, *Thamnophis*, pocket gopher, *Thomomys*, and pocket mouse, *Peromyscus*. At nearly the same distance but west-northwest of the proposed project area south of Long Canyon, our older Quaternary locality LACM 5904 produced fossil specimens of undetermined rabbit, Leporidae, and pocket gopher, *Thomomys*.

In the elevated terrain in the northern, eastern and southern portions of the proposed project area there are exposures of the Plio-Pleistocene Temucula Arkose. Our closest Temecula Arkose localities, LACM 3269, and 4043-4047, occur between Kolb Creek and Temecula Creek immediately south of the central portion of the proposed project area. These localities have produced fossil specimens of turtle, Testudinata, horses, *Nannippus* and *Equus*, and camel, Camelidae.

Excavations in the metamorphic rocks exposed in elevated terrain in the western to southwestern portions of the proposed project area will not uncover any recognizable fossils. Shallow excavations in the younger Quaternary Alluvium exposed in the less elevated terrain in the proposed project area probably will not encounter significant vertebrate fossils. Deeper excavations in those areas that extend down into older sedimentary deposits, and any excavations in the exposures of the Temecula Arkose in the more elevated terrain in the northern, eastern, and southern portions of the proposed project area, however, may well uncover significant fossil vertebrate remains. Any substantial excavations in the sedimentary deposits exposed in the proposed project area, therefore, should be closely monitored to quickly and professionally collect any specimens without impeding development. Also, sediment samples should be collected and processed to determine the small fossil potential in the proposed project area. Any fossils recovered during mitigation should be deposited in an accredited and permanent scientific institution for the benefit of current and future generations.

This records search covers only the vertebrate paleontology records of the Natural History Museum of Los Angeles County. It is not intended to be a thorough paleontological survey of the proposed project area covering other institutional records, a literature survey, or any potential on-site survey.

Sincerely,



Samuel A. McLeod, Ph.D.
Vertebrate Paleontology

enclosure: invoice

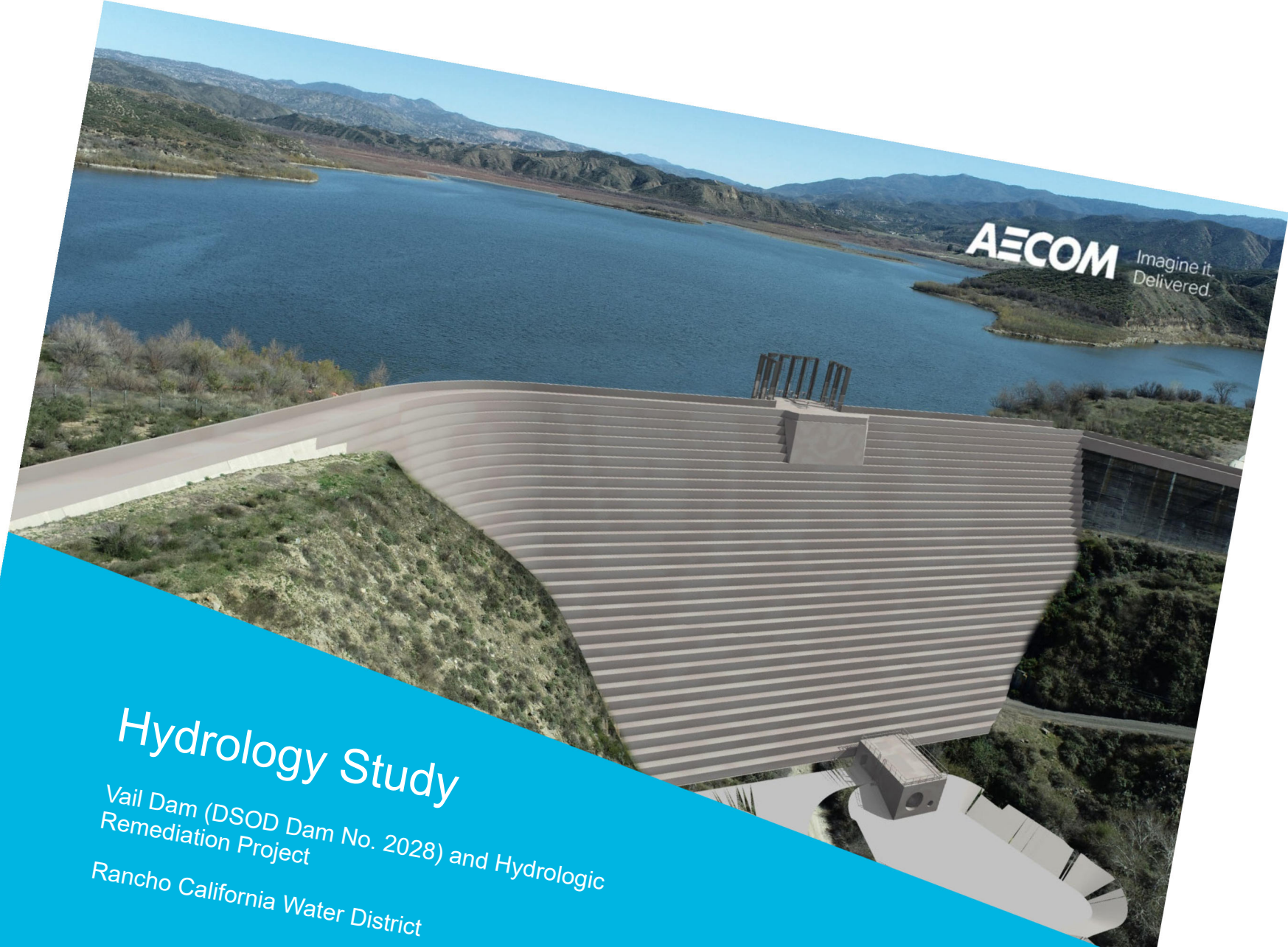
APPENDIX H

HYDROLOGY STUDY AND PRELIMINARY WATER QUALITY MANAGEMENT PLAN

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Hydrology Study

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Hydrology Study

Vail Dam (DSOD Dam No. 2028) and Hydrologic Remediation Project

Rancho California Water District

Prepared for:

Rancho California Water District

42135 Winchester Road
Temecula, California

Prepared by:

AECOM
999 Town and Country Rd
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August 31, 2022

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This document has been prepared by AECOM for sole use of our client (the “Client”) in accordance with generally accepted consultancy principles, the budget for fees and the terms of reference agreed between AECOM and the Client. Any information provided by third parties and referred to herein has not been checked or verified by AECOM, unless otherwise expressly stated in the document. No third party may rely upon this document without the prior and express written agreement of AECOM.

ENGINEERING CERTIFICATION

This report has been prepared under my direction as the professional engineer in direct responsible charge of the work, in accordance with the provisions of the Professional Engineer's Act of the State of California.



Jimmy J Medellin, PE
Registration No.: C77250
Date: August 31, 2022

Statement of Limitation:

Background information, design bases, and other data have been furnished to AECOM by Rancho California Water District (RCWD) and/or third parties, which AECOM has used in preparing this report. AECOM has relied on this information as furnished and is neither responsible for nor has confirmed the accuracy of this information in total. Where previous information has been used as a basis for further analysis, the accuracy of the base assumptions have been reviewed prior to use in this report.

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1. Introduction & Purpose

The Rancho California Water District (RCWD) proposes to remediate seismic and hydrologic hazards associated with the existing Vail Dam, an arch dam, by constructing a new straight-axis gravity concrete dam[1] immediately downstream of the existing dam. Hydrologic and seismic evaluations of the existing dam, conducted by the California Department of Water Resources Division of Safety of Dams (DSOD), indicate that the existing dam's spillway is insufficient to pass the Probable Maximum Flood (PMF)[2] without overtopping the dam and that the existing concrete arch dam would not resist the stresses induced by the Maximum Credible Earthquake (MCE).

RCWD is the Lead Agency pursuant to the California Environmental Quality Act (CEQA). There will be federal agency involvement in the project, and compliance with the National Environmental Policy Act (NEPA) will be required. RCWD is applying for grant funding for the project under the Federal Emergency Management Agency (FEMA) Hazard Mitigation Grant Program and Water Infrastructure for Improvements to the Nation (WIIN) Act funding from the U.S. Bureau of Reclamation (USBR). The project would affect endangered species and waters of the U.S., and would require permits from the U.S. Army Corps of Engineers (USACE) and the U.S. Fish and Wildlife Service (USFWS). The NEPA Lead Agency has not yet been determined.

This report is to provide a drainage study based on the Riverside County Flood Control and Water Conservation District guidelines for a proposed Development. AECOM Technical Services, Inc. (AECOM) prepared this report on behalf of the Rancho California Water District. The purpose of this study is to determine whether this site is impacted by off-site drainage flows, and what measures are necessary to protect the development from these flows. Additionally, this study will determine the expected on-site flows produced because of the proposed development.

1.1 Project Background

1.1.1 Regional Location and Setting

Vail Dam and Vail Lake are located in unincorporated southwestern Riverside County, east of the City of Temecula, in Southern California (see Figure 1-1). Vail Dam spans Temecula Creek, a northwesterly draining tributary of the Santa Margarita River that drains the north side of Palomar Mountain. The watershed for Vail Lake is approximately 318 square miles and the lake is fed by Temecula Creek, Wilson Creek, Kolb Creek, and Arroyo Seco.

1.1.2 Vail Dam and Reservoir

Vail Dam is a concrete arch dam spanning between concrete and rock abutments, approximately 120 feet (ft) high in the middle. The dam has a maximum height of 152 ft from the dam crest to the lowest point in the foundation and has a 3.5 ft high concrete parapet wall extending above the upstream dam crest. The dam has eight outlets, including a low-level outlet. An at-grade meter vault is located approximately 100 ft downstream, and a stream release valve building is located about 200 ft downstream of the dam. The spillway[3] is located beyond the left abutment and connects to the left abutment[4] gravity block at a right angle. The spillway is comprised of a 119 ft long ogee[5] weir[6], a 343 ft long flat-crested weir, and a 65 ft long concrete overpour weir. Access to the dam is currently available from De Portola Road via the Upper VDC Pond Access Road, and from that point, along the Canyon Access Road or North Access Road, or from SR-79 South via Vail Oak Road and the South Access Road.

1 A gravity dam is a designed to hold back water by primarily using the weight of the dam material to resist the horizontal water pressure. Gravity dams are designed for each section of the dam to be stable and independent of any other dam section.
2 The PMF is the flood that may be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible in the drainage basin under study (FEMA 2004).
3 A spillway is a structure used to provide the controlled release of flows from a dam or levee into a downstream area.
4 Abutment refers to the substructure at each end of the dam.
5 Ogee refers to the weir shape. An ogee is a curve shaped similar to the letter S, consisting of two arcs that curve in opposite directions.
6 A weir is a dam across the width of a river or stream to raise the water level or divert its flow.

Vail Lake impounds up to 42,680 acre-feet (ac-ft) of water with the reservoir at the spillway crest. The reservoir is currently used primarily for water supply but historically has been utilized for recreation also. The reservoir has a 318 square mile drainage area, which rapidly fills the reservoir in wet years. Water released from Vail Lake is typically re-stored in the Pauba Valley groundwater basin via the Upper VDC Recharge Basins. The average water level from 1978 (the year during which RCWD took ownership of Vail Dam) through May 2020 has been 1,445.1 ft NAVD88.[7] The operating level of the reservoir is dependent on a variety of factors, including restrictions on pumping into the reservoir to prevent introduction of quagga mussel,[8] requirements to recharge groundwater to reduce evaporation of stored water, mandated releases between May and October to maintain the water flow in the creek, and the amount of precipitation.

1.1.3 Seismic and Hydrologic Deficiencies

California Department of Water Resources DSOD performed seismic stability and hydrologic analyses to evaluate potential hazards to the safety of Vail Dam and identified several deficiencies. RCWD conducted seismic and hydrologic analyses and flood routing studies for the dam and reservoir in 2014, 2015, and 2016 to evaluate these concerns.

1.1.3.1 Seismic Evaluations

The DSOD conducted independent seismic stability analyses of Vail Dam and issued a Memorandum of Design Review, Seismic Evaluation in 2012. The DSOD determined that the dam is seismically deficient in its current condition.

RCWD conducted dynamic seismic analyses of the existing dam, which indicate that the stresses induced by strong ground shaking during an earthquake would exceed the dam's allowable tensile strengths on the downstream face of the arch dam. The extent and duration of the overstress is such that a failure of the dam could occur during the MCE. The analyses also indicate sliding instabilities at the base of some of the dam blocks (URS 2016).

1.1.3.2 Hydrologic Evaluations

The DSOD performed a hydrologic analysis of Vail Dam and issued a Memorandum of Hydrologic Review (URS 2013) that concluded that the dam would overtop by 3.4 ft during the PMF. The DSOD memorandum recommended that RCWD should take measures to address erosion that would result from the overtopping the dam or prevent overtopping during the PMF altogether.

RCWD conducted an independent hydrologic analysis to calculate the Probable Maximum Precipitation (PMP)[9] and PMF to verify whether Vail Dam would overtop during the PMF. It was determined that the General Storm PMF would overtop the Vail Dam parapet wall by 4.0 ft (URS 2013).

1.1.3.3 Emergency Drawdown Analysis

RCWD completed an emergency drawdown analysis to determine whether the Vail Dam outlet system is capable of lowering the maximum storage depth of the lake by 10 percent within 7 days and draining the full contents of the lake within 90 days as required by the DSOD. The results of the analysis showed that the existing outlet system is able to meet both criteria at a reduced water level but does not at the maximum normal operating level (1,457.6 ft) (URS 2013).

1.2 Proposed project: New Concrete Gravity Dam

The Proposed Project includes construction of a straight-axis concrete gravity dam structure immediately downstream of the existing arch dam. The new dam would connect to the existing abutments. The parapet wall of the new gravity dam would extend to an elevation of 1,492.0 ft NAVD88, and the existing gravity blocks and parapet walls along the existing abutments would also be raised to this elevation. A downstream parapet wall would be constructed to serve primarily as a guardrail for vehicles traversing the crest. The downstream face of the dam would be stepped concrete.

[7] NAVD88 = North American Vertical Datum of 1988

[8] The quagga mussel is an aquatic invasive species, which is known to clog water intake structures (e.g. pipes and screens), disrupt native ecosystems, and inhibit recreational activities.

[9] The PMP is defined as the greatest depth of precipitation for a given duration that is physically possible over a given size storm area at a particular geographical location during a certain time of the year (FEMA 2004).

The new dam would include new outlet works that would be designed to meet the emergency reservoir drawdown requirements.

Construction materials and methods used for the Proposed Project would take into account local seismic activity. The added straight-axis concrete gravity structure would be constructed of Roller Compacted Concrete (RCC), which would be vertical at the upstream face of the structure and at a slope of approximately 0.8 horizontal to 1 vertical (H:V), on the downstream side. The downstream face would be constructed using 4 ft high lifts and the crest would be 10 ft wide. These improvements would protect against catastrophic dam failure during an MCE.

1.2.1 Dam Layout

The new gravity dam would be constructed immediately downstream of the existing arch dam and abut the existing gravity abutments. The new gravity dam would be 6.8 ft higher than the original dam and route the PMF entirely through the existing spillway system. A 3.5 ft high parapet wall would be located on both sides of the crest. Reservoir water would not normally be against the upstream parapet wall, but the parapet wall would prevent overtopping of the dam during the PMF.

The width of the dam crest (between parapet walls) would be 15 ft to 20 ft. The crest width would allow vehicular access for construction and maintenance of the dam structure. Vehicular access would be provided by wrapping the dam around the existing right gravity abutment and providing access from the North Access Road. The existing left gravity abutment downstream of the new dam would also need to be raised.

The upstream face of the new gravity dam would be vertical. The downstream face of the dam would generally be inclined at 0.8:1 H:V, extending from the upstream edge at the crest elevation down to the downstream toe. This inclination would be steeper in the upper part of the dam. The downstream face would be formed using steps with vertical faces of 4 ft.

1.2.2 Inlet/Outlet Facilities

As stated previously, the existing arch dam has eight outlets, including a low-level outlet. A reinforced concrete outlet tower would be constructed on the upstream side of the new dam. The tower would have nine intake gates and one outlet gate. The new facilities would retain RCWD's capability to store imported water in the reservoir by filling through the existing 48-inch diameter transmission pipeline that comes up the canyon from the Upper VDC Recharge Basins. The new outlet facilities would also have the capability for emergency releases that meet regulatory requirements.

Downstream control facilities would provide for releases to Temecula Creek and valves and meters would control and measure reservoir inflows and outflows. These facilities include an energy dissipater valve vault, an energy dissipater stilling basin and outlet channel for the creek releases, and a meter vault to measure reservoir inflows and outflows.

1.2.3 Modifications to Existing Facilities

Relocation of Pipelines and Energy Dissipater Valves. There are a number of pipelines that currently service the existing dam that cross the footprint of the new dam foundation excavation. During construction, the water pipelines would be replaced with a temporary single 60-inch diameter pipeline that would connect to energy dissipater valves temporarily located downstream of the dam foundation excavation. A permanent energy dissipater valve would be constructed at the toe of the new dam.

Existing Dam Demolition. Portions of the existing arch dam would be partially demolished to allow for hydraulic connection of the reservoir with the new outlet tower. The five upper blocks of the existing dam would be removed. A berm would be constructed upstream of the existing dam to support a crane, which would be used for demolition of the existing dam.

Demolition of the existing gravity abutments would also occur where the new dam contacts those abutments. This would consist of hydroblasting and removing 2–3 inches of concrete on the sloping downstream faces of the abutments and removing the upper 6 inches of the crests of both the right and left gravity abutments.

Spillway Modifications. The existing spillway would be used as the spillway for the new gravity dam. Grouted riprap from the dam foundation excavation or dam demolition concrete would be utilized to armor the area below the ogee and overpour weirs.

1.2.4 Dam Foundation

Preparation of the new gravity dam foundation includes excavation to slightly weathered or fresh rock and then treatment of the excavated surface. Shallow consolidation grouting of the rock would increase the stiffness of the foundation. Dewatering of the excavation would also be required.

1.2.5 Seepage Control

Seepage through the dam foundation would be controlled by foundation grouting, which would include a grout curtain, possibly stitch grouting, and foundation drains. Seepage through the dam would be controlled by the upstream facing of the dam, the internal dam drains, and water stops at the concrete joints.

1.2.6 RCC Mix Design

Prior to dam construction, the RCC mix, which is comprised of aggregate, cement, and fly ash, would be designed and tested. A concrete batch plant would be located at the staging area near De Portola Road (see Figure 1-2). The objective of the RCC mix design is to develop an efficient mix that does not segregate, is easy to compact, and provides engineering properties that are consistent with the design loading.

It is currently estimated that dam construction would require approximately 81,600 cubic yards (cy) of RCC, which would utilize approximately 147,000 tons of aggregate that would need to be imported and stored on site prior to use. However, this volume would increase if additional foundation excavation is required to enhance the seismic response of the dam. Potential quarries for aggregate include a quarry located in the community of Fallbrook east of I-15 along SR-76, approximately 25 miles from the Project site, as well as a quarry located in the City of Corona. Concrete and cement would also be imported from the City of Victorville. Fly ash, a byproduct of coal power generation, would be imported from out of state.

1.2.7 Electrical, Mechanical, and Instrumentation for the Dam

The existing dam facilities have overhead electrical service provided by Southern California Edison (SCE). The existing overhead service would need to be rerouted to accommodate the footprint of the new dam and outlet works facilities. New power poles would be provided to route the existing service up the downstream side of the right abutment to the new Dam Control Building. All new electrical utility facilities would be designed per SCE standards. Power is used for lighting, security cameras, gate actuators, trash rack hoists, and monitoring and control systems.

1.2.8 Site Development

The Project site would need to be further developed to support construction and operation of the new dam. This would include improvements to access roads, provision for construction staging and material disposal areas, and partial demolition of the existing dam.

Construction Access Roads. Improvements would be required to existing access roads to accommodate construction traffic. These include Pond Access Road #1, the access road from De Portola Road (an existing, paved road) to the mouth of the canyon, the North Access Road, the Canyon Access Road, and the South Access Road (which connects to SR-79 South) (see Figure 1-2). Pond Access Road #2 is a proposed alternate access point from De Portola Road, connecting to Pond Access Road #1 at the edge of the Upper VDC Recharge Basins.

North Access Road. There is an existing unimproved North Access Road that traverses approximately 2 miles from the northeast corner of the Upper VDC percolation ponds to the right abutment of the existing dam. This access road would be improved to provide vehicular access to the crest of the new dam (Figure 1-2). The North Access Road would be the primary access route to the new dam. Vehicular access is not feasible from the left abutment due to the height of the existing left gravity abutment.

The improvements would include gravel surfacing and improvement of drainage. Material from excavation of the dam foundation may be reused to improve the North Access Road. The road would remain a single lane road. Realignment would be needed where the road is outside of the property boundary and where excavation through a rock knob would be required.

Canyon Access Road. The existing unpaved access road through the canyon below the dam is approximately 2 miles long and is currently a single lane bound on both sides by vegetation with limited sight lines (Figure 1-2). This access road would need to be widened to two lanes (25 ft total width) for construction traffic, with several turnouts to allow vehicles to pass. Widening would be accomplished through removal of the existing vegetation on both sides of the current roadway (no physical widening would be required). This widening would be only for the purpose of construction, and the access road would be revegetated and restored to a single lane after construction of the dam is complete. Other improvements to the Canyon Access Road would include gravel surfacing. The existing five Arizona type crossings of the creek would remain; however, temporary culverts may be required during construction at the five Arizona crossings to provide construction vehicle crossings.

Pond Access Roads. Initially, site access would be provided via an existing unpaved access road and along the north side of the Upper VDC recharge basins (Pond Access Road #1) (refer to Figure 1-2). Pond Access Road #2 is a short segment that would connect Pond Access Road #1 to De Portola Road, and would be constructed within property owned by RCWD, south of the future Upper VDC Regional Pump Station and Chlorine Contact Tank Project (RCWD Project No. D1903), avoiding conflict with that project. Pond Access Road #2 would provide for two-way traffic (25 ft total width), and include gravel surfacing and would also provide access to one of the construction staging areas. Once Pond Access Road #2 has been completed, the majority of construction access for the Project area would be provided along that route. The existing access for Pond Access Road #1 at De Portola Road would provide a secondary access point when required.

South Access Road. The current South Access Road would need to be relocated as it is within the footprint of the foundation excavation of the new dam. A new roadway embankment would be constructed along the north facing slope of the canyon, approximately 150 ft downstream of the existing access road. The alignment of the new South Access Road is shown on Figure 1-2. This location was selected to provide access from the spillway area and to provide an area immediately downstream of the new dam for construction staging.

It is anticipated that the South Access Road embankment would be constructed using materials excavated for the new dam foundation. This road would also have gravel surfacing and drainage improvements. The South Access Road would be inundated whenever the reservoir overflows; therefore, during operation, major erosion would need to be repaired on this road after spill events.

Construction Staging and Disposal Areas. The site development would include staging areas to support construction and demolition activities. Material disposal areas are also planned for placement of excess foundation excavation spoils.

Staging Areas. Limited area is available immediately adjacent to the proposed dam and downstream due to the narrow width of this portion of the canyon. Therefore, staging areas have been identified in various locations, including the relatively level area downstream of the spillway, wider portions of the canyon downstream of the dam, and within a vacant portion of RCWD's property adjacent to De Portola Road. The proposed staging areas are shown on Figure 1-2. Staging areas include aggregate stockpile areas, laydown areas, and access and staging areas. It is anticipated that the contractor would determine the optimal locations within the staging areas for each activity. Staging areas would be required to provide the following:

1. **RCC Mix Plant Area:** This area would contain a portable concrete mix plant with silos of cement and fly ash and stockpiles of aggregate in 3 to 4 sizes. This mix plant area is anticipated to require the larger of the staging areas and would likely be located near De Portola Road, as all materials would be brought in from off-site locations. The RCC would be hauled from the mix plant to the dam site with off-road trucks.

2. **Foundation Grout Mix Plant:** This area would contain a small mix plant for the grout used in the foundation grouting. This grout mix plant would be located adjacent to the dam site.

3. **Crushing Plant:** This area would contain a portable rock crushing plant for crushing materials excavated from the dam foundation. Because of the limited space available adjacent to the dam, it is likely that the crushing plant will be located in a mid-canyon area.

4. **Contractor Trailers:** Both the contractor's and engineer's field offices would be located within staging areas.

5. **Laydown Areas:** These areas would provide material laydown/storage areas and space for activities such as fabricating rebar and assembling concrete forms, etc.

Disposal Areas. As discussed previously, approximately 58,400 cy of materials (including the previous foundation spoils, alluvium, fill, and moderately weathered rock) would be generated for excavation for the dam foundation. Most of this material would be used to grade the new alignment of the South Access Road, and a limited quantity of the less weathered rock would be used as riprap for spillway armoring. The balance of the excavation materials would require removal from the dam area and subsequent disposal. RCWD currently plans to keep the excess materials on its property for possible future re-use. Disposal areas have been identified near the mouth of the canyon as shown on Figure 1-2. Off-site disposal, if needed, would be at a nearby licensed landfill. Prior to revegetation, the disposal materials may need to be buried under soil in order to allow for plant establishment.

1.2.9 Construction Schedule

Construction of the new dam is anticipated to be initiated in the fall of 2022 and completed in the spring of 2025. It is anticipated that the new dam and outlet works would be substantially complete in approximately 23 months. The existing dam would then be partially demolished after completion of the tower, and it is expected that construction would be complete in approximately 29 months (AECOM 2019).

2. Watershed Description

The project site is located in the Santa Margarita watershed. The major surface water body within the Santa Margarita Watershed is the Santa Margarita River, which drains in a westerly direction from headwaters in Riverside County to the Santa Margarita Estuary and the Pacific Ocean. Major tributaries to the Santa Margarita River include Temecula Creek, Murrieta Creek, De Luz Creek, Sandia Creek, and Rainbow Creek Major tributaries of Temecula Creek include Pechanga Creek and Wilson Creek via Vail Lake.

Existing land use north of the project site generally consists of undeveloped property and is considered rural mountainous or open space–conservation as shown in Figure 1-3. To the south of the project site land is mostly undeveloped property open space – rural. The area on the east is also undeveloped property open space – rural. To the west, the area consists of developed ranch property within the Valle de Caballos (VDC) Policy Area with land designation of rural residential and RCWD Upper VDC Groundwater Recharge Basins.

3. Hydrology

3.1 Previous Hydrology Study

As described in Section 1.1.3.2, previously a hydrologic analysis was performed for Vail dam to determine PMP and conduct drawdown analysis. The study drainage area was of 318 sq miles contributing to Vail Lake. The current project site consisting of access roads was not part of that study.

3.2 Precipitation

For this hydrologic analysis, estimation of peak runoff from the drainage areas is required to determine the peak runoff discharge into the existing drainage feature (Temecula Creek). Because peak runoff is estimated by the Rational Method, the isohyetal maps of point precipitation for the 1-hour storm contained within the RCFC&WCD hydrology manual were used to develop the intensity-frequency-duration curves necessary for the calculations.

The 1-hour duration map was developed by the using information and equations from the National Oceanic and Atmospheric Administration Atlas 2, Precipitation-Frequency Atlas of the Western United States, Volume XI-California published in 1973. The 10-year and 100-year 1-hour precipitation depths for Vail Lake are 0.86 inches and 1.28 inches respectively as shown on Plate D-4.3 & D-4.4 of the RCFC&WCD hydrology manual. The NOAA Atlas 14 point precipitation for 10-year and 100-year 1-hour are 1.09 inches and 1.86 inches respectively.

The rainfall intensity (in/hr) of 0.88 in/hr (10-yr) and 1.3 in/hr (100-yr) was used for the site as per Plate D-4.1 RCFC&WCD, 1978).

3.2 Hydrologic Soil Group

The Natural Resource Conservation Service (NRCS, formerly the Soil Conservation Service) and the US Forest Service have mapped the soils in many areas of Riverside County based on the soil's infiltration capabilities as classified by the NRCS. The NRCS categorized soils into four hydrologic soil groups according to their minimum infiltration rate. The four hydrologic soil groups consist of:

- Group A – soils having high rates of infiltration (greater than 0.3 inches/hour);
- Group B – soils having moderate rates of infiltration (0.15 – 0.3 inches/hour);
- Group C – soils having low rates of infiltration (0.05 – 0.15 inches/hour); and
- Group D – soils having very low rates of infiltration (0 - 0.05 inches/hour).

On plate C-1.62 of the RCHM, soil near Vail Lake has been placed in the Group C/D hydrologic soil group, i.e. the soils have a slow rate of water transmission and have a medium to high potential to produce runoff. The river wash area (Canyon Access Road) is Group A soil. NRCS web soil survey describe the soils as rocky loam and sandy loam.

3.3 Soil Cover and Vegetation Type

The type of vegetation, or soil cover, as well as the quality and density of that soil cover within the watershed have a major impact on the infiltration capacity of a given soil. RCFC&WCD uses the system developed by the NRCS to consider and account for soil cover. Vegetation are diverse in the area with scrub communities (inland sage scrub, chaparral etc) dominant along with woodland vegetation (AECOM, 2019).

The Open Brush / Woodland cover type described in the RCHM most closely matched the vegetation at the site (Plate C-2). Because the storm event used for this study is a general storm occurring during the winter as opposed to the drier summer conditions, the quality of the soil cover was considered to be in Fair condition. Fair cover quality is described as moderate cover with 50 percent to 75 percent of the ground surface protected.

3.4 Antecedent Moisture Conditions

The RCHM defines antecedent moisture conditions (AMC) as the relative wetness of a watershed just prior to a runoff producing storm event. If a storm event was preceded by a separate, significant storm event that increased the water content of the soil, less storage is available within the soil pore space. This is accounted for through the AMC as follows:

AMC I – Lowest runoff potential. The watershed soils are dry enough to allow satisfactory grading or cultivation to take place.

AMC II – Moderate runoff potential, an intermediate condition.

AMC III – Highest runoff potential. The soil is practically saturated from antecedent rains.

For the purposes of design hydrology, the RCHM requires using AMC II for hydrologic analysis of the 10-year and 100-year storms. AMC II was the condition considered for the analysis.

3.3 Methodology

Hydrologic calculations were performed in accordance with the Riverside County Flood Control and Water Conservation District Hydrology Manual (RCFC&WCD, 1978). Calculations were completed for the 10-year and 100-year recurrence interval storms for existing and project conditions at the Vail Dam.

Peak storm runoff generated from tributary areas was estimated using the Rational Method described in the RCHM. The Rational Method estimates peak discharge in cubic feet per second (cfs) based on the product of:

- C, runoff coefficient that accounts for infiltration and its related factors as well as the proportion of pervious to impervious area;
- I, intensity of rainfall in inches per hour (in/hr); and
- A, tributary area in acres.

Using the elevation contours provided on the plans, tributary areas were delineated as shown on Figure 2-1 & 2-2.

Kirpich Equation Tc = K*[(Length**3)/(Elev Change)]**.2) is used for Tc calculations as used in County accepted Softwares for Rational Method. The Tc for initial subarea was calculated as 12.4 minutes (see spreadsheet in Appendix A).

3.4 Watershed and Subarea Delineation

As described in Section 1 of this report, the proposed project is to construct a new gravity dam and improve the access roads serving the dam. The proposed project limits comprise of approximately 50 acres and is not expected to have a change in the overall hydrology of the watershed either during or post construction of the dam. The new impervious area added to the watershed to construct the new gravity dam is approx. 1 acre and is not to have impact on the existing surface flow drainage patterns of the watershed (Figure 2-3).

For the purpose of this report, drainage areas immediately downstream and up to approximately 1500 feet of the existing and proposed dam were delineated and studied. Further downstream, there are no changes in the impervious cover, and therefore the hydrology remains the same for existing and project conditions.

The subareas were delineated by CAD utilizing the surface contour data. The subareas and the flow patterns for existing and proposed condition are shown in Figures 2-1 & 2-2.

4. Existing Condition Analysis

The site existing condition (pre-project) consists of existing arch dam, spillway structure and dirt roads for access to dam. The current site condition consists of access roads that drain to Vail lake. The current impervious area is considered negligible since the existing roads are unpaved/unimproved.

For the purpose of this analysis, only areas immediately downstream of the existing dam, up to approximately 1500 ft was included (Figure 2-1). It was considered justified since only Subarea A1 has changes in the percent imperviousness due to the new gravity dam (including Dam Control Building). The rest of the watershed land cover is expected to remain the same.

Table 4-1 below summarize the calculations for the Existing condition analysis for the drainage area. The 10-year storm would produce approximately 79.15 cfs of runoff assuming all flow reaches the point of concentration. The 100-year storms would produce 126.54 cfs.

Table 4-1 Existing Condition Analysis for 10-yr and 100-yr storm

Existing Condition Peak flow rates for 100-yr storm							
Sub-area	**Area (ac)**	**Impervious Percent**	**Rainfall Intensity (in/hr)**	**Runoff Index**	**Runoff Coefficient**	**Flow Rate (cfs)**	**∑ Flow Rate (cfs)**
A1	5.36	0	3.09	81	0.71	11.77	11.77
A2	8.23	0	2.98	75	0.68	16.70	28.48
A3	7.39	0	2.96	75	0.68	14.89	43.37
A4	13.33	0	2.75	81	0.71	26.06	69.42
A5	12.67	0	2.67	81	0.71	24.03	93.45
A6	19.58	0	2.48	75	0.68	33.08	126.54
Existing Condition Peak flow rates for 10-yr storm							
Sub-area	**Area (ac)**	**Impervious Percent**	**Rainfall Intensity (in/hr)**	**Runoff Index**	**Runoff Coefficient**	**Flow Rate (cfs)**	**∑ Flow Rate (cfs)**
A1	5.36	0	2.09	81	0.68	7.63	7.63
A2	8.23	0	2.02	75	0.62	10.30	17.93
A3	7.39	0	2.00	75	0.62	9.17	27.10
A4	13.33	0	1.84	81	0.68	16.67	43.77
A5	12.67	0	1.78	81	0.68	15.33	59.11
A6	19.58	0	1.65	75	0.62	20.04	79.15

5. Project Condition Analysis

The site would be developed to support construction and operation of the new gravity dam. This includes improvements to access road, provision for construction and staging areas, material disposal areas and new gravity dam. The improvements, however, would result in approx. 1 acre increase in the impervious area mainly due to the gravity dam surface area.

As shown in Figure 2-2, only areas immediately downstream of the existing dam were included in the project condition peak flow analysis. Subarea A1 percent impervious will increase approximately 21 percent due to construction of the gravity dam.

Table 5-1 below summarize the calculations for the Project condition analysis for the drainage area. The 10-year storm would produce approximately 79.77 cfs of runoff assuming all flow reaches the point of concentration. The 100-year storms would produce 127.53 cfs.

Table 5-1 Project Condition Analysis for 10-yr and 100-yr storm

Project Condition Peak flow rates for 100-yr storm							
Subarea	Area (ac)	Impervious Percent	Rainfall Intensity (in/hr)	Runoff Index	Runoff Coefficient	Flow Rate (cfs)	∑ Flow Rate (cfs)
A1	5.36	21	3.09	84	0.77	12.77	12.77
A2	8.23	0	2.98	75	0.68	16.70	29.47
A3	7.39	0	2.96	75	0.68	14.89	44.36
A4	13.33	0	2.75	81	0.71	26.06	70.42
A5	12.67	0	2.67	81	0.71	24.03	94.45
A6	19.58	0	2.48	75	0.68	33.08	127.53
Project Condition Peak flow rates for 10-yr storm							
Subarea	Area (ac)	Impervious Percent	Rainfall Intensity (in/hr)	Runoff Index	Runoff Coefficient	Flow Rate (cfs)	∑ Flow Rate (cfs)
A1	5.36	21	2.09	84	0.74	8.25	8.25
A2	8.23	0	2.02	75	0.62	10.30	18.54
A3	7.39	0	2.00	75	0.62	9.17	27.72
A4	13.33	0	1.84	81	0.68	16.67	44.39
A5	12.67	0	1.78	81	0.68	15.33	59.72
A6	19.58	0	1.65	75	0.62	20.04	79.77

6. Conclusion

Based on the analyses and results of this report, the following conclusions were derived from the hydrology results:

- The project condition peak flows for 10-year and 100-year storm are increased by <1% or <1 cfs from existing condition. This increase in peak flow is considered negligible and would not impact flooding condition to up stream or downstream properties.
- The energy dissipator basin downstream of the new dam will be designed to accommodate increased flow from Subarea A1, which would be the source of the highest increase in peak runoff.
- The land cover remains the same (pervious) in Subareas A2 through A6 for existing and proposed conditions; therefore, there is no increase in peak flow for these areas and mitigation is not required.

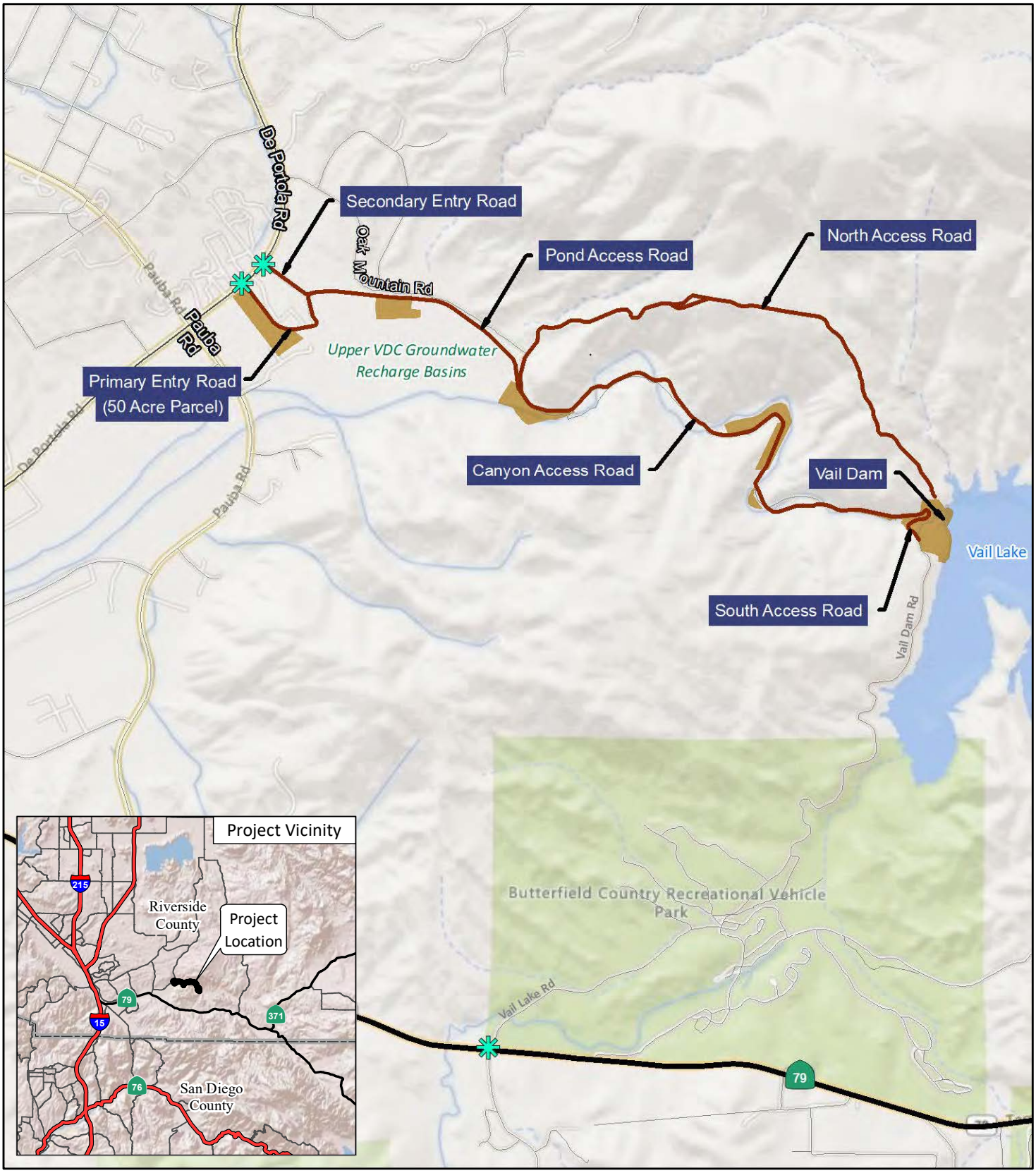
7. References

AECOM, 2013. Hydrologic Report, Vail Dam. Prepared for RCWD, November 8, 2013.

AECOM, 2019. Preliminary Design Report (30% Design), Vail Dam Seismic and Hydrologic Remediation Project. Prepared for RCWD, August 22, 2019

Riverside County Flood Control and Water Conservation District (RCFC&WCD), 1978. Hydrology Manual. April, 1978.

Figures



LSA

LEGEND

- Project Feature Access Roads
- Project Feature Areas
- Site Access Point

0 1250 2500
FEET

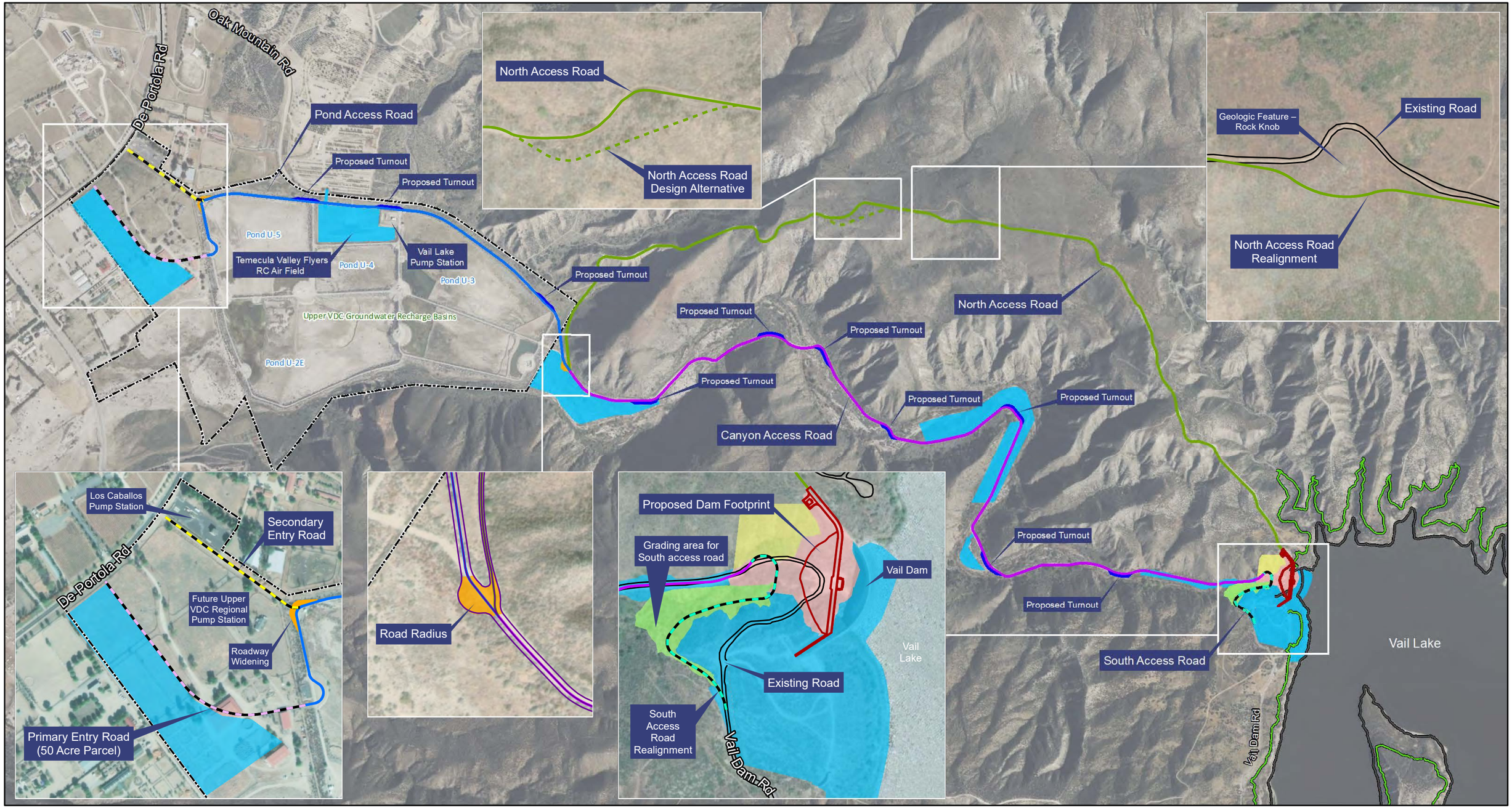
FIGURE 1-1

Vail Dam Seismic and Hydrologic Remediation Project

Project Vicinity

SOURCE: Bing Maps (2018); AECOM (6/2022)

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LSA

LEGEND

- Canyon Access Road
- North Access Road
- North Access Road Design Alternative
- Primary Entry Road (50 Acre Parcel)
- Secondary Entry Road
- Pond Access Road
- Realigned South Access Road
- Proposed Truck Turnout
- Roadway Radius
- Proposed Dam Footprint
- Property Boundary
- Dam Construction Area
- South Access Road Construction Area
- Staging and Laydown Area
- Temporary Construction Area
- Spillway Crest Elevation (1472.6' NAVD88)
- Current Water Level (1428.2' NAVD88)

N

0 500 1000
FEET

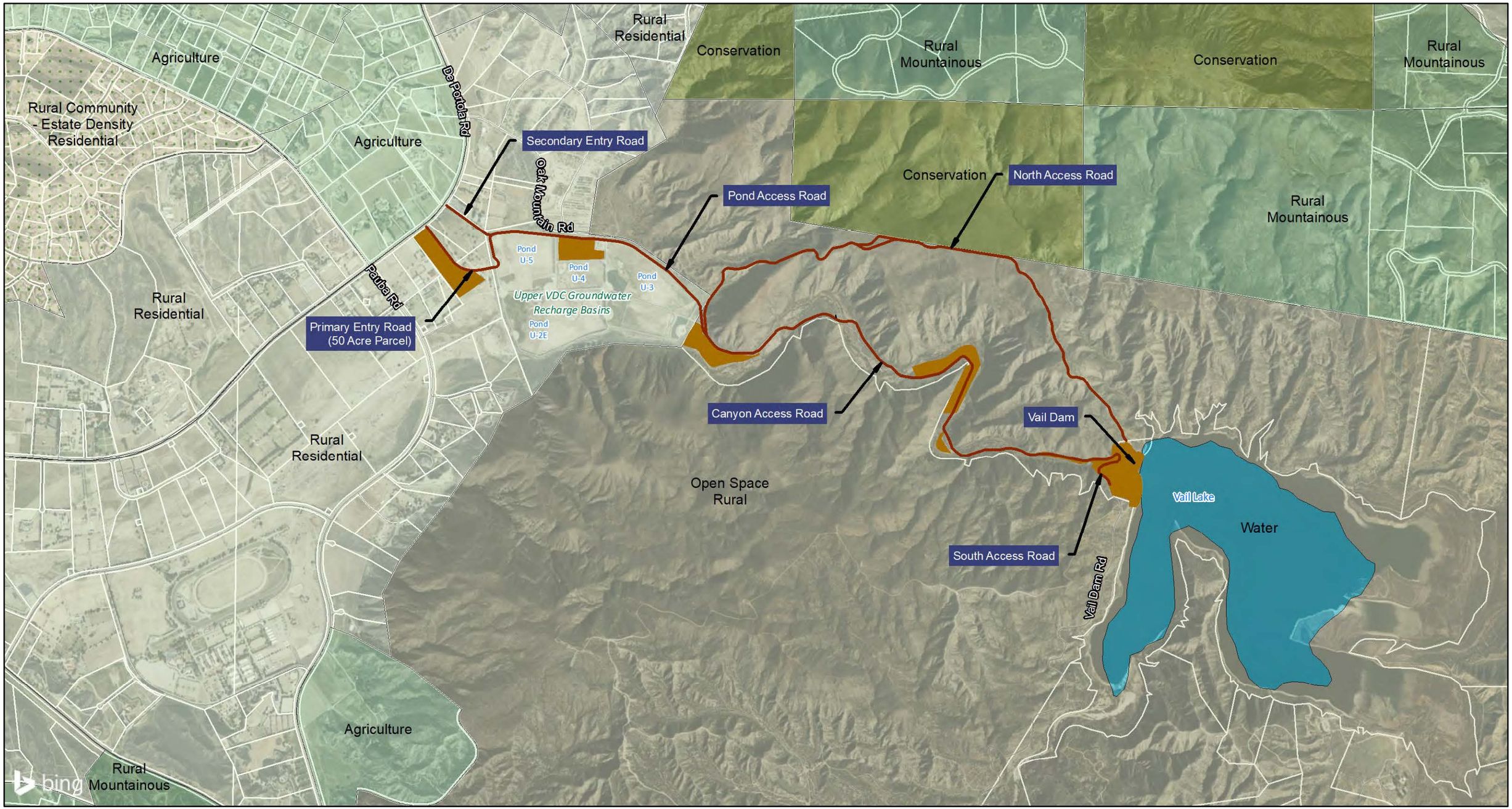
SOURCE: Bing Maps (2020); AECOM (6/2022)

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FIGURE 1-2

Vail Dam Seismic and Hydrologic Remediation Project

Staging/Laydown Areas and Access Roads



LSA

LEGEND

- Project Feature Access Roads
- Project Feature Areas

Surrounding Land Use

- Rural Community - Estate Density Residential
- Rural Residential
- Rural Mountainous
- Agriculture
- Conservation
- Open Space Rural
- Water

0 850 1700
FEET

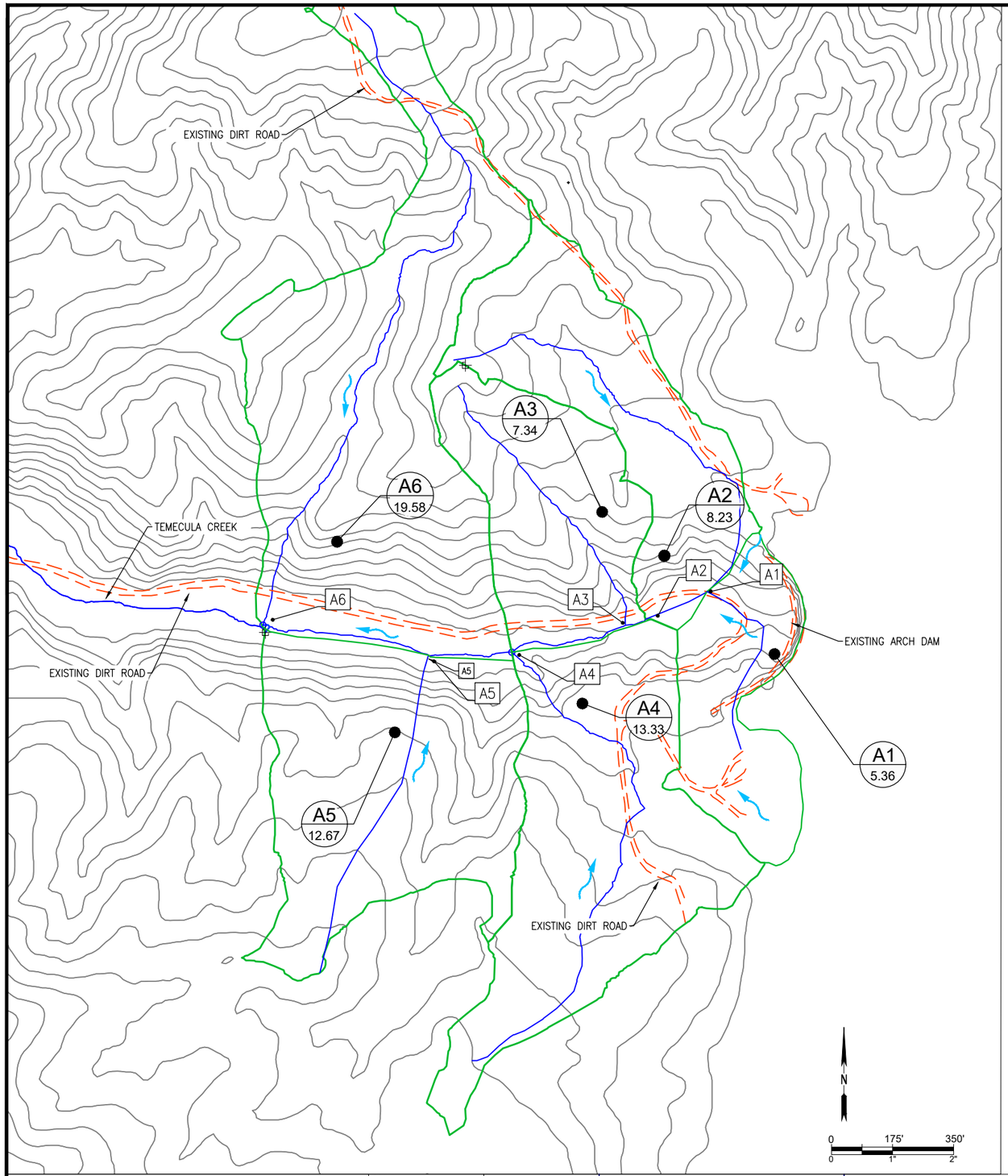
FIGURE 1-3

Vail Dam Seismic and Hydrologic Remediation Project

Surrounding Land Use

SOURCE: Bing Maps (2020); AECOM (6/2022); Riverside County Transportation and Land Use Management Agency (2012)

I:\RCW1902\GIS\MXD\EIR-EIS\LandUse.mxd (7/15/2022)



LEGEND:

- EXISTING DIRT ROAD
- EXISTING CONTOUR
- WATERSHED BOUNDARY
- FLOW PATH
- FLOW ARROW
- A1 / 13.6 — WATERSHED NAME / AREA
- A1 — CONCENTRATION POINT

	A	B	C	D	E	F
1	EXISTING CONDITION 100-YR STORM					
2	SUBAREA	AREA (acres)	IMPERVIOUS PERCENT	RAINFALL INTENSITY (in/hr)	RUNOFF COEFFICIENT	Σ FLOW RATE (cfs)
3	A1	5.36	0.00	3.09	0.71	11.77
4	A2	8.23	0.00	2.98	0.68	28.48
5	A3	7.39	0.00	2.96	0.68	43.37
6	A4	13.33	0.00	2.75	0.71	69.42
7	A5	12.67	0.00	2.67	0.71	93.45
8	A6	19.58	0.00	2.48	0.68	126.54

NOT FOR CONSTRUCTION

R.C.W.D. RECORD DWG NO.

REVISIONS

NUMBER	DATE	INITIALS	DESCRIPTION

SCALE AS SHOWN
DESIGNED XXX
DRAWN XXX
CHECKED XXX

AECOM
999 TOWN & COUNTRY ROAD
ORANGE, CA 92868
TEL (714) 567-2400

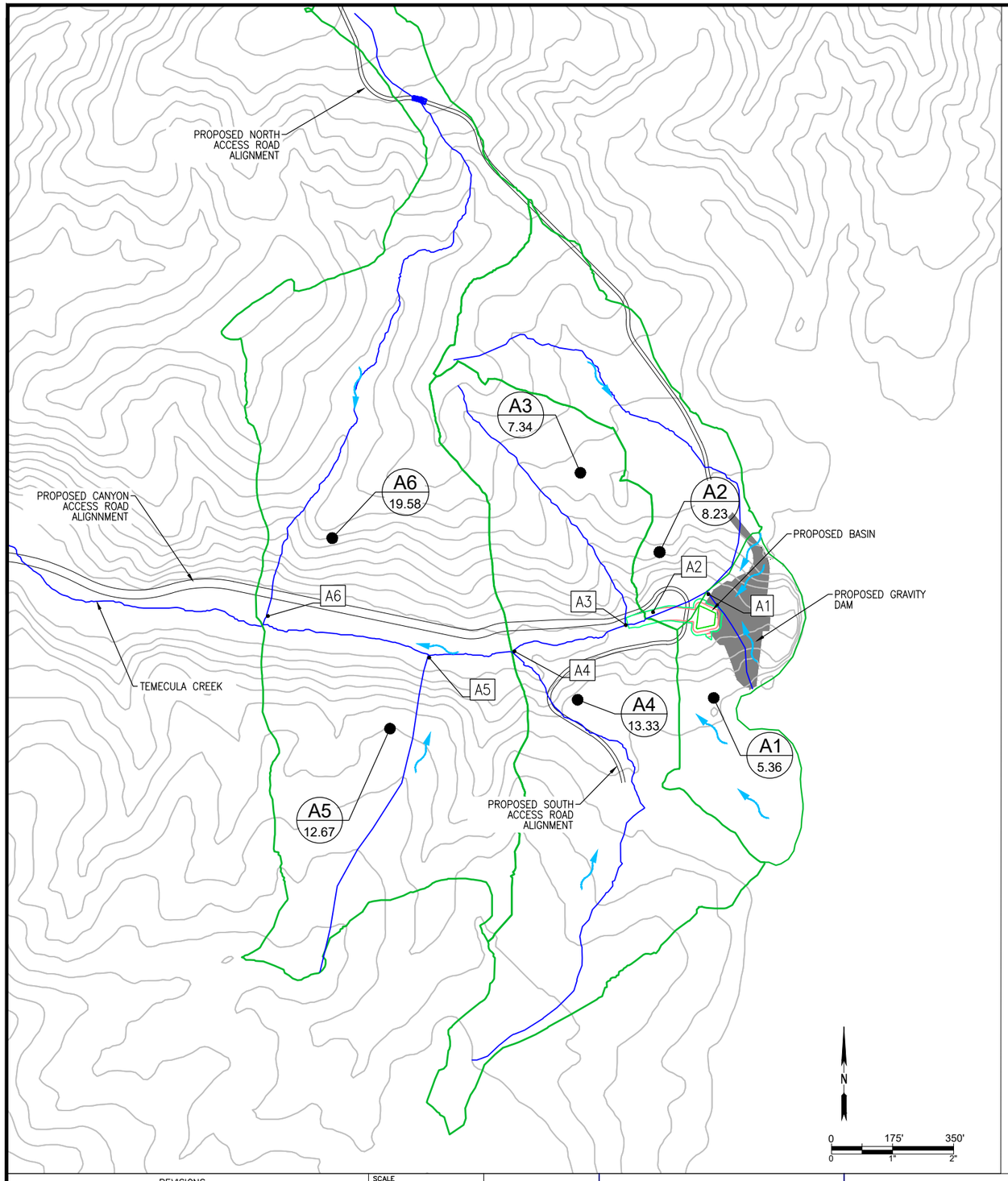
Rancho Water
Rancho California Water District
42135 Winchester Road
Temecula, CA 92590
Phone: (951) 296-6900 Fax: (951) 296-6863

RANCHO CALIFORNIA WATER DISTRICT
APPROVED FOR CONSTRUCTION
Engineering Manager Date
Engineering Date | Contracts & Inspection Date | Operations & Maintenance Date

RANCHO CALIFORNIA WATER DISTRICT
VAIL DAM SEISMIC AND HYDROLOGIC REMEDIATION PROJECT
PROJECT NO. D1911

FIGURE 2-1 EXISTING CONDITION HYDROLOGY MAP

SHEET X
SHEET OF 98



LEGEND:

- PROPOSED ROAD ALIGNMENTS
- EXISTING CONTOUR
- WATERSHED BOUNDARY
- FLOW PATH
- FLOW ARROW
- A1 / 13.6 — WATERSHED NAME / AREA
- A1 — CONCENTRATION POINT

PROJECT CONDITION 100-YR STORM					
SUBAREA	AREA (acres)	IMPERVIOUS PERCENT	RAINFALL INTENSITY (in/hr)	RUNOFF COEFFICIENT	Σ FLOW RATE (cfs)
A1	5.36	21.00	3.09	0.77	12.77
A2	8.23	0.00	2.98	0.68	29.47
A3	7.39	0.00	2.96	0.77	44.36
A4	13.33	0.00	2.75	0.71	70.42
A5	12.67	0.00	2.67	0.71	94.45
A6	19.58	0.00	2.48	0.68	127.53

NOT FOR CONSTRUCTION

R.C.W.D. RECORD DWG NO.

REVISIONS

NUMBER	DATE	INITIALS	DESCRIPTION

SCALE: AS SHOWN
DESIGNED: XXX
DRAWN: XXX
CHECKED: XXX

AECOM
999 TOWN & COUNTRY ROAD
ORANGE, CA 92868
TEL (714) 567-2400

Rancho Water
Rancho California Water District
42135 Winchester Road
Temecula, CA 92590
Phone: (951) 296-6900 Fax: (951) 296-6863

RANCHO CALIFORNIA WATER DISTRICT
APPROVED FOR CONSTRUCTION

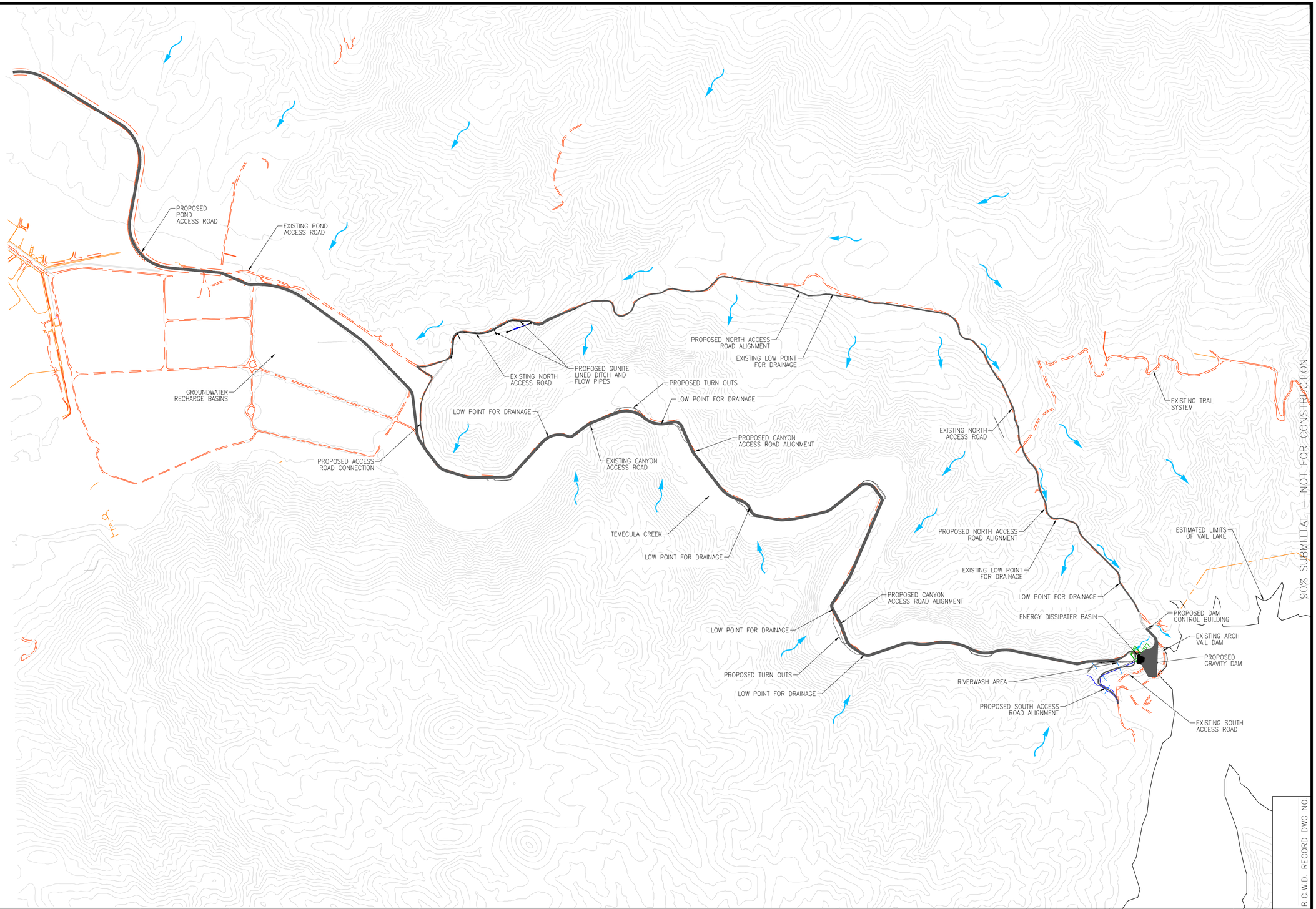
Engineering Manager Date

Engineering Date | Contracts & Inspection Date | Operations & Maintenance Date

RANCHO CALIFORNIA WATER DISTRICT
VAIL DAM SEISMIC AND HYDROLOGIC REMEDIATION PROJECT
PROJECT NO. D1911

FIGURE 2-2 PROJECT CONDITION HYDROLOGY MAP

SHEET X
SHEET OF 98



90% SUBMITTAL – NOT FOR CONSTRUCTION

R.C.W.D. RECORD DWG NO.

REVISIONS			
NUMBER	DATE	INITIALS	DESCRIPTION

SCALE AS SHOWN

DESIGNED XXX

DRAWN XXX

CHECKED XXX

AECOM
999 TOWN & COUNTRY ROAD
ORANGE, CA 92868
TEL (714) 567-2400

Rancho Water
Rancho California Water District
42135 Winchester Road
Temecula, CA 92590
Phone: (951) 296-6900 Fax: (951) 296-6863

RANCHO CALIFORNIA WATER DISTRICT

APPROVED FOR CONSTRUCTION

Engineering Date

RANCHO CALIFORNIA WATER DISTRICT

VAIL DAM SEISMIC AND HYDROLOGIC REMEDIATION PROJECT
PROJECT NO. D1911

FIGURE 2-3 OVERALL SITE MAP

SHEET C-----

SHEET XX OF 102

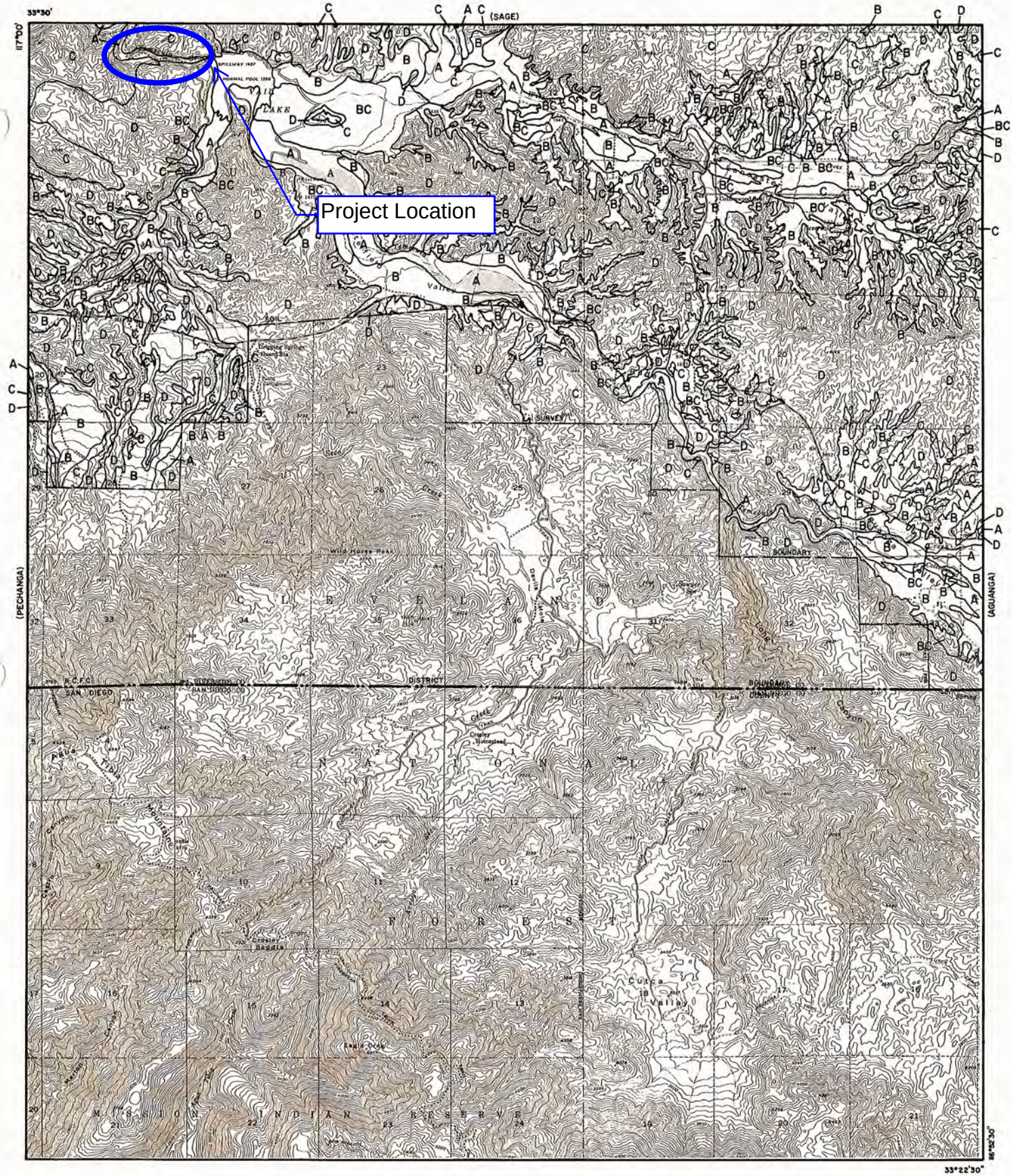
Appendix A

Rational Method Calculation Spreadsheet

Rational Method Calculations																
Sub-Area	Soil Group[1]	Cover Type[2]	Area (acres)	Percent Impervious	Rainfall Intensity[3] (in/hr)	Runoff Index[4]	Runoff Coefficient[5]	Δ Flow rate (cfs)	∑ Flow Rate (cfs)	Upper Elevation (ft)	Lower Elevation (ft)	Length of flow (ft)	Slope (ft/ft)	Velocity	Δ Time of Concentration[6] (min)	∑ Time of Concentration (min)
100-year Existing Condition																
A1	D	Open Brush/Woodland	5.36	0	3.09	81	0.71	11.77		1475	1360	570	0.202		12.40	
A2	C	Open Brush/Woodland	8.23	0	2.98	75	0.68	16.70	28.48	1360	1356	185	0.022	3.82	0.81	13.21
A3	C	Open Brush/Woodland	7.39	0	2.96	75	0.68	14.89	43.37	1356	1353	62	0.048	5.9	0.18	13.39
A4	D	Open Brush/Woodland	13.33	0	2.75	81	0.71	26.06	69.42	1353	1349	349	0.011	2.94	1.98	15.37
A5	D	Open Brush/Woodland	12.67	0	2.67	81	0.71	24.03	93.45	1349	1345	241	0.017	4.77	0.84	16.21
A6	C	Open Brush/Woodland	19.58	0	2.48	75	0.68	33.08	126.54	1345	1340	492	0.010	3.68	2.23	18.44
100-year Project Condition																
A1	D	Open Brush/Woodland	5.36	21	3.09	84	0.77	12.77		1475	1360	570	0.202		12.40	
A2	C	Open Brush/Woodland	8.23	0	2.98	75	0.68	16.70	29.47	1360	1356	185	0.022	3.82	0.81	13.21
A3	C	Open Brush/Woodland	7.39	0	2.96	75	0.68	14.89	44.36	1356	1353	62	0.048	5.9	0.18	13.39
A4	D	Open Brush/Woodland	13.33	0	2.75	81	0.71	26.06	70.42	1353	1349	349	0.011	2.94	1.98	15.37
A5	D	Open Brush/Woodland	12.67	0	2.67	81	0.71	24.03	94.45	1349	1345	241	0.017	4.77	0.84	16.21
A6	C	Open Brush/Woodland	19.58	0	2.48	75	0.68	33.08	127.53	1345	1340	492	0.010	3.68	2.23	18.44
10-year Existing Condition																
A1	D	Open Brush/Woodland	5.36	0	2.09	81	0.68	7.63		1475	1360	570	0.202		12.40	
A2	C	Open Brush/Woodland	8.23	0	2.02	75	0.62	10.30	17.93	1360	1356	185	0.022	3.51	0.88	13.28
A3	C	Open Brush/Woodland	7.39	0	2.00	75	0.62	9.17	27.10	1356	1353	62	0.048	5.23	0.2	13.48
A4	D	Open Brush/Woodland	13.33	0	1.84	81	0.68	16.67	43.77	1353	1349	349	0.011	2.6	2.24	15.72
A5	D	Open Brush/Woodland	12.67	0	1.78	81	0.68	15.33	59.11	1349	1345	241	0.017	4.24	0.95	16.67
A6	C	Open Brush/Woodland	19.58	0	1.65	75	0.62	20.04	79.15	1345	1340	492	0.010	3.27	2.51	19.18
10-year Project Condition																
A1	D	Open Brush/Woodland	5.36	21	2.09	84	0.74	8.25		1475	1360	570	0.202		12.40	
A2	C	Open Brush/Woodland	8.23	0	2.02	75	0.62	10.30	18.54	1360	1356	185	0.022	3.51	0.88	13.28
A3	C	Open Brush/Woodland	7.39	0	2.00	75	0.62	9.17	27.72	1356	1353	62	0.048	5.23	0.2	13.48
A4	D	Open Brush/Woodland	13.33	0	1.84	81	0.68	16.67	44.39	1353	1349	349	0.011	2.6	2.24	15.72
A5	D	Open Brush/Woodland	12.67	0	1.78	81	0.68	15.33	59.72	1349	1345	241	0.017	4.24	0.95	16.67
A6	C	Open Brush/Woodland	19.58	0	1.65	75	0.62	20.04	79.77	1345	1340	492	0.010	3.27	2.51	19.18

Source: RCFC&WCD 1978
1. Plate C-1.15
2. Plate C-2
3. Plate D-4.1
4. Plate D-5.5
5. Plate D-5.7
6. Tc = K*[(Length**3)/(Elev. Change)]**.2, K=0.709

Soils Map
(Plate C-1.62)



LEGEND

—— SOILS GROUP BOUNDARY

A SOILS GROUP DESIGNATION

RCFC&WCD

HYDROLOGY MANUAL

N

0 FEET 5000

HYDROLOGIC SOILS GROUP MAP FOR VAIL LAKE

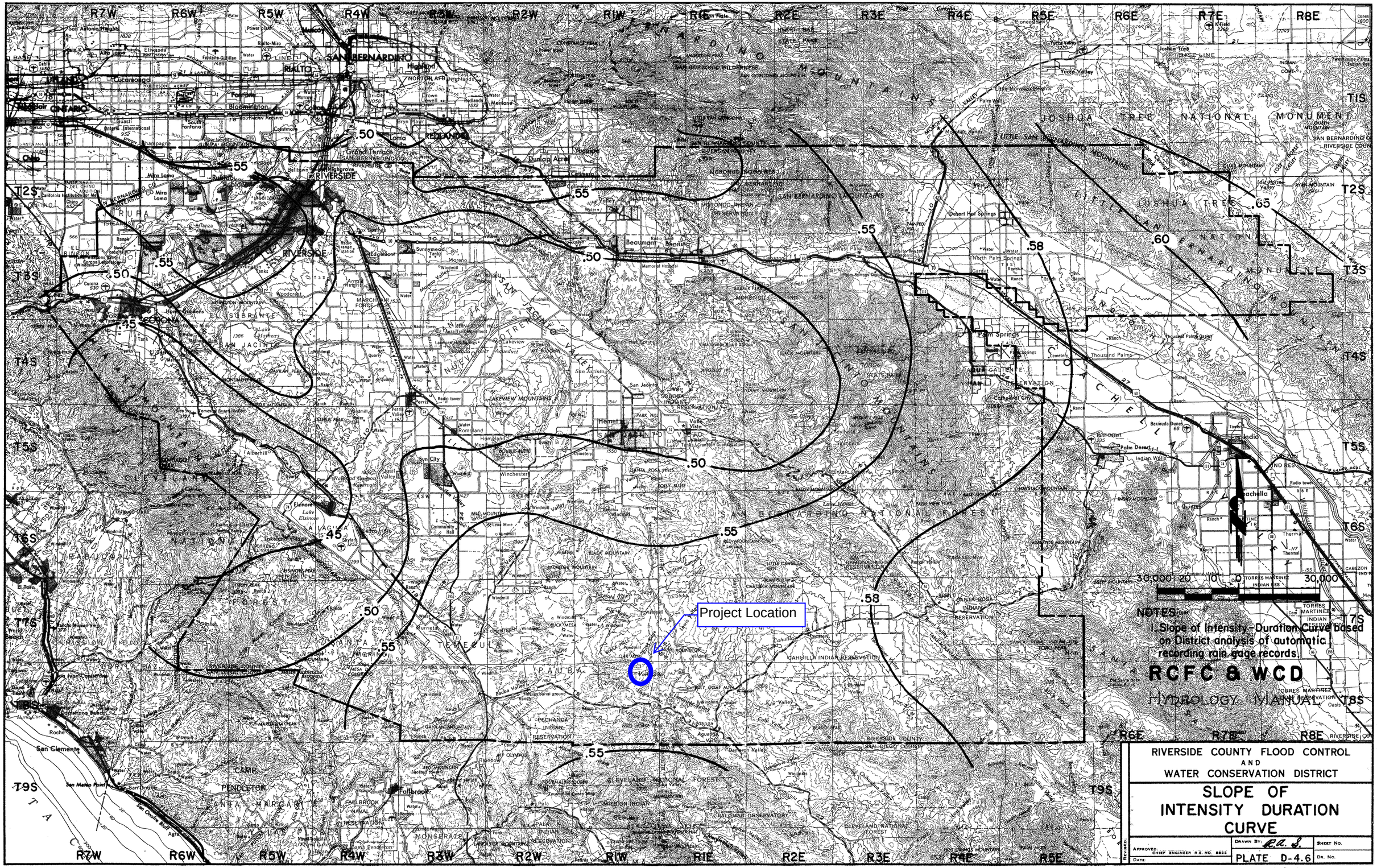
PLATE C-1.62

Standard Intensity-Duration Curves (Plate D-4.1, 4 of 6; D-4.6)

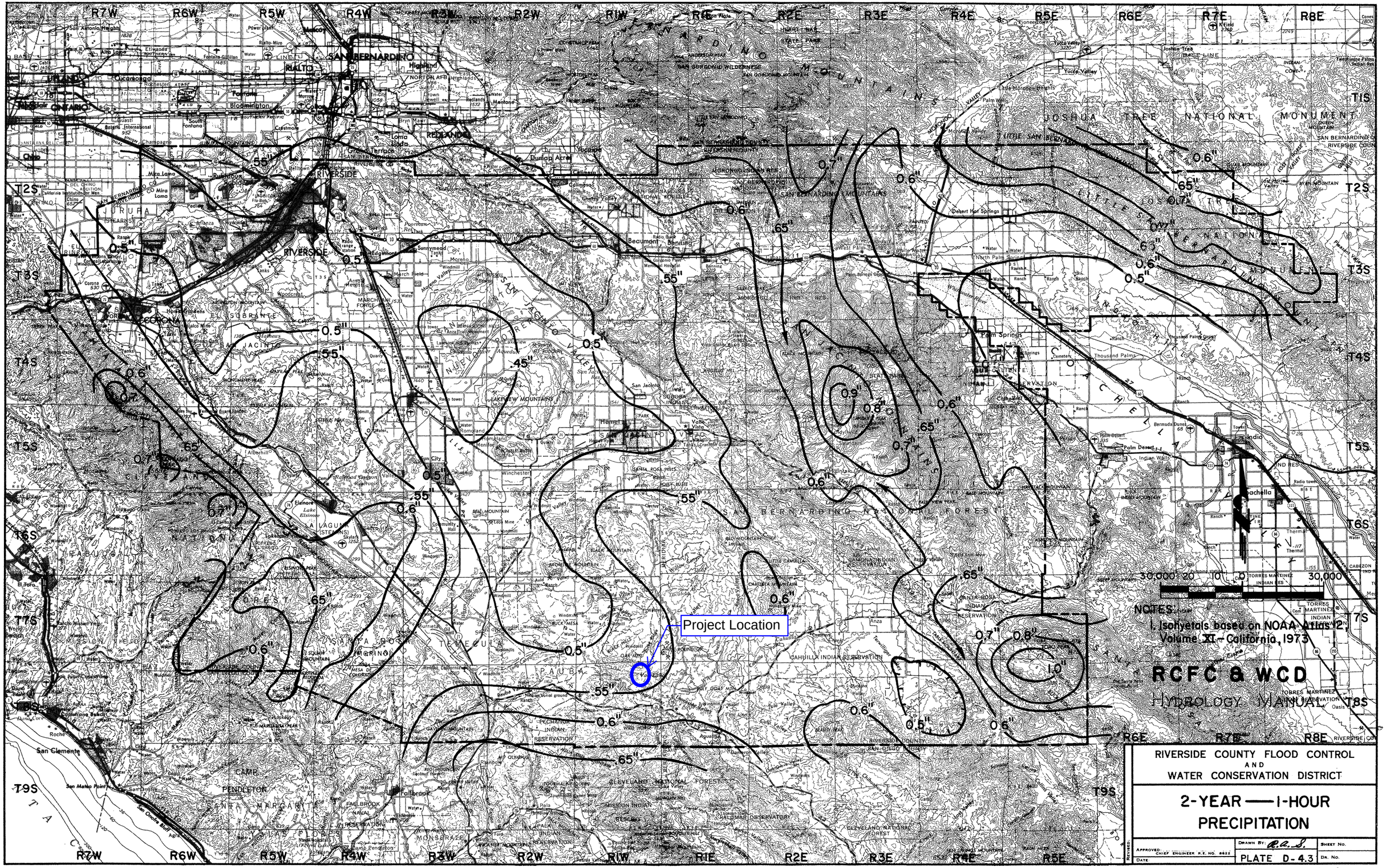
RAINFALL INTENSITY—INCHES PER HOUR

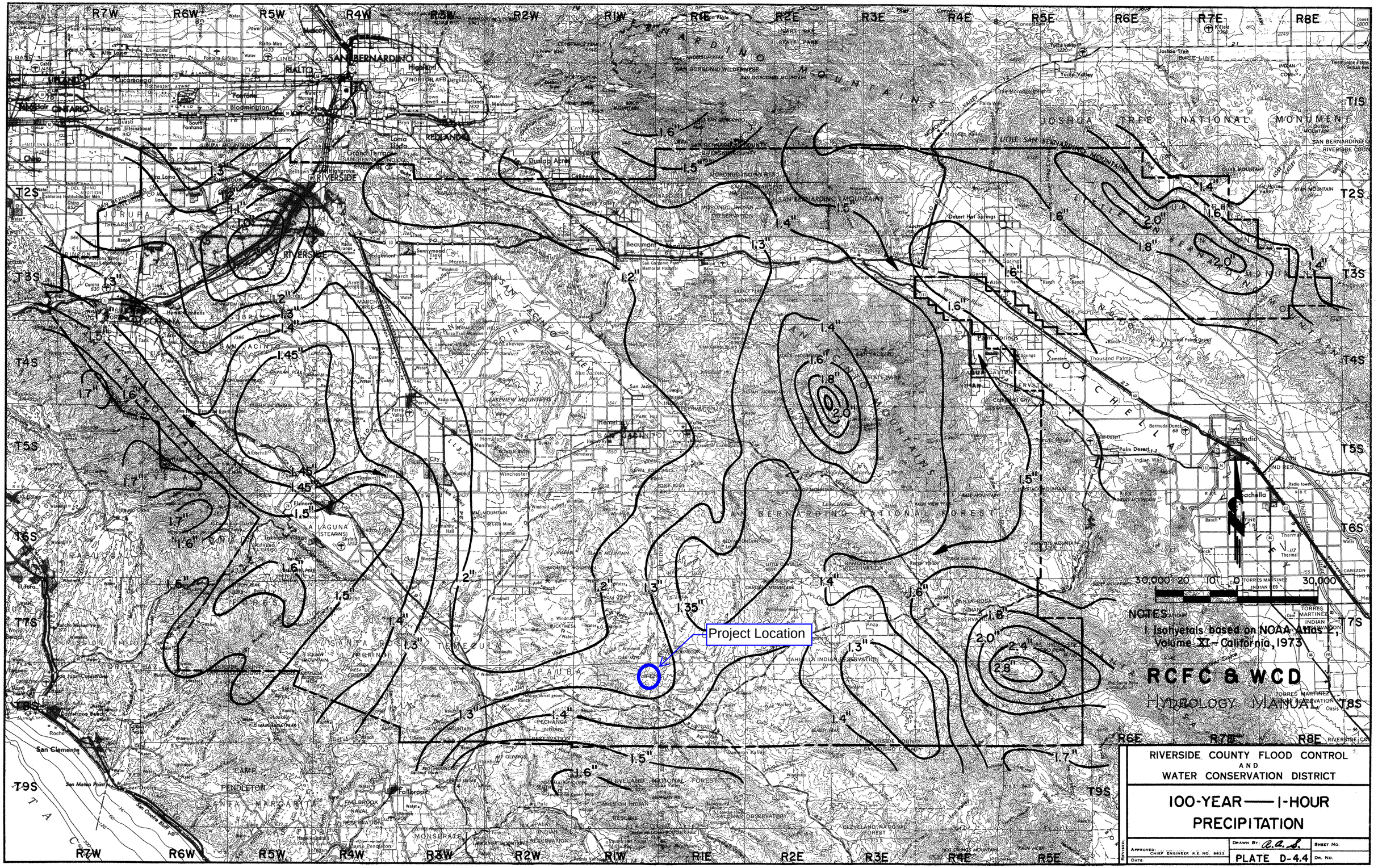
MIRA LOMA			MURRIETA - TEMECULA & RANCHO CALIFORNIA			NORCO			PALM SPRINGS			PERRIS VALLEY		
DURATION MINUTES	FREQUENCY		DURATION MINUTES	FREQUENCY		DURATION MINUTES	FREQUENCY		DURATION MINUTES	FREQUENCY		DURATION MINUTES	FREQUENCY	
	10 YEAR	100 YEAR		10 YEAR	100 YEAR		10 YEAR	100 YEAR		10 YEAR	100 YEAR		10 YEAR	100 YEAR
5	2.84	4.48	5	3.45	5.10	5	2.77	4.16	5	4.23	6.76	5	2.64	3.78
6	2.58	4.07	6	3.12	4.61	6	2.53	3.79	6	3.80	6.08	6	2.41	3.46
7	2.37	3.75	7	2.87	4.24	7	2.34	3.51	7	3.48	5.56	7	2.24	3.21
8	2.21	3.49	8	2.67	3.94	8	2.19	3.29	8	3.22	5.15	8	2.09	3.01
9	2.08	3.28	9	2.50	3.69	9	2.07	3.10	9	3.01	4.81	9	1.98	2.84
10	1.96	3.10	10	2.36	3.48	10	1.96	2.94	10	2.83	4.52	10	1.88	2.69
11	1.87	2.95	11	2.24	3.30	11	1.87	2.80	11	2.67	4.28	11	1.79	2.57
12	1.78	2.82	12	2.13	3.15	12	1.79	2.68	12	2.54	4.07	12	1.72	2.46
13	1.71	2.70	13	2.04	3.01	13	1.72	2.58	13	2.43	3.88	13	1.65	2.37
14	1.64	2.60	14	1.96	2.89	14	1.66	2.48	14	2.33	3.72	14	1.59	2.29
15	1.58	2.50	15	1.89	2.79	15	1.60	2.40	15	2.23	3.58	15	1.54	2.21
16	1.53	2.42	16	1.82	2.69	16	1.55	2.32	16	2.15	3.44	16	1.49	2.14
17	1.48	2.34	17	1.76	2.60	17	1.50	2.25	17	2.08	3.32	17	1.45	2.08
18	1.44	2.27	18	1.71	2.52	18	1.46	2.19	18	2.01	3.22	18	1.41	2.02
19	1.40	2.21	19	1.66	2.45	19	1.42	2.13	19	1.95	3.12	19	1.37	1.97
20	1.36	2.15	20	1.61	2.38	20	1.39	2.08	20	1.89	3.03	20	1.34	1.92
22	1.29	2.04	22	1.53	2.26	22	1.32	1.98	22	1.79	2.86	22	1.28	1.83
24	1.24	1.95	24	1.46	2.15	24	1.26	1.90	24	1.70	2.72	24	1.22	1.75
26	1.18	1.87	26	1.39	2.06	26	1.22	1.82	26	1.62	2.60	26	1.18	1.69
28	1.14	1.80	28	1.34	1.98	28	1.17	1.76	28	1.56	2.49	28	1.13	1.63
30	1.10	1.73	30	1.29	1.90	30	1.13	1.70	30	1.49	2.39	30	1.10	1.57
32	1.06	1.67	32	1.24	1.84	32	1.10	1.64	32	1.44	2.30	32	1.06	1.52
34	1.03	1.62	34	1.20	1.78	34	1.06	1.59	34	1.39	2.22	34	1.03	1.48
36	1.00	1.57	36	1.17	1.72	36	1.03	1.55	36	1.34	2.15	36	1.00	1.44
38	.97	1.53	38	1.13	1.67	38	1.01	1.51	38	1.30	2.09	38	.98	1.40
40	.94	1.49	40	1.10	1.62	40	.98	1.47	40	1.27	2.02	40	.95	1.37
45	.89	1.40	45	1.03	1.52	45	.92	1.39	45	1.18	1.89	45	.90	1.29
50	.84	1.32	50	.97	1.44	50	.88	1.31	50	1.11	1.78	50	.85	1.22
55	.80	1.26	55	.92	1.36	55	.84	1.25	55	1.05	1.68	55	.81	1.17
60	.76	1.20	60	.88	1.30	60	.80	1.20	60	1.00	1.60	60	.78	1.12
65	.73	1.15	65	.84	1.24	65	.77	1.15	65	.95	1.53	65	.75	1.08
70	.70	1.11	70	.81	1.19	70	.74	1.11	70	.91	1.46	70	.72	1.04
75	.68	1.07	75	.78	1.15	75	.72	1.07	75	.88	1.41	75	.70	1.00
80	.65	1.03	80	.75	1.11	80	.69	1.04	80	.85	1.35	80	.68	.97
85	.63	1.00	85	.73	1.07	85	.67	1.01	85	.82	1.31	85	.66	.94
SLOPE = .530			SLOPE = .550			SLOPE = .500			SLOPE = .580			SLOPE = .490		

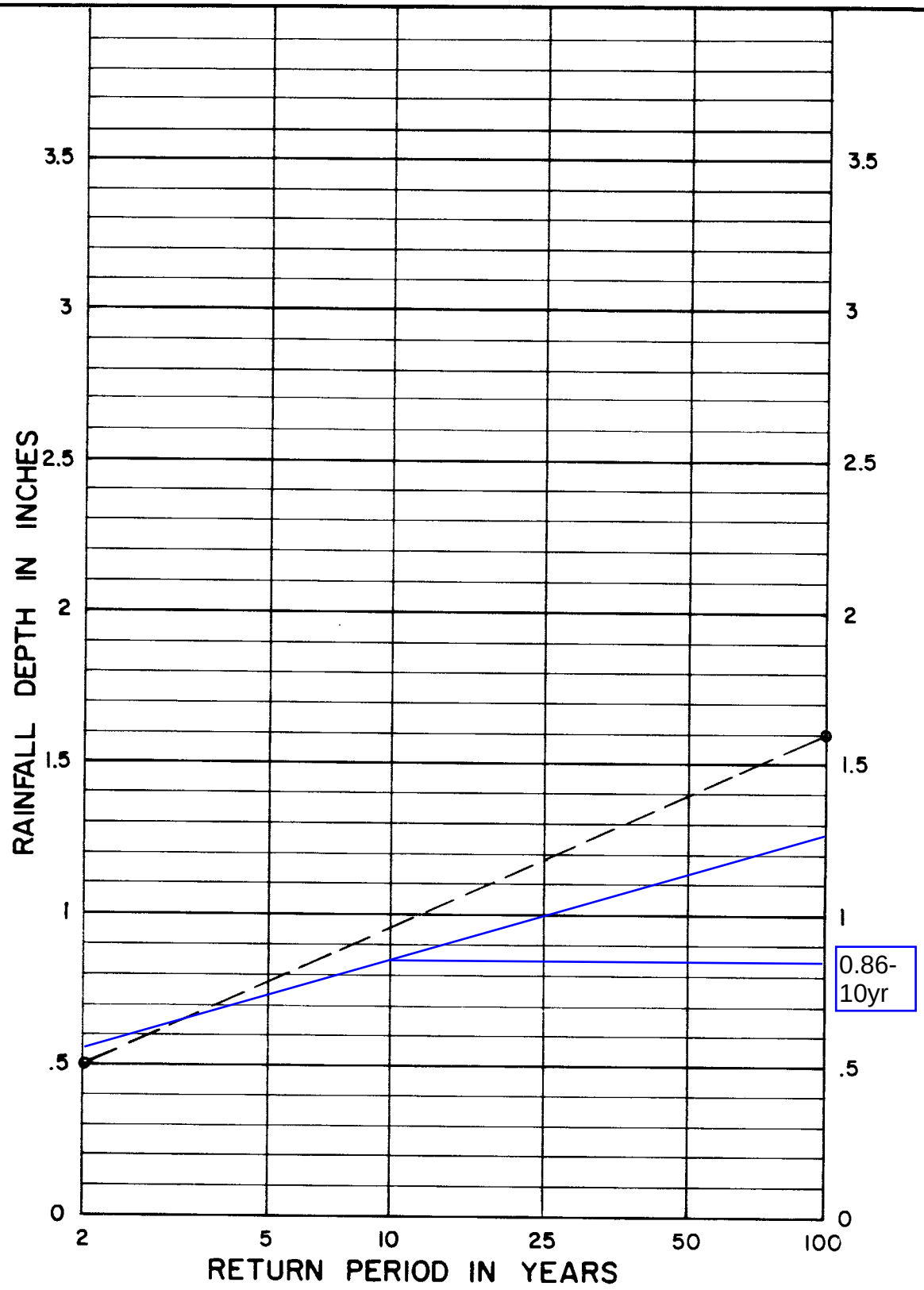
STANDARD
INTENSITY-DURATION
CURVES DATA


.50
.55
.45
.58
.60
.65
Project Location
NOTES
1. Slope of Intensity-Duration Curve based on District analysis of automatic recording rain gage records
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
SLOPE OF INTENSITY DURATION CURVE
PLATE D-4.6
SAN BERNARDINO MOUNTAINS
SAN GORGONIO WILDERNESS
JOSHUA TREE NATIONAL MONUMENT
SAN JACINTO MOUNTAINS
CLEVELAND NATIONAL FOREST
SAN BERNARDINO NATIONAL FOREST
SANTA ANA RIVER
SAN JACINTO FAULT
SAN ANDREAS FAULT
SAN JACINTO VALLEY
SANTA ANA MOUNTAINS
PECHANGA INDIAN RESERVATION
SOBOBA INDIAN RESERVATION
AGUA CALIENTE INDIAN RESERVATION
CAHUILLA INDIAN RESERVATION
SANTA ROSA INDIAN RESERVATION
TORRES MARTINEZ INDIAN RESERVATION
SAN JACINTO WILDLIFE AREA
SAN JACINTO RIVER
SAN JACINTO PEAK
SAN GORGONIO MOUNTAIN
SAN GABRIEL MOUNTAINS
SAN JACINTO MOUNTAINS
SAN BERNARDINO MOUNTAINS
SAN BERNARDINO
RIVERSIDE
RIALTO
REDLANDS
CORONA
NORCO
ONTARIO
MONTCLAIR
CHINO
FONTANA
RANCHO CUCAMONGA
SAN CLEMENTE
FALLBROOK
TEMECULA
MURRIETA
HEMET
SAN JACINTO
PERRIS
BEAUMONT
BANNING
PALM SPRINGS
CATHEDRAL CITY
DESERT HOT SPRINGS
INDIO
COACHELLA
LA QUINTA
PALM DESERT
MARCH AFB
NORTON AFB
R7W
R6W
R5W
R4W
R3W
R2W
R1W
R1E
R2E
R3E
R4E
R5E
R6E
R7E
R8E
T2S
T3S
T4S
T5S
T6S
T7S
T8S
T9S

Precipitation maps (Plate D-4.3,D-4.4)


Project Location
NOTES:
1. Isohyetals based on NOAA Atlas 2, Volume XI - California, 1973
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
2-YEAR — 1-HOUR PRECIPITATION
PLATE D-4.3
DRAWN BY: R.A.S.
APPROVED CHIEF ENGINEER R.E. NO. 8822
DATE
SHEET No.
DR. No.
REVISED:


Project Location
NOTES:
1. Isohyetals based on NOAA Atlas 2, Volume XI - California, 1973
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
100-YEAR — 1-HOUR PRECIPITATION
DRAWN BY: A.A.S.
SHEET NO.
PLATE D-4.4
DR. NO.
APPROVED: CHIEF ENGINEER R.E. NO. 6822
DATE
REVISED



NOTE:

1. For intermediate return periods plot 2-year and 100-year one hour values from maps, then connect points and read value for desired return period. For example given 2-year one hour = .50" and 100-year one hour = 1.60", 25-year one hour = 1.18"

Reference: NOAA Atlas 2, Volume XI - California, 1973.

RCFC & WCD

HYDROLOGY MANUAL

RAINFALL DEPTH VERSUS RETURN PERIOD FOR PARTIAL DURATION SERIES

PLATE D-4.5

Runoff Index & Runoff Coefficient (Plate D-5.5, D-5.7)

RUNOFF INDEX NUMBERS OF HYDROLOGIC SOIL-COVER COMPLEXES FOR PERVIOUS AREAS-AMC II

Cover Type (3)	Quality of Cover (2)	Soil Group A	B	C	D
NATURAL COVERS -					
Barren (Rockland, eroded and graded land)		78	86	91	93
Chaparrel, Broadleaf (Manzonita, ceanothus and scrub oak)	Poor	53	70	80	85
	Fair	40	63	75	81
	Good	31	57	71	78
Chaparrel, Narrowleaf (Chamise and redshank)	Poor	71	82	88	91
	Fair	55	72	81	86
Grass, Annual or Perennial	Poor	67	78	86	89
	Fair	50	69	79	84
	Good	38	61	74	80
Meadows or Cienegas (Areas with seasonally high water table, principal vegetation is sod forming grass)	Poor	63	77	85	88
	Fair	51	70	80	84
	Good	30	58	72	78
Open Brush (Soft wood shrubs - buckwheat, sage, etc.)	Poor	62	76	84	88
	Fair	46	66	77	83
	Good	41	63	75	81
Woodland (Coniferous or broadleaf trees predominate. Canopy density is at least 50 percent)	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	28	55	70	77
Woodland, Grass (Coniferous or broadleaf trees with canopy density from 20 to 50 percent)	Poor	57	73	82	86
	Fair	44	65	77	82
	Good	33	58	72	79
URBAN COVERS -					
Residential or Commercial Landscaping (Lawn, shrubs, etc.)	Good	32	56	69	75
Turf (Irrigated and mowed grass)	Poor	58	74	83	87
	Fair	44	65	77	82
	Good	33	58	72	79
AGRICULTURAL COVERS -					
Fallow (Land plowed but not tilled or seeded)		76	85	90	92

RCFC & WCD
HYDROLOGY MANUAL

RUNOFF INDEX NUMBERS FOR PERVIOUS AREA

PLATE D-5.5 (1 of 2)

RCFC & WCD

HYDROLOGY MANUAL

RUNOFF COEFFICIENT CURVE DATA

RUNOFF COEFFICIENTS FOR RI INDEX NO. = 76

IMPERVIOUS PERCENT	INTENSITY - INCHES/HOUR										
	.0	.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	5.0	6.0
0.	.00	.49	.63	.70	.74	.77	.79	.80	.81	.83	.84
5.	.04	.51	.65	.71	.75	.78	.79	.81	.82	.83	.84
10.	.09	.53	.66	.72	.76	.78	.80	.81	.82	.84	.85
15.	.13	.55	.67	.73	.77	.79	.81	.82	.83	.84	.85
20.	.18	.57	.69	.74	.77	.80	.81	.82	.83	.84	.85
25.	.22	.59	.70	.75	.78	.80	.82	.83	.84	.85	.86
30.	.27	.61	.71	.76	.79	.81	.82	.83	.84	.85	.86
35.	.31	.63	.73	.77	.80	.82	.83	.84	.84	.85	.86
40.	.36	.65	.74	.78	.81	.82	.83	.84	.85	.86	.86
45.	.40	.67	.75	.79	.81	.83	.84	.85	.85	.86	.87
50.	.45	.69	.77	.80	.82	.84	.84	.85	.86	.87	.87
55.	.49	.71	.78	.81	.83	.84	.85	.86	.86	.87	.87
60.	.54	.74	.79	.82	.84	.85	.86	.86	.87	.87	.88
65.	.58	.76	.81	.83	.85	.85	.86	.87	.87	.88	.88
70.	.63	.78	.82	.84	.85	.86	.87	.87	.87	.88	.88
75.	.67	.80	.83	.85	.86	.87	.87	.88	.88	.88	.89
80.	.72	.82	.85	.86	.87	.87	.88	.88	.88	.89	.89
85.	.76	.84	.86	.87	.88	.88	.88	.89	.89	.89	.89
90.	.81	.86	.87	.88	.88	.89	.89	.89	.89	.89	.89
95.	.86	.88	.89	.89	.89	.89	.89	.90	.90	.90	.90
100.	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90

RUNOFF COEFFICIENTS FOR RI INDEX NO. = 78

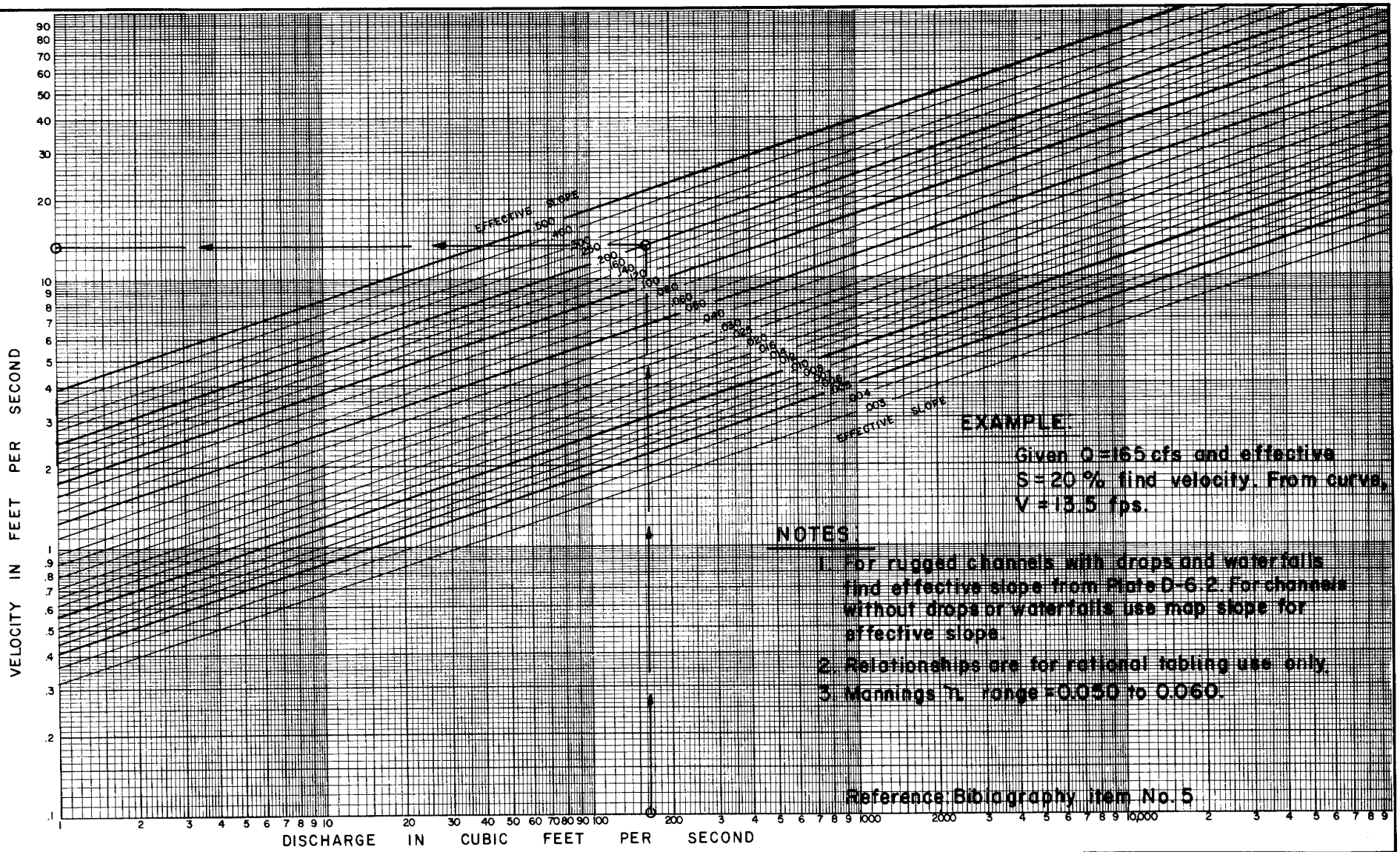
IMPERVIOUS PERCENT	INTENSITY - INCHES/HOUR										
	.0	.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	5.0	6.0
0.	.00	.51	.65	.72	.76	.78	.80	.81	.82	.84	.85
5.	.04	.53	.67	.73	.76	.79	.80	.82	.83	.84	.85
10.	.09	.55	.68	.74	.77	.79	.81	.82	.83	.84	.85
15.	.13	.57	.69	.75	.78	.80	.81	.83	.83	.85	.85
20.	.18	.59	.70	.76	.79	.81	.82	.83	.84	.85	.86
25.	.22	.61	.72	.76	.79	.81	.82	.83	.84	.85	.86
30.	.27	.63	.73	.77	.80	.82	.83	.84	.85	.86	.86
35.	.31	.65	.74	.78	.81	.82	.83	.84	.85	.86	.87
40.	.36	.67	.75	.79	.81	.83	.84	.85	.85	.86	.87
45.	.40	.69	.76	.80	.82	.84	.84	.85	.86	.87	.87
50.	.45	.71	.78	.81	.83	.84	.85	.86	.86	.87	.87
55.	.49	.73	.79	.82	.84	.85	.85	.86	.87	.87	.88
60.	.54	.75	.80	.83	.84	.85	.86	.87	.87	.87	.88
65.	.58	.76	.81	.84	.85	.86	.86	.87	.87	.88	.88
70.	.63	.78	.83	.85	.86	.86	.87	.87	.88	.88	.88
75.	.67	.80	.84	.85	.86	.87	.87	.88	.88	.88	.89
80.	.72	.82	.85	.86	.87	.88	.88	.88	.88	.89	.89
85.	.76	.84	.86	.87	.88	.88	.88	.89	.89	.89	.89
90.	.81	.86	.88	.88	.89	.89	.89	.89	.89	.89	.89
95.	.86	.88	.89	.89	.89	.89	.89	.90	.90	.90	.90
100.	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90

RUNOFF COEFFICIENTS FOR RI INDEX NO. = 80

IMPERVIOUS PERCENT	INTENSITY - INCHES/HOUR										
	.0	.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	5.0	6.0
0.	.00	.54	.67	.74	.77	.79	.81	.82	.83	.84	.85
5.	.04	.56	.69	.74	.78	.80	.81	.83	.83	.85	.86
10.	.09	.58	.70	.75	.78	.80	.82	.83	.84	.85	.86
15.	.13	.59	.71	.76	.79	.81	.82	.83	.84	.85	.86
20.	.18	.61	.72	.77	.80	.82	.83	.84	.84	.86	.86
25.	.22	.63	.73	.78	.80	.82	.83	.84	.85	.86	.86
30.	.27	.65	.74	.79	.81	.83	.84	.85	.85	.86	.87
35.	.31	.67	.75	.79	.82	.83	.84	.85	.86	.86	.87
40.	.36	.68	.76	.80	.82	.84	.85	.85	.86	.87	.87
45.	.40	.70	.78	.81	.83	.84	.85	.86	.86	.87	.87
50.	.45	.72	.79	.82	.84	.85	.86	.86	.87	.87	.88
55.	.49	.74	.80	.83	.84	.85	.86	.86	.87	.87	.88
60.	.54	.76	.81	.83	.85	.86	.86	.87	.87	.88	.88
65.	.58	.77	.82	.84	.86	.86	.87	.87	.88	.88	.88
70.	.63	.79	.83	.85	.86	.87	.87	.88	.88	.88	.89
75.	.67	.81	.84	.86	.87	.87	.88	.88	.88	.89	.89
80.	.72	.83	.86	.87	.87	.88	.88	.88	.89	.89	.89
85.	.76	.85	.87	.88	.88	.88	.89	.89	.89	.89	.89
90.	.81	.86	.88	.88	.89	.89	.89	.89	.89	.89	.90
95.	.86	.88	.89	.89	.89	.89	.90	.90	.90	.90	.90
100.	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90

RUNOFF COEFFICIENTS FOR RI INDEX NO. = 82

IMPERVIOUS PERCENT	INTENSITY - INCHES/HOUR										
	.0	.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	5.0	6.0
0.	.00	.57	.70	.75	.79	.81	.82	.83	.84	.85	.86
5.	.04	.58	.71	.76	.79	.81	.82	.83	.84	.85	.86
10.	.09	.60	.72	.77	.80	.82	.83	.84	.84	.86	.86
15.	.13	.62	.73	.78	.80	.82	.83	.84	.85	.86	.86
20.	.18	.63	.74	.78	.81	.82	.84	.84	.85	.86	.87
25.	.22	.65	.75	.79	.81	.83	.84	.85	.85	.86	.87
30.	.27	.67	.76	.80	.82	.83	.84	.85	.86	.87	.87
35.	.31	.68	.77	.80	.83	.84	.85	.85	.86	.87	.87
40.	.36	.70	.78	.81	.83	.84	.85	.86	.86	.87	.87
45.	.40	.72	.79	.82	.84	.85	.86	.86	.87	.87	.88
50.	.45	.73	.80	.83	.84	.85	.86	.87	.87	.88	.88
55.	.49	.75	.81	.83	.85	.86	.86	.87	.87	.88	.88
60.	.54	.77	.82	.84	.85	.86	.87	.87	.88	.88	.88
65.	.58	.78	.83	.85	.86	.87	.87	.88	.88	.88	.89
70.	.63	.80	.84	.86	.87	.87	.88	.88	.88	.89	.89
75.	.67	.82	.85	.86	.87	.88	.88	.88	.88	.89	.89
80.	.72	.83	.86	.87	.88	.88	.88	.89	.89	.89	.89
85.	.76	.85	.87	.88	.88	.89	.89	.89	.89	.89	.89
90.	.81	.87	.88	.89	.89	.89	.89	.89	.89	.90	.90
95.	.86	.88	.89	.89	.89	.90	.90	.90	.90	.90	.90
100.	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90



RCFC & WCD HYDROLOGY MANUAL

VELOCITY - DISCHARGE - SLOPE RELATIONSHIPS
NATURAL MOUNTAIN CHANNELS

PLATE D-6.3

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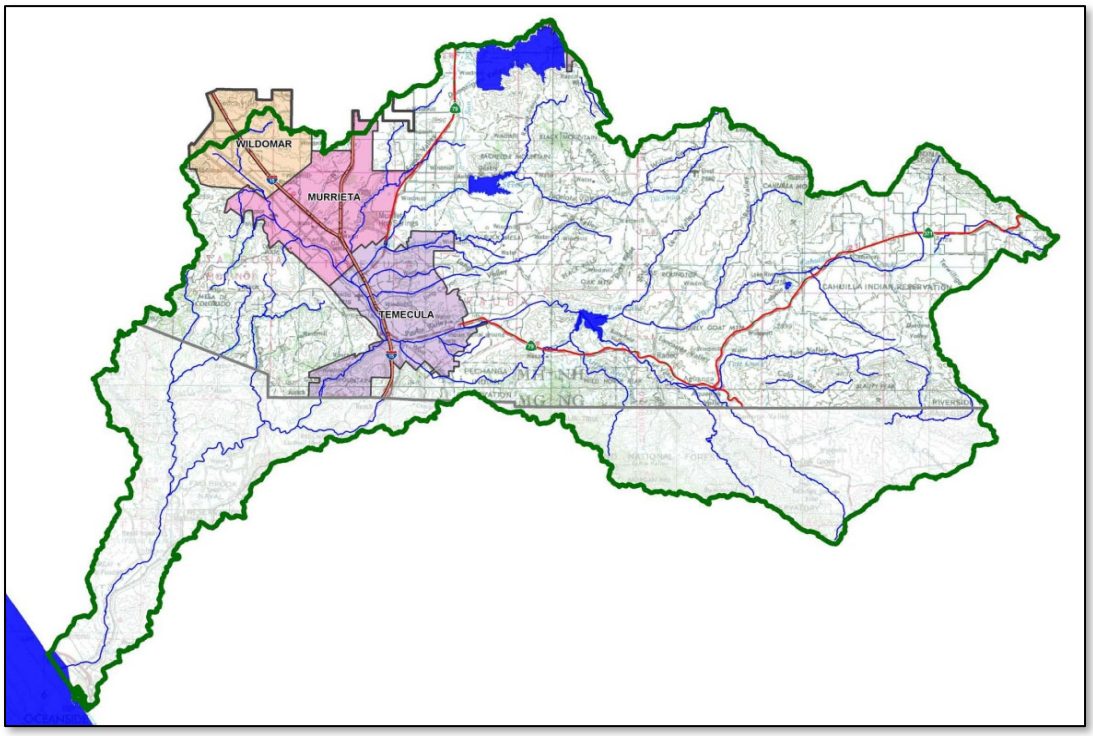
Preliminary Water Quality Management Plan

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County Project Specific Water Quality Management Plan

Project Specific WQMP for a Priority Development Project in the unincorporated portions of Riverside County located within the Santa Margarita Region.

Project Title: Vail Dam Seismic and Hydrologic Remediation Project
Development No: Project No. D1911
Design Review/Case No: Insert text here



☒ **Preliminary**
☐ **Final**

Original Date Prepared: August 31, 2022

Revision Date(s):

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Based on 2018 WQMP, prepared for Compliance with Regional Board Order No. **R9-2013-0001** *as amended by Order No.* **R9-2015-0001** *and Order No.* **R9-2015-0100**

OWNER'S CERTIFICATION

This Project-Specific WQMP has been prepared for Rancho California Water District by AECOM for the Vail Dam Seismic and Hydrologic Remediation project.

This WQMP is intended to comply with the requirements of Riverside County for County Ordinance No. 754 which includes the requirement for the preparation and implementation of a Project-Specific WQMP.

The undersigned, while owning the property/project described in the preceding paragraph, shall be responsible for the implementation and funding of this WQMP and will ensure that this WQMP is amended as appropriate to reflect up-to-date conditions on the site. In addition, the property owner accepts responsibility for interim operation and maintenance of Stormwater Best Management Practices until such time as this responsibility is formally transferred to a subsequent owner. This WQMP will be reviewed with the facility operator, facility supervisors, employees, tenants, maintenance and service contractors, or any other party (or parties) having responsibility for implementing portions of this WQMP. At least one copy of this WQMP will be maintained at the project site or project office in perpetuity. The undersigned is authorized to certify and to approve implementation of this WQMP. The undersigned is aware that implementation of this WQMP is enforceable under Riverside County Water Quality Ordinance (No. 754).

"I, the undersigned, certify under penalty of law that the provisions of this WQMP have been reviewed and accepted and that the WQMP will be transferred to future successors in interest."

Owner's Signature	Date
Owner's Printed Name	Owner's Title/Position

PREPARER'S CERTIFICATION

"The selection, sizing and design of stormwater treatment and other stormwater quality and quantity control Best Management Practices in this plan meet the requirements of Regional Water Quality Control Board Order No. **R9-2013-0001** as amended by Order Nos. **R9-2015-0001 and R9-2015-0100**."

Preparer's Signature	August 2022 Date
Derek Plaza Preparer's Printed Name	Civil Engineer, QSD/P Preparer's Title/Position

Preparer's Licensure: Civil PE & QSD/P #89125

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Section A: Project and Site Information

PROJECT INFORMATION	
Type of PDP:	New Development - Hillside Development Project
Type of Project:	Water storage facility & access improvement
Planning Case Number:	TBD
Rough Grade Permit No.:	Planning and Preliminary Design Stage; permit number to be assigned later
Development Name:	Vail Dam Seismic & Hydrologic Remedication Project
PROJECT LOCATION	
Latitude & Longitude (DMS):	Dam at 33.4959, -116.9773
Project Watershed and Sub-Watershed:	Santa Margarita River
24-Hour 85th Percentile Storm Depth (inches):	0.65
Is project subject to Hydromodification requirements?	☐ Y ☒ N (Select based on Section A.3)
APN(s):	927320080, 927320045
Map Book and Page No.:	136
PROJECT CHARACTERISTICS	
Proposed or Potential Land Use(s)	Open-space rural, open-space water
Proposed or Potential SIC Code(s)	N/A
Existing Impervious Area of Project Footprint (SF)	8325
Total area of proposed Impervious Surfaces within the Project Limits (SF)/or Replacement	50516
Total Project Area (ac)	15.7
Does the project consist of offsite road improvements?	☐ Y ☒ N
Does the project propose to construct unpaved roads?	☒ Y ☐ N
Is the project part of a larger common plan of development (phased project)?	☐ Y ☒ N
Has preparation of Project-Specific WQMP included coordination with other site plans?	☒ Y ☐ N
EXISTING SITE CHARACTERISTICS	
Is the project located within any Multi-Species Habitat Conservation Plan area (MSHCP Criteria Cell?)	☒ Y ☐ N
6807,6809,6909,0,6911,6913,6917,6989,6992,7001,7010,7012,7014,7107,7119,7117	
Is a Geotechnical Report attached?	☐ Y ☒ N
If no Geotech. Report, list the Natural Resources Conservation Service (NRCS) soils type(s) present on the site (A, B, C and/or D)	A, C, D
Provide a brief description of the project: Project includes constructing a new straight-axis gravity concrete dam to replace the existing concrete arch dam. The site development includes improvements to access roads, provision for construction staging and material disposal areas, and partial demolition of the existing dam.	

Paver and dirt roads are considered pervious for determining WQMP applicability.

A.1 Maps and Site Plans

The Project-Specific WQMP, includes a map of the Project vicinity and existing site. In addition, it includes all grading, drainage, landscape/plant palette and other pertinent construction plans in Appendix 2 as listed below:

- Vicinity and location maps
- Parcel Boundary and Project Footprint
- Existing and Proposed Topography
- Drainage Management Areas (DMAs)
- Proposed Structural Best Management Practices (BMPs) if any
- Drainage Paths
- Drainage infrastructure, inlets, overflows
- Source Control BMPs
- Site Design BMPs
- Buildings, Roof Lines, Downspouts if any
- Impervious Surfaces
- Pervious Surfaces
- Standard Labeling
- Cross Section and Outlet details if any

A.2 Receiving Waters

Table A-1 below, lists in order of upstream to downstream, the Receiving Waters that the Project site is tributary to, Receiving Water's 303(d) listed impairments, designated Beneficial Uses, and proximity, if any, to a RARE Beneficial Use. The map in Appendix 1 identifies the path of the stormwater discharged from the site all the way to the outlet of the Santa Margarita River to the Pacific Ocean.

Sources: *https://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2014_2016.shtml*
http://www.waterboards.ca.gov/sandiego/water_issues/programs/basin_plan/

Table A-1 Identification of Receiving Waters

Receiving Waters	Hydrologic Unit Basin Number	USEPA Approved 303(d) List Impairments	Existing Beneficial Uses*	Potential Beneficial Uses	Proximity to RARE Beneficial Use
Temecula Creek	2.51, 2.52	Chlorpyrifos, Copper, Indicator Bacteria (E.Coli, FC), Total Dissolved Solids, Toxicity, Phosphorus	MUN, AGR, IND, PROC, GWR, REC2, WARM, WILD	REC1	<1 mile
Santa Margarita River (Upper)	2.22, 2.21	Indicator Bacteria (EC), Iron, Manganese, Nitrogen, Phosphorous, Toxicity	MUN, AGR, IND, REC1, REC2, WARM, COLD, WILD, RARE	None	8.7 miles
Santa Margarita river (Lower)	2.13, 2.12, 2.11	Indicator Bacteria, Benthic Community Effects, Chlorpyrifos, Nitrogen, Phosphorous, Toxicity	MUN, AGR, IND, PROC, REC1, REC2, WARM, COLD, WILD, RARE	None	8.7 miles

*Notes:

Municipal and domestic supply (MUN)
Agricultural supply (AGR)
Industrial service supply (IND)
Industrial process supply (PROC)
Freshwater replenishment (FRSH)
Groundwater recharge (GWR)
Contact water recreation (REC-1)
Non-Contact water recreation (REC-2)
Warm freshwater habitat (WARM)
Cold freshwater habitat (COLD)
Wildlife habitat (WILD)
Rare, threatened, or endangered species (RARE)
Spawning, reproduction, and/or early development (SPWN)

A.3 Drainage System Susceptibility to Hydromodification

Table A-2 below, lists in order of the point of discharge at the project site down to the Santa Margarita River[1], each drainage system or receiving water that the project site is tributary to. Based on the table, the applicable hydromodification performance standards are documented in Section E. Exempted categories of receiving waters include:

- Existing storm drains that discharge directly to water storage reservoirs, lakes, or enclosed embayments, or
- Conveyance channels whose bed and bank are concrete lined all the way from the point of discharge to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean.
- Other water bodies identified in an approved WMAA

As per Section 5.2.3 of 'Hydromodification Susceptibility Documentation Report and Mapping for Santa Margarita Region' (April 2014), "Application of onsite Hydromodification controls for development discharging to Temecula Creek below Vail Lake will not provide any meaningful restorative benefits to Temecula Creek. This is due to the fact that operation of the dam and the lake dominate the hydrology and sedimentation in the downstream reach."

As per the Section 3.2.ii of 'Santa Margarita Region Hydromodification Plan' (May 2014), "…the effects of cumulative watershed impacts are minimal in those reaches for which the contributing drainage area exceeds 100 square miles and with a 100-year design flow in excess of 20,000 cfs. Development and redevelopment projects that discharge either directly… into such large river channels are hence exempt from the SMR HMP requirements, provided that properly sized energy dissipation is implemented at the outfall location. Table 5 also provides the corresponding upstream and downstream limits to define the exempted reach."

Table 5 - Exempt Channel Reaches in the Santa Margarita Region

River	Downstream Limit	Upstream Limit
Murrieta Creek	Confluence with Santa Margarita River	Above Warm Springs Creek
Temecula Creek	Confluence with Santa Margarita River	Outlet of Vail Lake
Santa Margarita River	Pacific Ocean	At Origin

Appendix 7 Exhibit G in is a map showing 'potentially' exempt areas and based on information discussed above, the project is considered exempt from hydromodification requirements. Appendix 1 includes this map exhibiting each drainage system and the associated susceptibility. Appendix 7 Exhibit G-1shows the map of Critical Coarse Sediment Yield Area. As discussed here and in the next sections, the project is improving the existing road conditions and is not expected to have an impact on sediment yield, therefore, exempt from requirements of high yield sediment areas.

Table A-2 Identification of Susceptibility to Hydromodification

Drainage System	Drainage System Material	Hydromodification Exemption	Hydromodification Exempt
Vail Lake	Sheet flow into the Reservoir	Project discharging runoff directly to the exempt reservoirs. The outlet elevation of the conveyance system must be within (or below) the normal operating water surface elevations of the reservoir and properly designed energy dissipation must be provided.	☒ Y ☐ N
Temecula Creek, from u/s Outflow of Vail Lake to d/s confluence with Santa Margarita River	Sheet flow into Earthern Bottom river	Drainage area larger than 100 square miles and a 100-year design flow higher than 20,000 cfs, therefore cumulative watershed impacts are minimal.	☒ Y ☐ N

[1] Refer to Exhibit G of the WQMP for a map of exempt and potentially exempt areas. These maps are from the Draft SMR WMAA as of January 5, 2018 and will be replaced upon acceptance of the SMR WMAA.

Drainage System	Drainage System Material	Hydromodification Exemption	Hydromodification Exempt
Summary of Performance Standards			
☒ **Hydromodification Exempt** – Select if "Y" is selected in the Hydromodification Exempt column above, project is exempt from hydromodification requirements. ☐ **Not Exempt**-Select if "N" is selected in any row of the Hydromodification Exempt column above. Project is subject to hydrologic control requirements and may be subject to sediment supply requirements.			

A.4 Additional Permits/Approvals required for the Project:

Table A-3 Other Applicable Permits

Agency	Permit Required	
State Department of Fish and Game, 1602 Streambed Alteration Agreement	☒ Y	☐ N
State Water Resources Control Board, Clean Water Act Section 401 Water Quality Certification	☒ Y	☐ N
US Army Corps of Engineers, Clean Water Act Section 404 Permit	☒ Y	☐ N
US Fish and Wildlife, Endangered Species Act Section 7 Biological Opinion	☒ Y	☐ N
Statewide Construction General Permit Coverage	☒ Y	☐ N
Statewide Industrial General Permit Coverage	☐ Y	☒ N
Western Riverside MSHCP Consistency Approval (e.g., JPR, DBESP)	☒ Y	☐ N
Other US Army Corps of Engineers, Rivers and Harbors Act Section 10 Permit	☒ Y	☐ N
State Department of Fish and Game, Endangered Species Act Incidental Take Permit	☒ Y	☐ N
State Water Resources Control Board, Waste Discharge Requirements	☒ Y	☐ N
State Historic Preservation Officer, Section 106 Consultation and Concurrence	☒ Y	☐ N

If yes is answered to any of the questions above, the Co-permittee may require proof of approval/coverage from the above listed agencies as applicable including documentation of any associated requirements that may affect this Project-Specific WQMP.

Section B: Optimize Site Utilization (LID Principles)

Site Optimization

The following questions are based upon Section 3.2 of the WQMP Guidance Document. The guidance document suggests applying LID principles to the layout of the PDP to the extent applicable and feasible. The purpose of this is to reduce the number of Structural LID and/or Conventional Treatment BMPs at the site.

The checklist below is used to determine if LID principles will suffice and/or to determine an applicable Site Design BMP at the project site.

Project- Specific WQMP Site Design BMP Checklist
SITE DESIGN REQUIREMENTS
Answer the following questions below by indicating "Yes," "No," or "N/A" (Not Applicable). Justify all "No" and "N/A" answers by inserting a narrative at the end of the section. The narrative should include identification and justification of any constraints that would prevent the use of those categories of LID BMPs. Upon identifying Site Design BMP opportunities, include these on your WQMP Site plan in Appendix 1.
☒ Yes ☐ No ☐ N/A **Did you identify and preserve existing drainage patterns?**
The natural drainage patterns onsite were perserved for project conditions and stayed the same as existing conditions as detailed in the drainage study for the site.
☒ Yes ☐ No ☐ N/A **Did you identify and protect existing vegetation?**
The development was minimized and buffer zones were established and no areas other than project site were disturbed to preserve the natural conditions of the vegetation.
☒ Yes ☐ No ☐ N/A **Did you identify and preserve natural infiltration capacity?**
The development was minimized and no areas other than project site were disturbed to preserve the natural conditions of the soil and land cover, Also, at various locations grading was used to reduce stormwater velocities and maximize infiltration.
☒ Yes ☐ No ☐ N/A **Did you minimize impervious area?**
Impervious area was kept to minimum and was approx 7% of entire project area and limited to only one DMA.
☒ Yes ☐ No ☐ N/A **Did you identify and disperse runoff to adjacent pervious areas or small collection areas?**
There were no changes in drainage patterns for existing and post-dev conditions, however, where appropriate, the grades were adjusted to reduce stormwater velocities and maximize infiltration in the adjacent pervious areas.
☐ Yes ☐ No ☒ N/A **Did you utilize native or drought tolerant species in site landscaping?**
There is no landscaping required for the project.
☐ Yes ☐ No ☒ N/A **Did you implement harvest and use of runoff?**

Project- Specific WQMP Site Design BMP Checklist
The project did not result in additional runoff for reuse and harvest. The water was retained on site.
☐ Yes ☐ No ☒ N/A **Did you keep the runoff from sediment producing pervious area hydrologically separate from developed areas that require treatment?**
The pervious areas of the project were improved and thus minimize erosion. The developed areas of the project do not generate sediment and thus do not require treatment.

Based on above checklist it was determined that the project can utilize LID principles and would not require a structural BMP.

Section C: Delineate Drainage Management Areas (DMAs)

This section was completed utilizing the procedure in Section 3.2.5 & Section 3.3 of the WQMP Guidance Document. The project site comprises four DMAs. DMA 2, 3 & 4 are previous areas (unpaved access roads). DMA 1 consists of proposed gravity dam area.

See Table C-1 for details.

Table C-1 DMA Identification

DMA Name or Identification	Surface Type(s)[1]	Area (Sq. Ft.)	DMA Type
DMA 1	Impervious/Pervious	50632	To be Determined in Step 3
DMA 2	Pervious	110410	
DMA 3	Pervious	328375	
DMA 4	Pervious	178700	

Each DMA can be classified as one of the following four types:

- Type 'A': Self-Treating Areas:
- Type 'B': Self-Retaining Areas
- Type 'C': Areas Draining to Self-Retaining Areas
- Type 'D': Areas Draining to BMPs

Step 3.A – Identify Type 'A' Self-Treating Area

See that documents the DMAs that are classified as Self-Treating Areas.

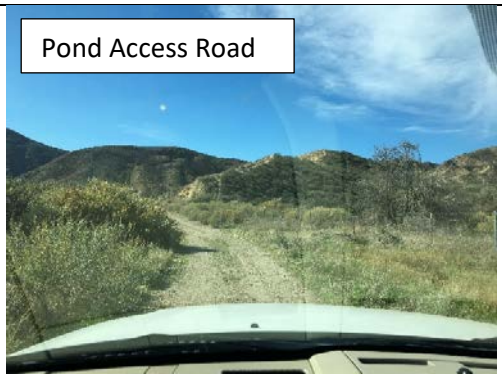
Table C-2 Type 'A', Self-Treating Areas

DMA Name or Identification	Area (Sq. Ft.)	Stabilization Type
DMA 2	110410	Gravel Resurfacing
DMA 3	328375	Gravel Resurfacing
DMA 4	178700	Gravel Resurfacing

DMA 2, 3, & 4 are pervious unpaved access roads which upon development will be improved (gravel surfacing, gunite lined ditch for North access Road) and graded in specific areas (see Access Road Plan Sheets C-1 to C-22) to reduce velocities of stormwater runoff and thus minimize runoff and erosion.

DMA 2, 3, & 4 area are considered Type 'A' Self Treating Areas since they are pervious, have adjacent pervious areas for overflow retention and therefore would not produce runoff. The existing condition pictures of North Access Road and Pond Access Road are shown here as reference.

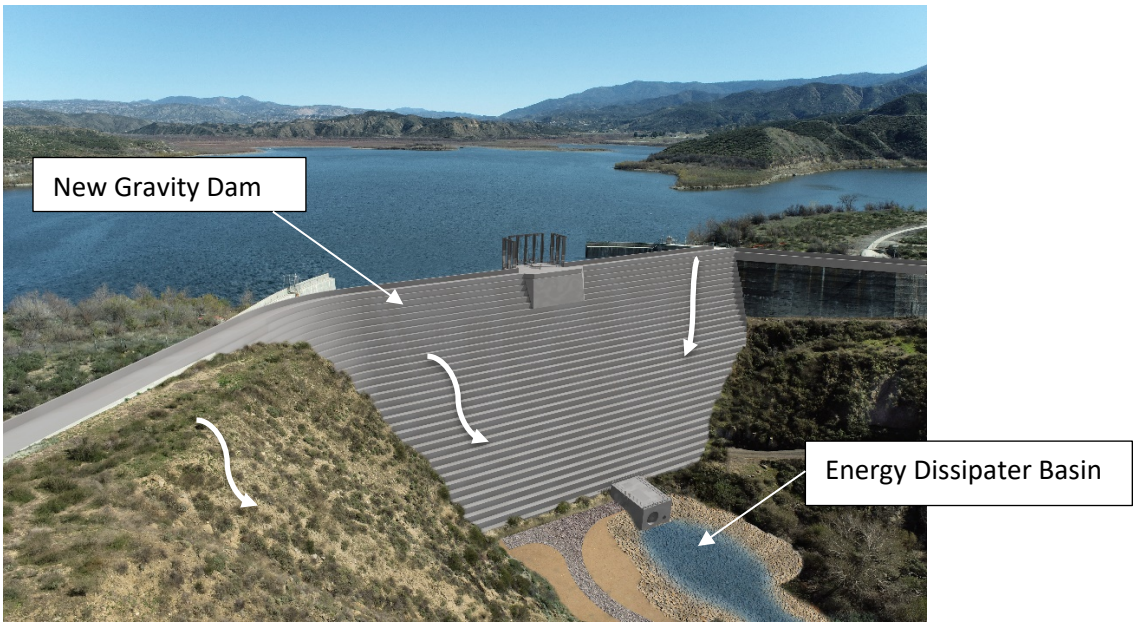




Step 3.B – Identify Type 'B' Self-Retaining Area and Type 'C' Areas Draining to Self-Retaining Areas

Type 'B' Self-Retaining Area: A Self-Retaining Area is shallowly depressed 'micro infiltration' areas designed to retain the Design Storm rainfall that reaches the area, without producing any Runoff.

DMA 1 comprises the impervious gravity dam area, dam crest and dam control building along with energy dissipater basin. The gravity dam and crest areas are upstream of the energy dissipator basin. Typically, during storm, release from dam is not expected and the volume of basin can be utilized to capture runoff. The energy dissipater basin (see image below) is considered a Type 'B' self-retaining area. Any sheet flow runoff not draining into the basin will flow towards the existing pervious areas downstream of the gravity dam and eventually to the riverwash areas. This runoff is not expected to generate any sediment and expected to be retained by the pervious riverwash. The runoff from dam control building is expected to be retained by the pervious land and ultimately by the Vail lake which is also a self retaining area.



The above diagram shows the drainage flow paths for stormwater from the dam to the energy dissipater basin.

See Table C-3 that identifies Type 'B' Self-Retaining Areas.

Table C-3 Type 'B', Self-Retaining Areas

Self-Retaining Area				Type 'C' DMAs that are draining to the Self-Retaining Area		
DMA Name/ ID	Post-project surface type	Area (square feet) [A]	Storm Depth (inches) [B]	DMA Name / ID	[C] from Table C-4= [C]	Required Retention Depth (inches) [D] = $[B] + \frac{[B]\cdot[C]}{[A]}$
DMA 1 – Energy Dissipater Area	Pervious	14309	0.65	DMA 1 – Concrete Dam & Crest	44959	2.7

Step 3.C– Identify Type 'C' Areas Draining to Self-Retaining Area

Type 'C' Areas Draining to Self-Retaining Areas: Runoff from impervious or partially pervious areas can be managed by routing it to Self-Retaining Areas consistent with the LID Principle discussed in SMR WQMP Section 3.2.5 for 'Dispersing Runoff to Adjacent Pervious Areas'.

The DMA 1 area which is impervious comprises of gravity dam and crest area is upstream to the energy dissipator basin and is considered Type 'C' Self Treating Area. It drains to Type 'B' Self Retaining Area.

See Table C-4 for Type 'C' Areas Draining to Self-Retaining Areas.



Table C-4 Type 'C', Areas that Drain to Self-Retaining Areas

DMA	Receiving Self-Retaining DMA

DMA Name/ ID	Area (square feet)	Post-project surface type	Runoff factor	Product	DMA name /ID	Area (square feet)	Ratio
	[A]		[B]	[C] = [A] x [B]		[D]	[C]/[D]
DMA 1 – Concrete Dam & Crest	50516	Concrete	0.89	44959	DMA 1 – Energy Dissipater Area	14309	3.1[1]
DMA 1 – Dam Control Building	116	Concrete	0.89	103	Vail Lake	0.63 sq mile	<1

[1]For the project site, higher than 2 ratio is observed, however, the pervious soil downstream will absorb the additional run-on.

Section D: Implement LID BMPs

D.1 Full Infiltration Applicability

☒ Site design LID principles or Tree Wells fully retain the DCV (i.e., all DMAs are Type A, B, or C), (Proceed to Section E).

As per Section C, the project site utilizes LID principles. The proposed condition runoff is not increased for Type 'A' DMA. The Self Retaining area DMA Type 'B' was calculated to accommodate runoff from developed DMA Type 'C'.

Section E: Implement Hydrologic Control BMPs and Sediment Supply BMPs

A completed Table 1.2 demonstrates that the project is exempt from Hydromodification Performance Standards, therefore, this section does not apply and and proceed to Section G.

☒ N/A Project is Exempt from Hydromodification Performance Standards.

Section F: Alternative Compliance

The alternative compliance does not apply to the project, however, a few elements of this were used to describe project conditions.

F.1 Identify Pollutants of Concern

The purpose of this section is to appropriately plan for mitigating Pollutants of Concern in lieu of implementing LID BMPs and to document compliance.

Table F-1 includes the watersheds identified as impaired in the Approved 2010 303(d) list; check box corresponding with the PDP's receiving water. The most recent 303(d) lists are available from the State Water Resources Control Board website: https://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml).

Table F-1 Summary of Approved 2014 and 2016 303(d) listed waterbodies and associated pollutants of concern for the Riverside County SMR Region and downstream waterbodies.

	Water Body	Nutrients[1]	Metals[2]	Toxicity	Bacteria and Pathogens	Pesticides and Herbicides	Sulfate	Total Dissolved Solids
☐	De Luz Creek	X	X				X	
☐	Long Canyon Creek		X		X	X		
☐	Murrieta Creek	X	X	X		X		
☐	Redhawk Channel	X	X		X	X		X
☐	Santa Gertudis Creek	X	X		X	X		
☐	Santa Margarita Estuary	X						
☒	Santa Margarita River (Lower)	X		X	X	X		
☒	Santa Margarita River (Upper)	X	X	X	X			
☒	Temecula Creek	X	X	X	X	X		X
☐	Warm Springs Creek	X	X		X	X		

[1] Nutrients include nitrogen, phosphorus and eutrophic conditions caused by excess nutrients.

[2] Metals includes copper, iron, and manganese.

After project completion, the site activity is minimal and therefore no pollutants (trash, sediment, etc.) are expected to be generated from the site.

F.2 Treatment Control BMP Selection

The project implemented LID principles at the project site. The pervious areas of the project were improved thus minimizing erosion. The runoff from gravity dam area flows to the energy dissipater basin. The pervious areas and basin performs as treatment control at the site. The runoff from the dam control building will drain into

F.3 Sizing Criteria

The project implemented LID principles at the project site. The DCV calculation supporting the LID principles is shown in Appendix 6.

Section G: Implement Trash Capture BMPs

This section does not apply as the project is not expected to generate any trash and does not meet the criteria listed below.

The Santa Margarita Regional Board has required Full Trash Capture compliance thru Order No. R9-2017-007. For the Santa Margarita Watershed, the County is requiring Track 1 full trash capture compliance for projects proposing the following uses as part of their development after **December 3, 2018**.

- High-density residential: all land uses with at least ten (10) developed dwelling units/acre.
- Industrial: land uses where the primary activities on the developed parcels involve product manufacture, storage, or distribution (e.g., manufacturing businesses, warehouses, equipment storage lots, junkyards, wholesale businesses, distribution centers, or building material sales yards).
- Commercial: land uses where the primary activities on the developed parcels involve the sale or transfer of goods or services to consumers (e.g., business or professional buildings, shops, restaurants, theaters, vehicle repair shops, etc.).
- Mixed urban: land uses where high-density residential, industrial, and/or commercial land uses predominate collectively (i.e., are intermixed).
- Public transportation stations: facilities or sites where public transit agencies' vehicles load or unload passengers or goods (e.g., bus stations and stops).

Section H: Source Control BMPs

Source Control BMPs include permanent, structural features such as roofs over and berms around trash and recycling areas, and Operational BMPs, such as regular sweeping and "housekeeping," that must be implemented by the site's occupant or user.

The Maximum Extent Practicable (MEP) standard typically requires both types of BMPs. In general, Operational Source Control BMPs cannot be substituted for a feasible and effective Structural Source Control BMP. Checklist below shows applicable Source Control BMPs for the project site.

Project-Specific WQMP Source Control BMP Checklist		
STEP 1: IDENTIFY POLLUTANT SOURCES		
☒ Yes Trash Storage Areas		
STEP 2: REQUIRED SOURCE CONTROL BMPS		
Pollutant Source	**Structural Source Control BMP**	**Operational Source Control BMP**
Trash	Use enclosures, containment structures, impervious pavement. Berm or grade the area to prevent run-on. Use lined bins. Provide roof/awning/lid. -	Housekeeping

Section I: Coordinate Submittal with Other Site Plans

For Final WQMPs, Table I-1 below is populated to assist the plan checker in an expeditious review of your project. This table is to be completed with the submittal of your final Project-Specific WQMP

Table I-1 Construction Plan Cross-reference

BMP No. or ID	BMP Identifier and Description	Corresponding Plan Sheet(s)
LID principles	LID principles - Grading, rock & gunite lined ditch, Energy Dissipater Basin	C-1 to C-22

Agency	Permit Required	
California Department of Fish and Wildlife, 1602 Lake and Streambed Alteration Agreement	☒ Y	☐ N
San Diego Regional Water Quality Control Board, Clean Water Act Section 401 Water Quality Certification	☒ Y	☐ N
US Army Corps of Engineers, Clean Water Act Section 404 Permit	☒ Y	☐ N
US Fish and Wildlife, Endangered Species Act Section 7 Biological Opinion	☐ Y	☒ N
Statewide Construction General Permit Coverage	☒ Y	☐ N
Statewide Industrial General Permit Coverage	☐ Y	☒ N
Western Riverside MSHCP Consistency Approval (e.g., JPR, DBESP)	☒ Y	☐ N

Other US Army Corps of Engineers, Rivers and Harbors Act Section 10 Permit	☒ Y	☐ N
State Department of Fish and Game, Endangered Species Act Incidental Take Permit	☐ Y	☒ N
State Water Resources Control Board, Waste Discharge Requirements	☒ Y	☐ N
State Historic Preservation Officer, Section 106 Consultation and Concurrence	☒ Y	☐ N

Section J: Operation, Maintenance and Funding

The project is within county jurisdiction and is outside the limits of the City of Temecula. Therefore, Final WQMP would need to be approved by RCFC & WCD at a later phase of design.

The owner (RCWD) will be responsible for maintenance and operation of the BMPs on the Project site as designed.

1

Section K: Acronyms, Abbreviations and Definitions

Regional MS4 Permit	Order No. R9-2013-0001 as amended by Order No. R9-2015-0001 and Order No. R9-2015-0100 an NPDES Permit issued by the San Diego Regional Water Quality Control Board.
Applicant	Public or private entity seeking the discretionary approval of new or replaced improvements from the Copermittee with jurisdiction over the project site. The Applicant has overall responsibility for the implementation and the approval of a Priority Development Project. The WQMP uses consistently the term "user" to refer to the applicant such as developer or project proponent. The WQMP employs also the designation "user" to identify the Registered Professional Civil Engineer responsible for submitting the Project-Specific WQMP, and designing the required BMPs.
Best Management Practice (BMP)	Defined in 40 CFR 122.2 as schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States. BMPs also include treatment requirements, operating procedures and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. In the case of municipal storm water permits, BMPs are typically used in place of numeric effluent limits.
BMP Fact Sheets	BMP Fact Sheets are available in the LID BMP Design Handbook. Individual BMP Fact Sheets include sitting considerations, and design and sizing guidelines for seven types of structural BMPs (infiltration basin, infiltration trench, permeable pavement, harvest-and-use, bioretention, extended detention basin, and sand filter).
California Stormwater Quality Association (CASQA)	Publisher of the California Stormwater Best Management Practices Handbooks, available at www.cabmphandbooks.com.
Conventional Treatment Control BMP	A type of BMP that provides treatment of stormwater runoff. Conventional treatment control BMPs, while designed to treat particular Pollutants, typically do not provide the same level of volume reduction as LID BMPs, and commonly require more specialized maintenance than LID BMPs. As such, the Regional MS4 Permit and this WQMP require the use of LID BMPs wherever feasible, before Conventional Treatment BMPs can be considered or implemented.
Copermittees	The Regional MS4 Permit identifies the Cities of Murrieta, Temecula, and Wildomar, the County, and the District, as Copermittees for the SMR.

County	The abbreviation refers to the County of Riverside in this document.
CEQA	California Environmental Quality Act - a statute that requires state and local agencies to identify the significant environmental impacts of their actions and to avoid or mitigate those impacts, if feasible.
CWA	Clean Water Act - is the primary federal law governing water pollution. Passed in 1972, the CWA established the goals of eliminating releases of high amounts of toxic substances into water, eliminating additional water pollution by 1985, and ensuring that surface waters would meet standards necessary for human sports and recreation by 1983. CWA Section 402(p) is the federal statute requiring NPDES permits for discharges from MS4s.
CWA Section 303(d) Waterbody	Impaired water in which water quality does not meet applicable water quality standards and/or is not expected to meet water quality standards, even after the application of technology based pollution controls required by the CWA. The discharge of urban runoff to these water bodies by the Copermittees is significant because these discharges can cause or contribute to violations of applicable water quality standards.
Design Storm	The Regional MS4 Permit has established the 85th percentile, 24-hour storm event as the "Design Storm". The applicant may refer to Exhibit A to identify the applicable Design Storm Depth (D85) to the project.
DCV	Design Capture Volume (DCV) is the volume of runoff produced from the Design Storm to be mitigated through LID Retention BMPs, Other LID BMPs and Volume Based Conventional Treatment BMPs, as appropriate.
Design Flow Rate	The design flow rate represents the minimum flow rate capacity that flow-based conventional treatment control BMPs should treat to the MEP, when considered.
District	Riverside County Flood Control and Water Conservation District.
DMA	A Drainage Management Area - a delineated portion of a project site that is hydraulically connected to a common structural BMP or conveyance point. The Applicant may refer to Section 3.3 for further guidelines on how to delineate DMAs.
Effective Area	Area which 1) is suitable for a BMP (for example, if infiltration is potentially feasible for the site based on infeasibility criteria, infiltration must be allowed over this area) and 2) receives runoff from impervious areas.
ESA	An Environmental Sensitive Area (ESA) designates an area "in which plants or animals life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which would be easily disturbed or degraded by human activities and developments". (Reference: California Public Resources Code § 30107.5).

HCOC	Hydrologic Condition of Concern - Exists when the alteration of a site's hydrologic regime caused by development would cause significant impacts on downstream channels and aquatic habitats, alone or in conjunction with impacts of other projects.
HMP	Hydromodification Management Plan – Plan defining Performance Standards for PDPs to manage increases in runoff discharge rates and durations.
Hydrologic Control BMP	BMP to mitigate the increases in runoff discharge rates and durations and meet the Performance Standards set forth in the HMP.
HSG	Hydrologic Soil Groups – soil classification to indicate the minimum rate of infiltration obtained for bare soil after prolonged wetting. The HSGs are A (very low runoff potential/high infiltration rate), B, C, and D (high runoff potential/very low infiltration rate)
Hydromodification	The Regional MS4 Permit identifies that increased volume, velocity, frequency and discharge duration of storm water runoff from developed areas has the potential to greatly accelerate downstream erosion, impair stream habitat in natural drainages, and negatively impact beneficial uses.
LID	Low Impact Development (LID) is a site design strategy with a goal of maintaining or replicating the pre-development hydrologic regime through the use of design techniques. LID site design BMPs help preserve and restore the natural hydrologic cycle of the site, allowing for filtration and infiltration which can greatly reduce the volume, peak flow rate, velocity, and pollutant loads of storm water runoff.
LID BMP	A type of stormwater BMP that is based upon Low Impact Development concepts. LID BMPs not only provide highly effective treatment of stormwater runoff, but also yield potentially significant reductions in runoff volume – helping to mimic the pre-project hydrologic regime, and also require less ongoing maintenance than Treatment Control BMPs. The applicant may refer to Chapter 2.
LID BMP Design Handbook	The LID BMP Design Handbook was developed by the Copermittees to provide guidance for the planning, design and maintenance of LID BMPs which may be used to mitigate the water quality impacts of PDPs within the County.
LID Principles	Site design concepts that prevent or minimize the causes (or drivers) of post-construction impacts, and help mimic the pre-development hydrologic regime.
MEP	Maximum Extent Practicable - standard established by the 1987 amendments to the CWA for the reduction of Pollutant discharges from MS4s. Refer to Attachment C of the Regional MS4 Permit for a complete definition of MEP.

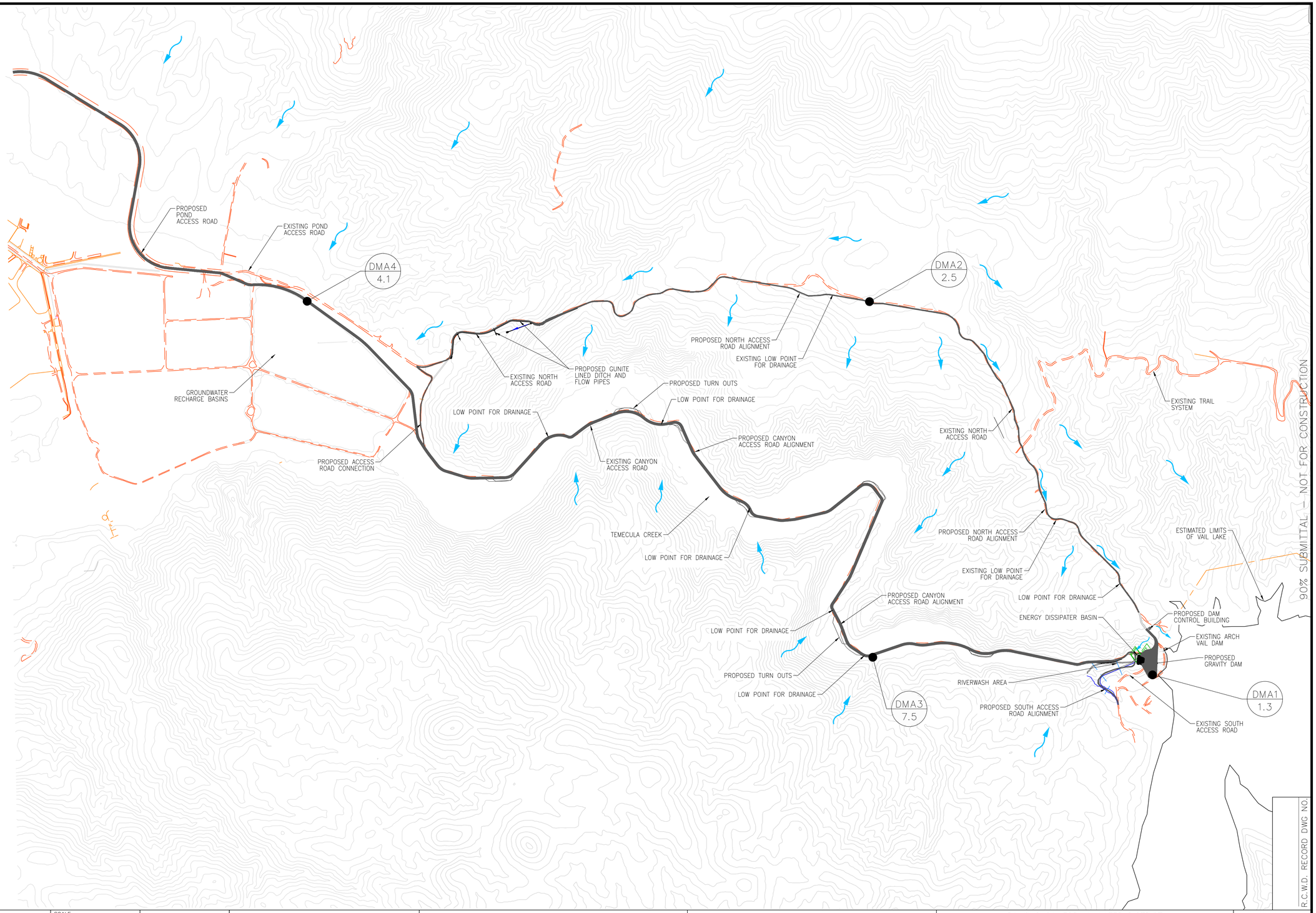
MS4	Municipal Separate Storm Sewer System (MS4) is a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains): (i) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or designated and approved management agency under section 208 of the CWA that discharges to waters of the United States; (ii) Designated or used for collecting or conveying storm water; (iii) Which is not a combined sewer; (iv) Which is not part of the Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.26.
New Development Project	Defined by the Regional MS4 Permit as 'Priority Development Projects' if the project, or a component of the project meets the categories and thresholds described in Section 1.1.1.
NPDES	National Pollution Discharge Elimination System - Federal program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under Sections 307, 318, 402, and 405 of the CWA.
NRCS	Natural Resources Conservation Service
PDP	Priority Development Project - Includes New Development and Redevelopment project categories listed in Provision E.3.b of the Regional MS4 Permit.
Priority Pollutants of Concern	Pollutants expected to be present on the project site and for which a downstream water body is also listed as Impaired under the CWA Section 303(d) list or by a TMDL.
Project-Specific WQMP	A plan specifying and documenting permanent LID Principles and Stormwater BMPs to control post-construction Pollutants and stormwater runoff for the life of the PDP, and the plans for operation and maintenance of those BMPs for the life of the project.
Receiving Waters	Waters of the United States.
San Diego Regional Board	San Diego Regional Water Quality Control Board - The term "Regional Board", as defined in Water Code section 13050(b), is intended to refer to the California Regional Water Quality Control Board for the San Diego Region as specified in Water Code Section 13200. State agency responsible for managing and regulating water quality in the SMR.
Site Design BMP	Site design BMPs prevent or minimize the causes (or drivers) of post-construction impacts, and help mimic the pre-development hydrologic regime.

SF	Parcels with a zoning classification for a single residential unit.
SMR	The Santa Margarita Region (SMR) represents the portion of the Santa Margarita Watershed that is included within the County of Riverside.
Source Control BMP	Source Control BMPs land use or site planning practices, or structural or nonstructural measures that aim to prevent runoff pollution by reducing the potential for contamination at the source of pollution. Source control BMPs minimize the contact between Pollutants and runoff.
Structural BMP	Structures designed to remove pollutants from stormwater runoff and mitigate hydromodification impacts.
TMDL	Total Maximum Daily Load - the maximum amount of a Pollutant that can be discharged into a waterbody from all sources (point and non-point) and still maintain Water Quality Standards. Under CWA Section 303(d), TMDLs must be developed for all waterbodies that do not meet Water Quality Standards after application of technology-based controls.
USEPA	United States Environmental Protection Agency
Volume-Based BMP	Volume-Based BMPs applies to BMPs where the primary mode of pollutant removal depends upon the volumetric capacity such as detention, retention, and infiltration systems.
WQMP	Water Quality Management Plan
Wet Season	The Regional MS4 Permit defines the wet season from October 1 through April 30.

Appendix 1: Maps and Site Plans

Location Map, WQMP Site Plan and Receiving Waters Map

Map and Site Plan Checklist
Indicate all Maps and Site Plans are included in your Project-Specific WQMP by checking the boxes below.
☒ Vicinity and Location Map
☒ Existing Site Map (unless exiting conditions are included in WQMP Site Plan)
☒ WQMP Site Plan
☒ Parcel Boundary and Project Footprint
☒ Existing and Proposed Topography & Drainage Management Areas (DMAs)
☒ Proposed Structural Best Management Practices (BMPs), with cross sections
☒ Drainage Paths
☒ Drainage infrastructure, inlets, overflows
☒ Source Control & Site Design BMPs (as applicable)
☒ Buildings, Roof Lines, Downspouts
☒ Impervious Surfaces
☒ Pervious Surfaces (i.e. Landscaping)
☒ Standardized Labeling



LEGEND

- PROPOSED CONTOURS
- EXISTING DIRT ROAD LINE
- PROPOSED ACCESS ROAD
- PROJECT AREA
- FLOW DIRECTION
- A1 / 13.6 — DRAINAGE MANAGEMENT AREA / ACREAGE

NOTES

1) IMPERVIOUS AREAS:
DMA 1 – GRAVITY DAM, DAM CREST, DAM CONTROL BUILDING
2) PERVIOUS AREAS:
DMA 1 – ENERGY DISSIPATER BASIN
DMA 2 – NORTH ACCESS ROAD
DMA 3 – SOUTH ACCESS ROAD, CANYON ACCESS ROAD, TURNOUT AREAS
DMA 4 – POND ACCESS ROAD, OAK MOUNTAIN ROAD

0 250' 500' 1000'
0 1" 2"

N

REVISIONS			
NUMBER	DATE	INITIALS	DESCRIPTION

SCALE AS SHOWN
DESIGNED XXX
DRAWN XXX
CHECKED XXX

AECOM
999 TOWN & COUNTRY ROAD
ORANGE, CA 92868
TEL (714) 567-2400

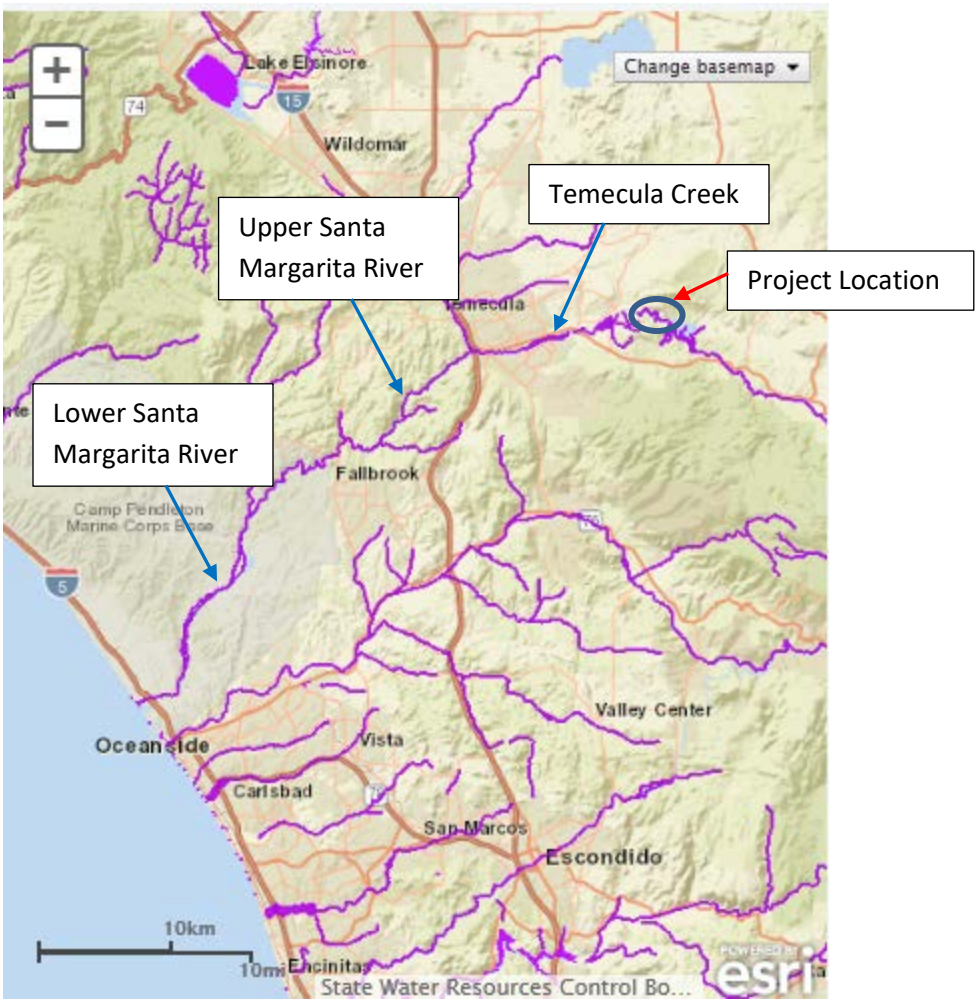
Rancho Water
Rancho California Water District
42135 Winchester Road
Temecula, CA 92590
Phone: (951) 296-6900 Fax: (951) 296-6863

RANCHO CALIFORNIA WATER DISTRICT
APPROVED FOR CONSTRUCTION
Engineering Date

RANCHO CALIFORNIA WATER DISTRICT
VAIL DAM SEISMIC AND HYDROLOGIC REMEDIATION PROJECT
PROJECT NO. D1911

FIGURE 1 OVERALL SITE MAP

SHEET C-----
SHEET XX OF 102



Impaired Water Body 303 (d) list map

Source: https://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2014_2016.shtml

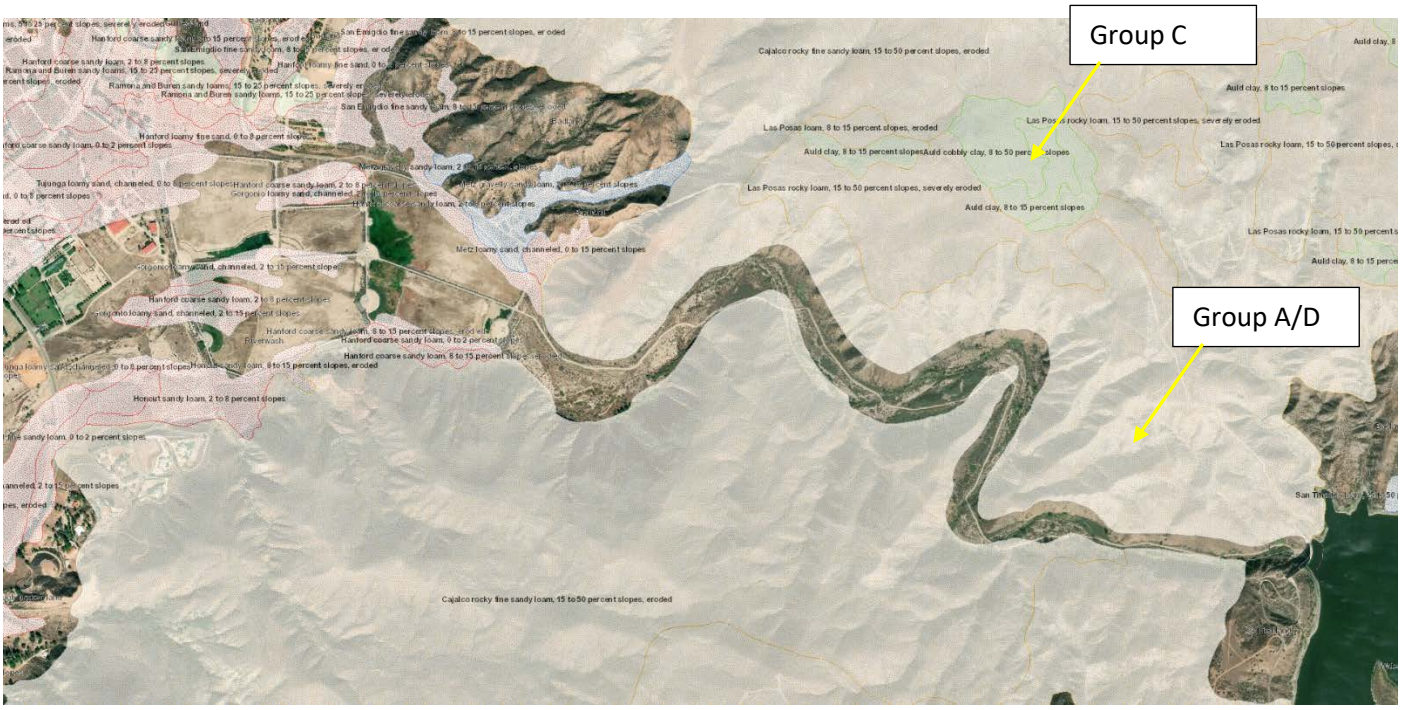


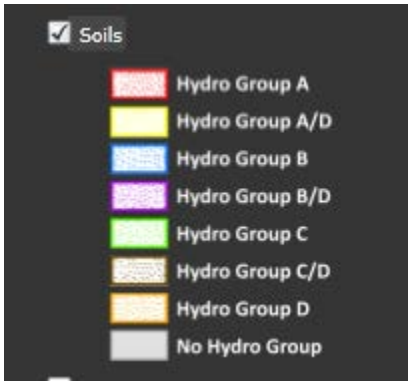
85th Percentile Isohyetal Map

Source: http://rcstormwatertool.org/SWCTT/



Map showing Parcel Boundary





Map showing Soils at the site

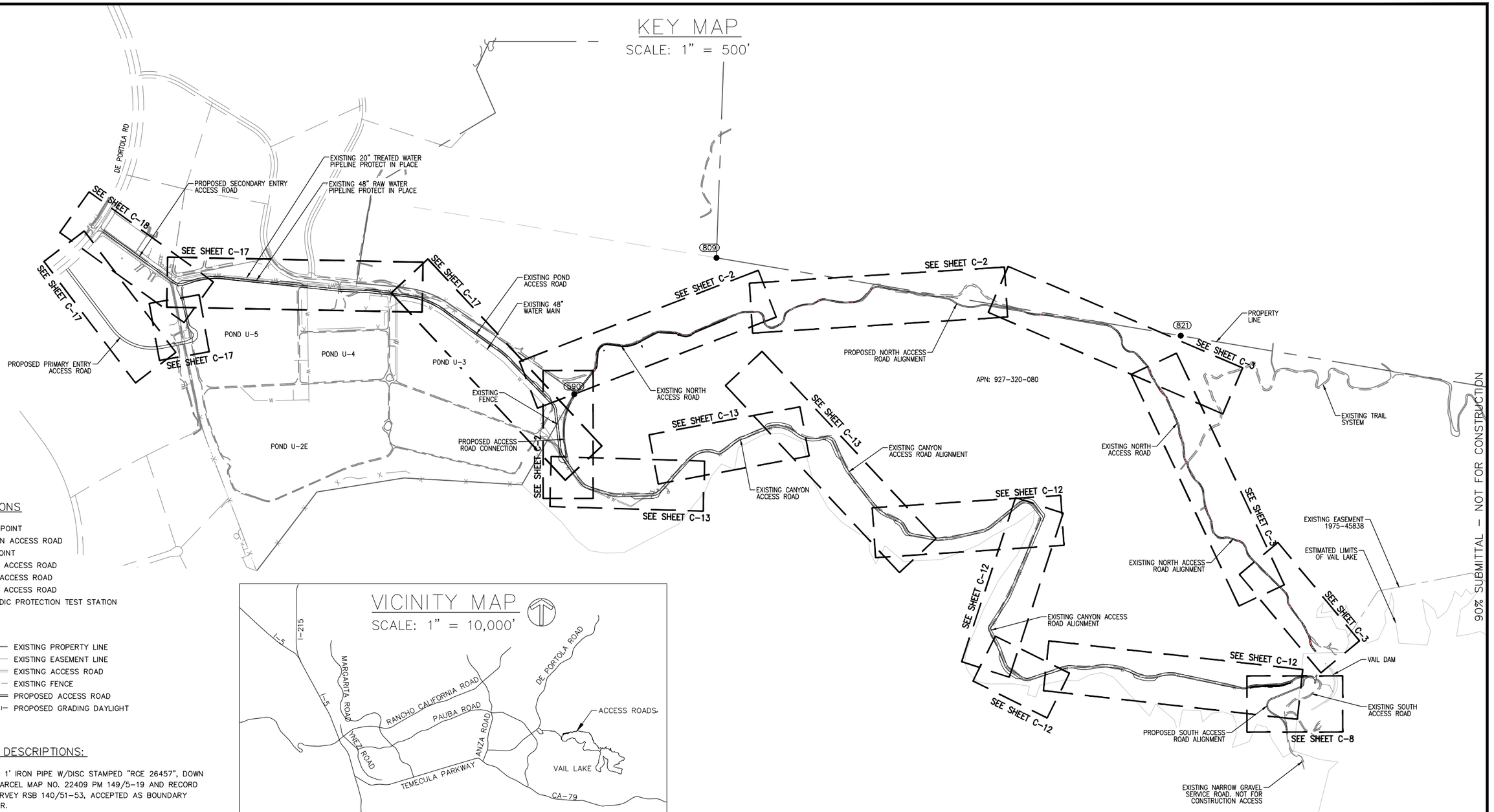

Project Location
FEMA Flood Plain
100 Year Flood Event
500 Year Flood Event

Appendix 2: Construction Plans

*The latest set of Grading, Drainage Plans, and Street Improvement plans **shall be included.***

KEY MAP

SCALE: 1" = 500'



ABBREVIATIONS

BP	BEGIN POINT
CAR	CANYON ACCESS ROAD
EP	END POINT
NAR	NORTH ACCESS ROAD
PAR	POND ACCESS ROAD
SAR	SOUTH ACCESS ROAD
C.P.T.S	CATHODIC PROTECTION TEST STATION

LEGEND

- EXISTING PROPERTY LINE
- EXISTING EASEMENT LINE
- EXISTING ACCESS ROAD
- EXISTING FENCE
- PROPOSED ACCESS ROAD
- PROPOSED GRADING DAYLIGHT

VICINITY MAP

SCALE: 1" = 10,000'

MONUMENT DESCRIPTIONS:

(590) FOUND 1" IRON PIPE W/DISC STAMPED "RCE 26457", DOWN 18", PARCEL MAP NO. 22409 PM 149/5-19 AND RECORD OF SURVEY RSB 140/51-53, ACCEPTED AS BOUNDARY CORNER.
N: 2127822.81 E: 6332295.74 EL: 1300.0

(809) FOUND 1" IRON PIPE WITH PLASTIC PLUG STAMPED "RCE 26457", FLUSH, PER PARCEL MAP NO. 22409 PM 149/5-19, POINT IS 0.40' SOUTH OF RANCHO LINE, USED FOR LINE ONLY.
N: 2129194.36 E: 6333738.76 EL: 1559.6

(821) FOUND 1" IRON PIPE , NO DISC, DOWN 0.5', SEE PARCEL MAP NO. 22409 PM 149/5-19 (CORNER PARCELS 9/10), ACCEPTED AS POINT ON RANCHO LINE.
N: 2128400.63 E: 6338472.13 EL: 1799.1

0 250' 500' 1000'
0 1" 2"

N

90% SUBMITTAL - NOT FOR CONSTRUCTION

R.C.W.D. RECORD DWG NO.

REVISIONS			
NUMBER	DATE	INITIALS	DESCRIPTION

SCALE: AS SHOWN
DESIGNED: XXX
DRAWN: XXX
CHECKED: XXX

AECOM
999 TOWN & COUNTRY ROAD
ORANGE, CA 92868
TEL (714) 567-2400

Rancho Water
Rancho California Water District
42135 Winchester Road
Temecula, CA 92590
Phone: (951) 296-6900 Fax: (951) 296-6863

RANCHO CALIFORNIA WATER DISTRICT
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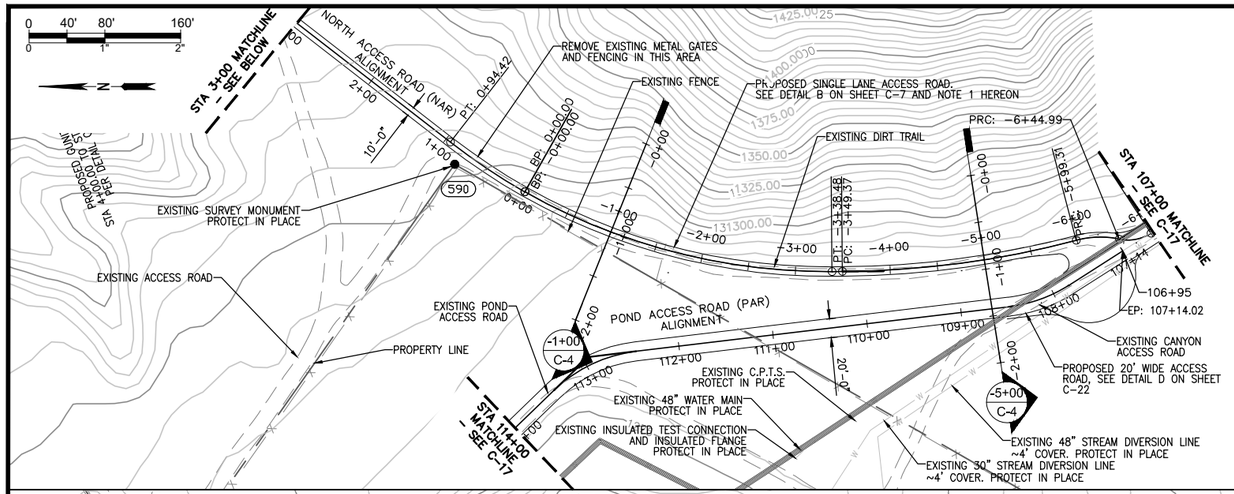
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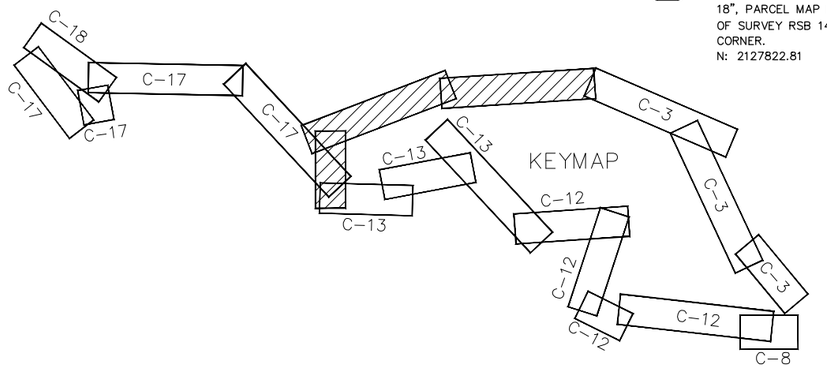
Engineering Date

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VAIL DAM SEISMIC AND HYDROLOGIC REMEDIATION PROJECT
PROJECT NO. D1911

ACCESS ROAD KEY PLAN

SHEET
C-1
SHEET 43 OF XX





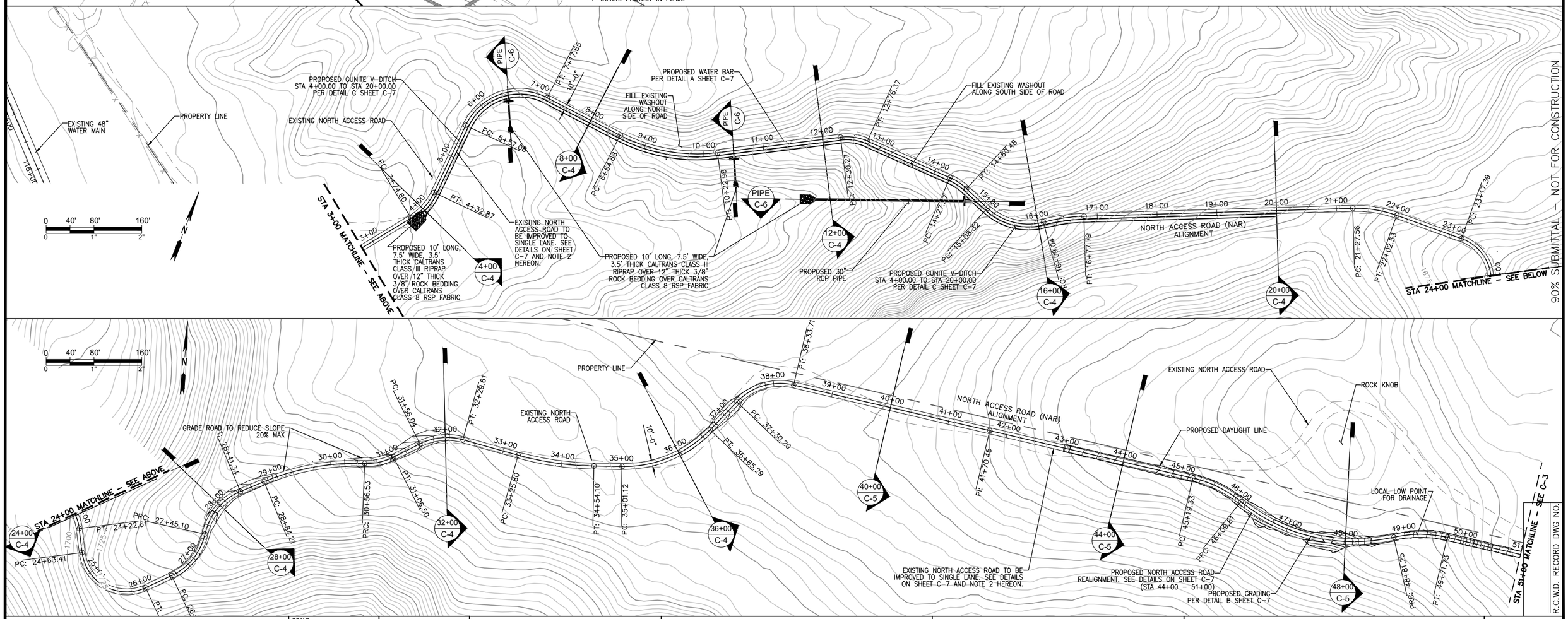
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N: 2127822.81 E: 6332295.74 EL: 1300.0

NOTES:

1. PROPOSED CONNECTION BETWEEN THE NORTH ACCESS ROAD AND POND ACCESS ROAD (STA 0+00 TO -6+79.87) ALONG EXISTING TRAIL.

2. THE EXISTING NORTH ACCESS ROAD TO BE IMPROVED TO A SINGLE LANE UNLESS OTHERWISE SHOWN.



REVISIONS			
NUMBER	DATE	INITIALS	DESCRIPTION

SCALE: AS SHOWN
DESIGNED: XXX
DRAWN: XXX
CHECKED: XXX

AECOM
999 TOWN & COUNTRY ROAD
ORANGE, CA 92868
TEL (714) 567-2400

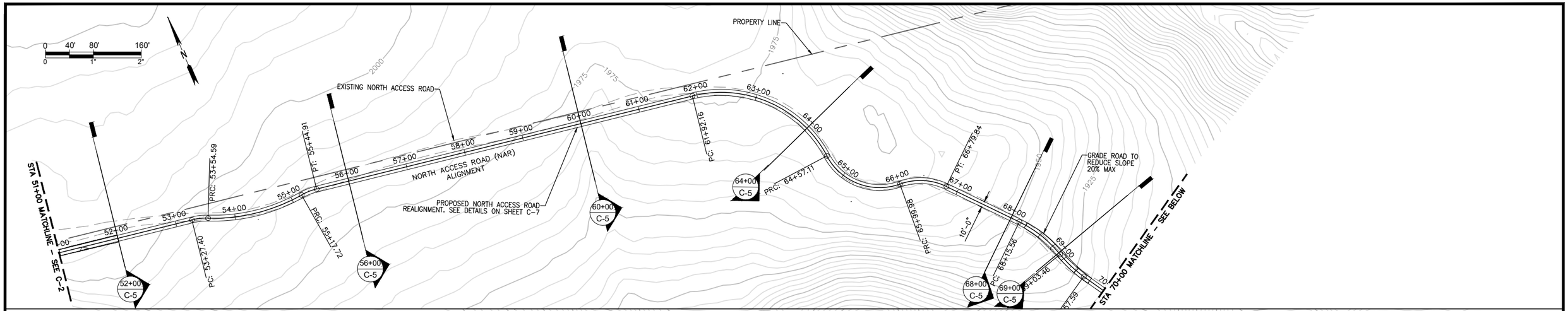
Rancho Water
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Phone: (951) 296-6900 Fax: (951) 296-6863

RANCHO CALIFORNIA WATER DISTRICT
APPROVED FOR CONSTRUCTION
Engineering Manager Date
Engineering Date

RANCHO CALIFORNIA WATER DISTRICT
VAIL DAM SEISMIC AND HYDROLOGIC REMEDIATION PROJECT
PROJECT NO. D1911

NORTH ACCESS ROAD PLAN - 1

SHEET
C-2
SHEET 44 OF XX



REVISIONS			
NUMBER	DATE	INITIALS	DESCRIPTION

SCALE: AS SHOWN
DESIGNED: XXX
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ORANGE, CA 92868
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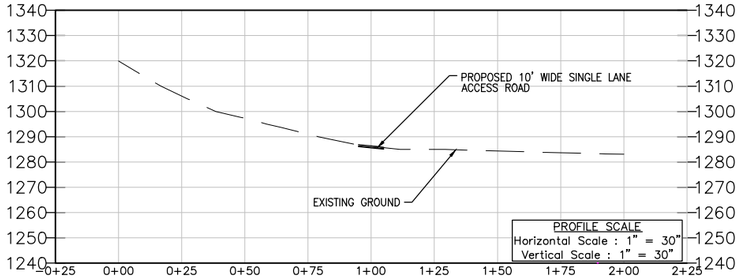
Engineering Date

RANCHO CALIFORNIA WATER DISTRICT
VAIL DAM SEISMIC AND HYDROLOGIC REMEDIATION PROJECT
PROJECT NO. D1911

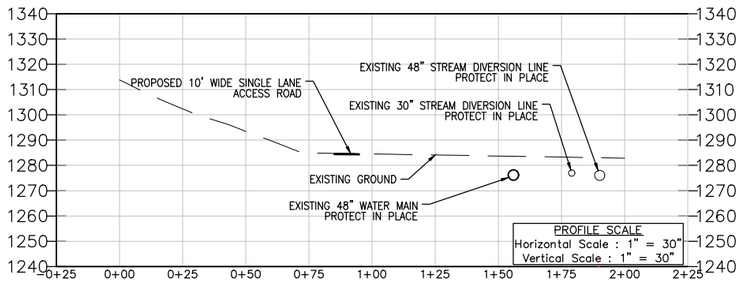
NORTH ACCESS ROAD PLAN - 2

SHEET
C-3
SHEET 45 OF XX

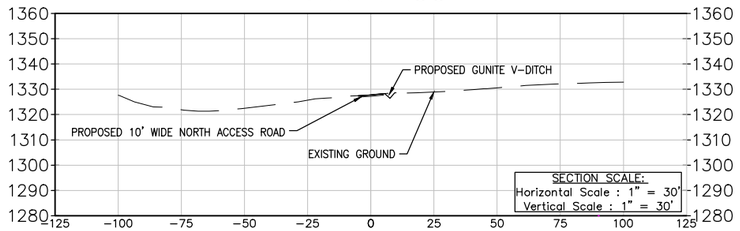
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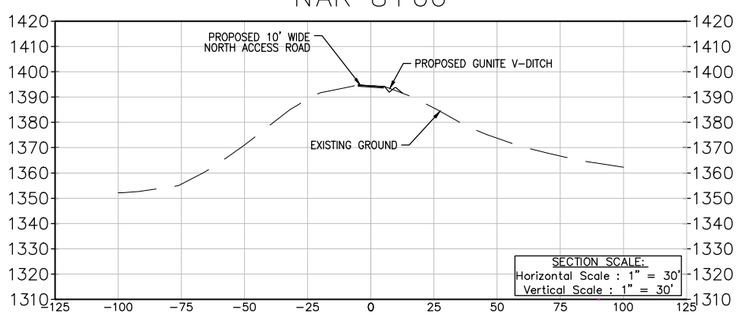
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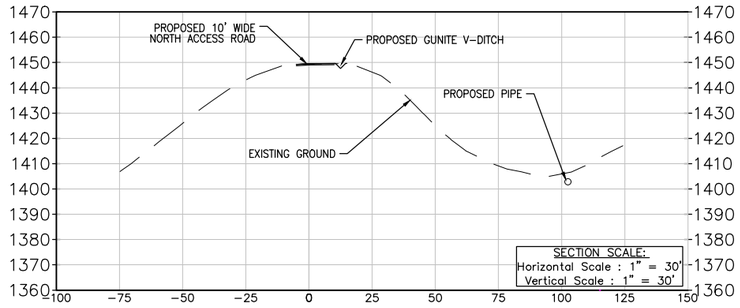
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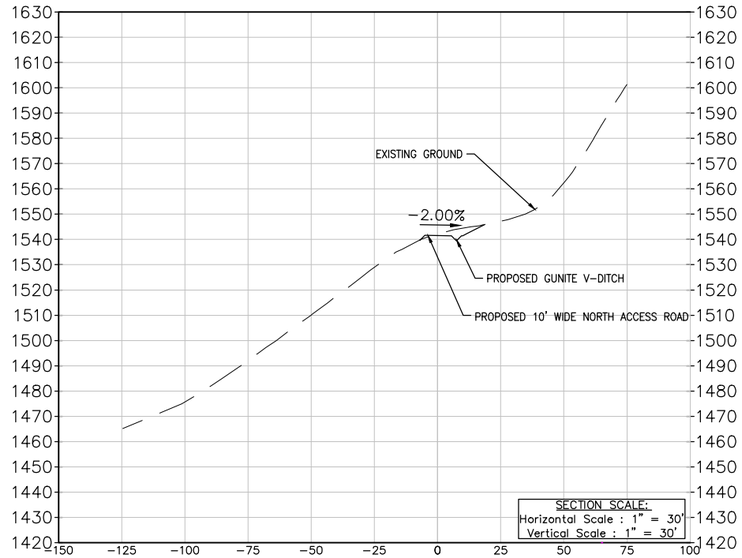
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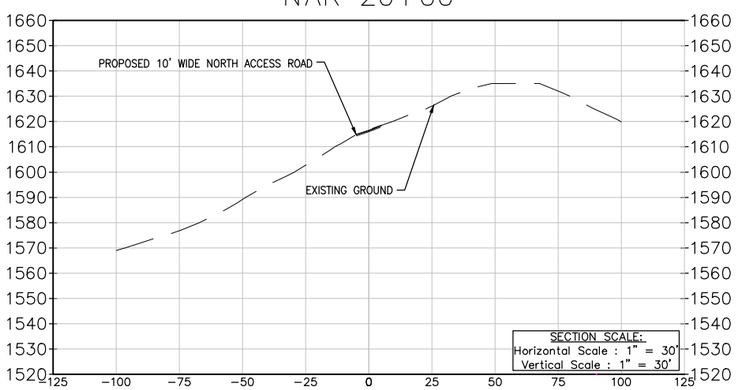
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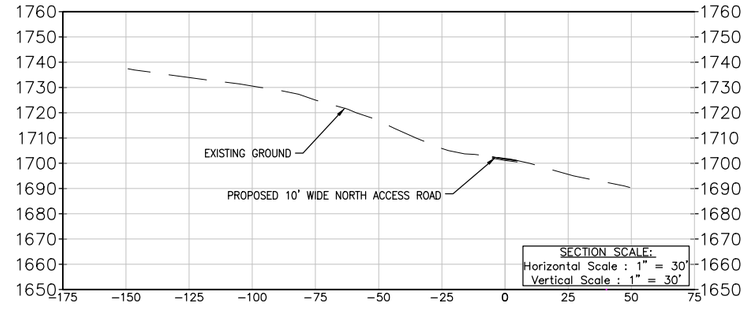
NAR 16+00



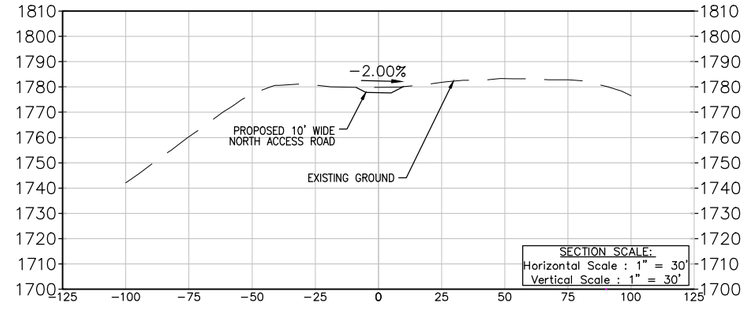
NAR 20+00



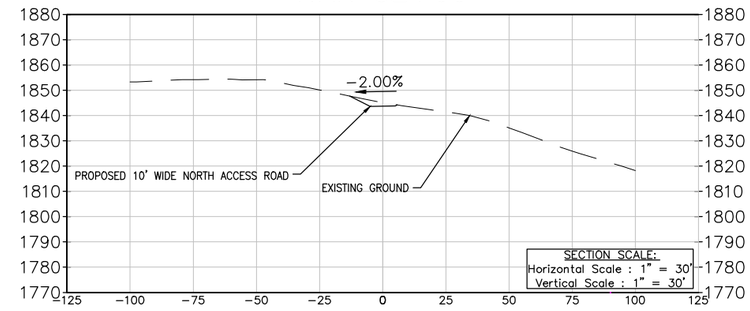
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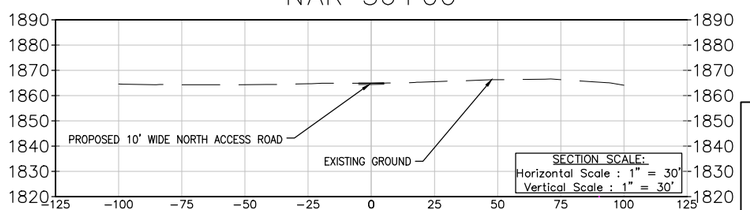
NAR 28+00



NAR 32+00



NAR 36+00



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R.C.W.D. RECORD DWG NO.

REVISIONS			
NUMBER	DATE	INITIALS	DESCRIPTION

SCALE: AS SHOWN
DESIGNED: XXX
DRAWN: XXX
CHECKED: XXX

AECOM
999 TOWN & COUNTRY ROAD
ORANGE, CA 92868
TEL (714) 567-2400

Rancho Water
Rancho California Water District
42135 Winchester Road
Temecula, CA 92590
Phone: (951) 296-6900 Fax: (951) 296-6863

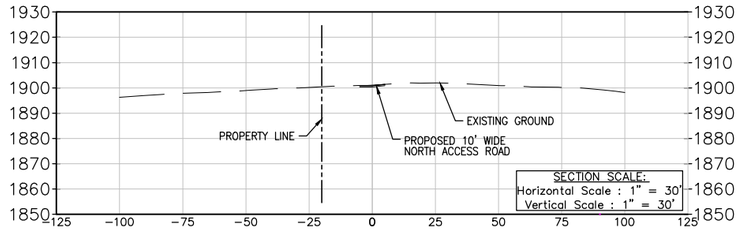
RANCHO CALIFORNIA WATER DISTRICT
APPROVED FOR CONSTRUCTION
Engineering Manager Date
Engineering Date

RANCHO CALIFORNIA WATER DISTRICT
VAIL DAM SEISMIC AND HYDROLOGIC REMEDIATION PROJECT
PROJECT NO. D1911

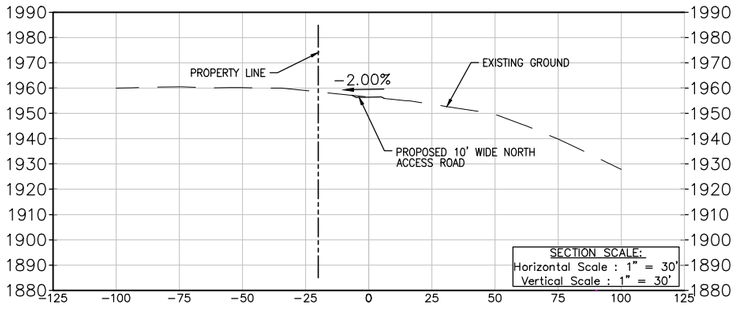
NORTH ACCESS ROAD SECTIONS

SHEET
C-4
SHEET 46 OF XX

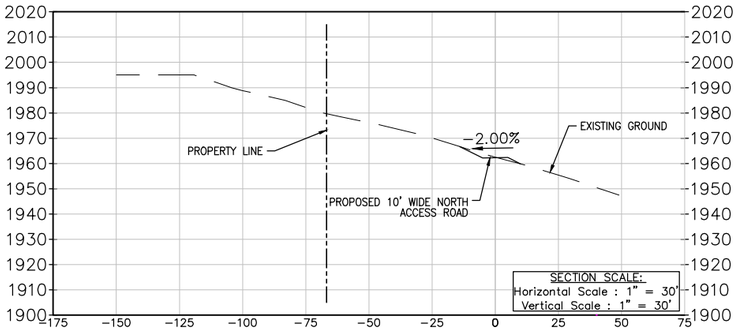
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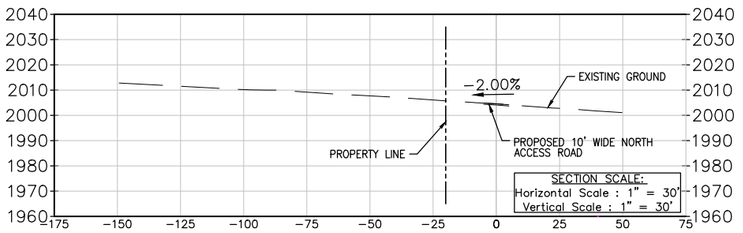
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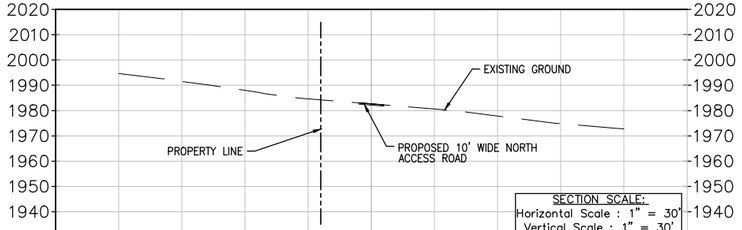
NAR 48+00



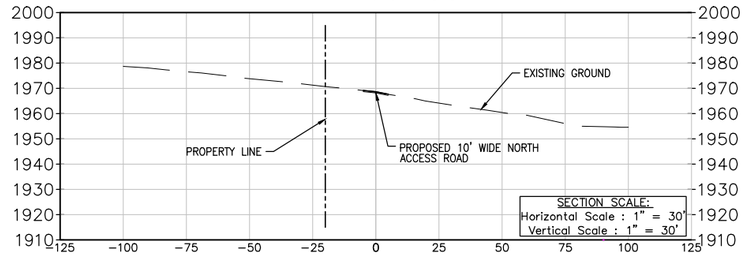
NAR 52+00



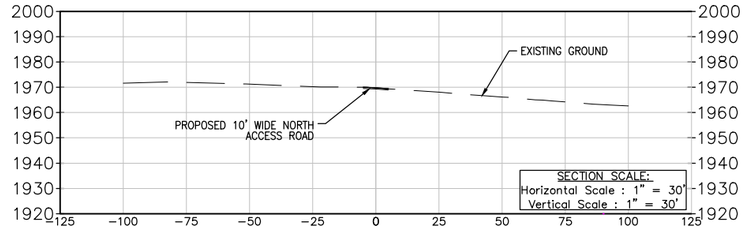
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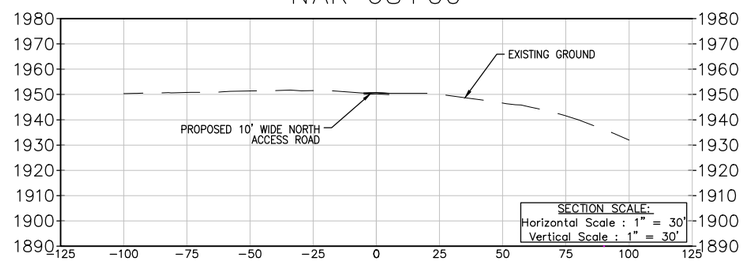
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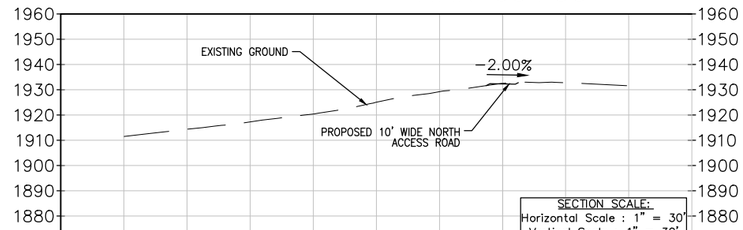
NAR 64+00



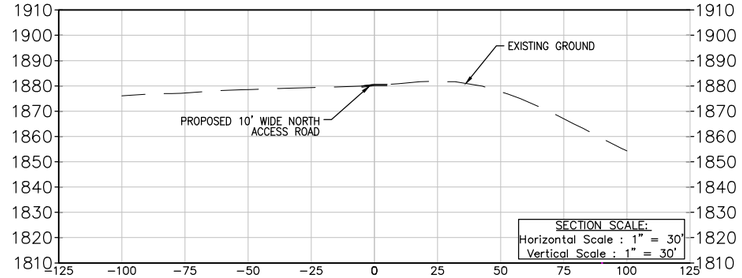
NAR 68+00



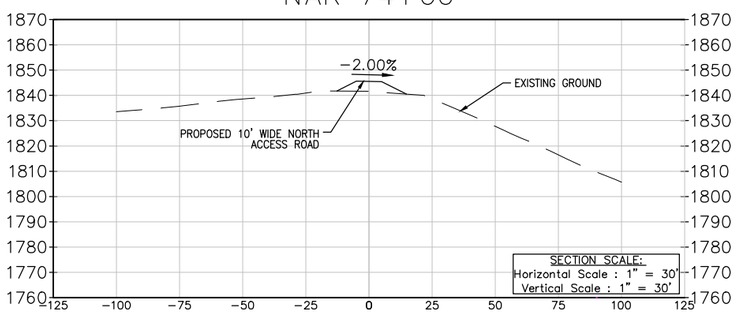
NAR 69+00



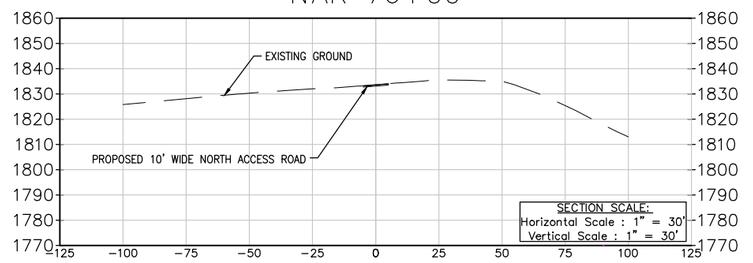
NAR 72+00



NAR 74+00



NAR 76+00



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CHECKED XXX

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TEL (714) 567-2400

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RANCHO CALIFORNIA WATER DISTRICT

APPROVED FOR CONSTRUCTION

Engineering Manager Date

Engineering Date

RANCHO CALIFORNIA WATER DISTRICT

VAIL DAM SEISMIC AND HYDROLOGIC REMEDIATION PROJECT

PROJECT NO. D1911

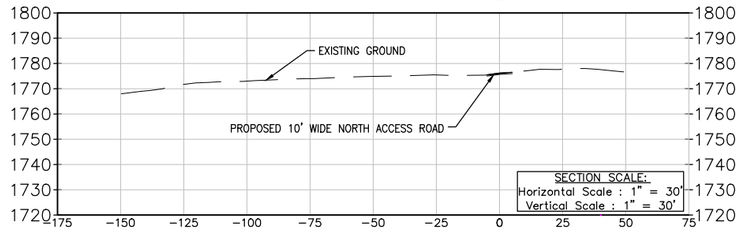
NORTH ACCESS ROAD SECTIONS

SHEET

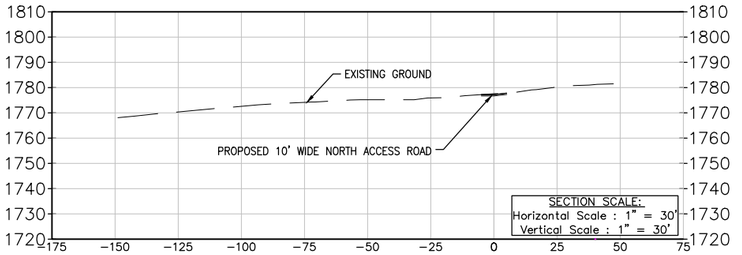
C-5

SHEET 47 OF XX

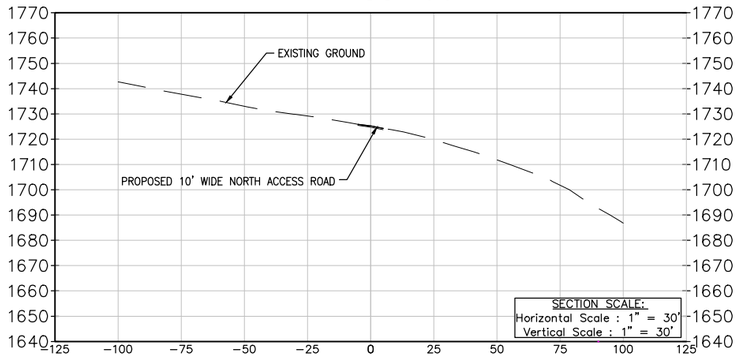
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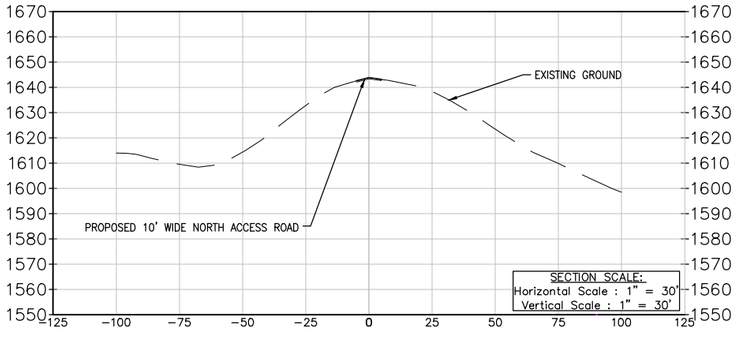
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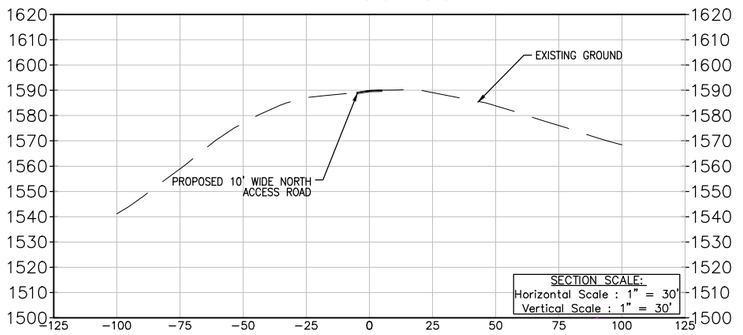
NAR 88+00



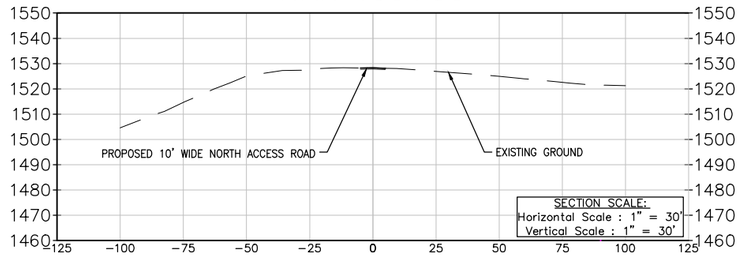
NAR 92+00



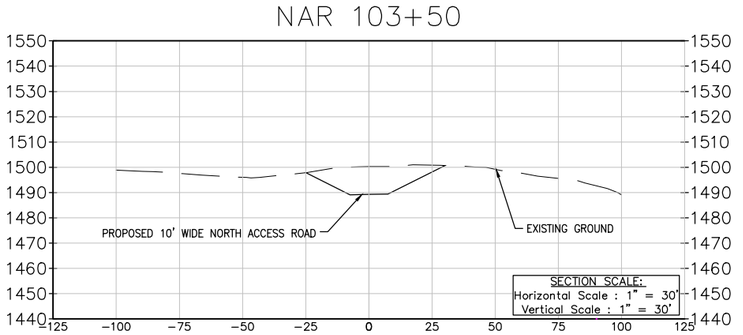
NAR 96+00



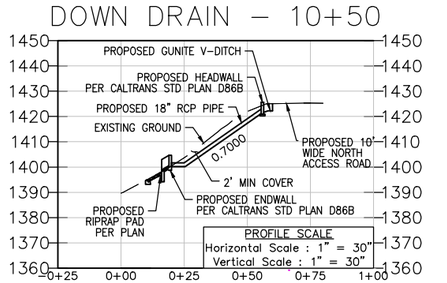
NAR 100+00



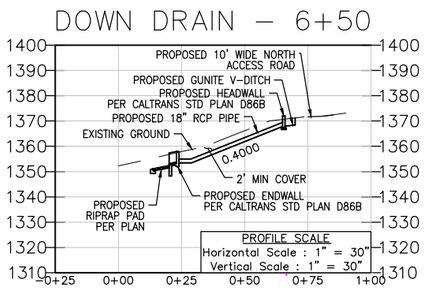
NAR 103+50



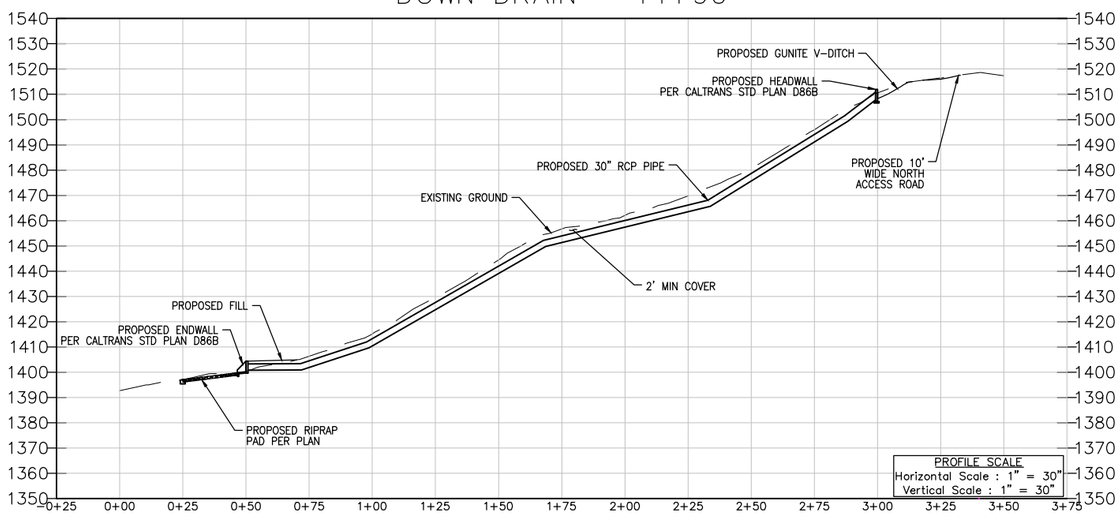
DOWN DRAIN – 10+50



DOWN DRAIN – 6+50



DOWN DRAIN – 14+90



90% SUBMITTAL – NOT FOR CONSTRUCTION

R.C.W.D. RECORD DWG NO.

REVISIONS			
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SCALE: AS SHOWN
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CHECKED: XXX

AECOM
999 TOWN & COUNTRY ROAD
ORANGE, CA 92868
TEL (714) 567-2400

Rancho Water
Rancho California Water District
42135 Winchester Road
Temecula, CA 92590
Phone: (951) 296-6900 Fax: (951) 296-6863

RANCHO CALIFORNIA WATER DISTRICT
APPROVED FOR CONSTRUCTION

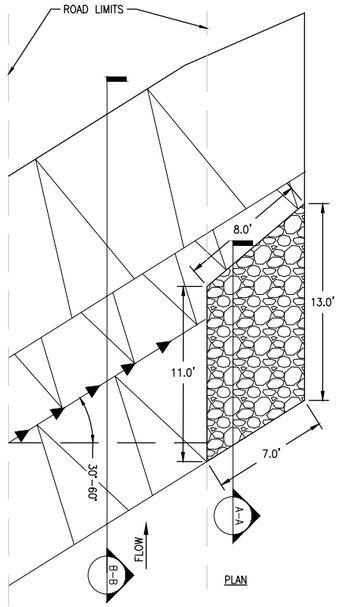
Engineering Manager Date

Engineering Date

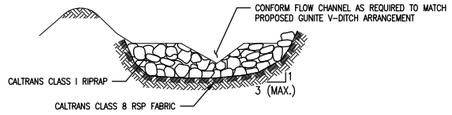
RANCHO CALIFORNIA WATER DISTRICT
VAIL DAM SEISMIC AND HYDROLOGIC REMEDIATION PROJECT
PROJECT NO. D1911

NORTH ACCESS ROAD SECTIONS

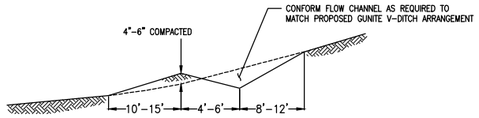
SHEET
C-6
SHEET 48 OF XX



PLAN



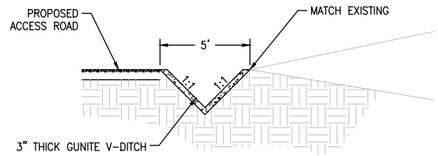
SECTION A-A



SECTION B-B

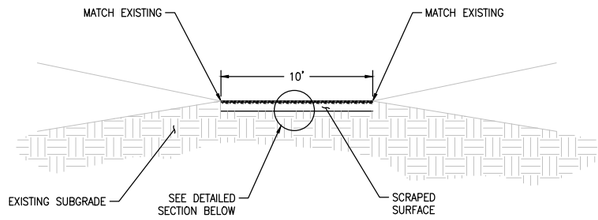
NOTES:
1. FOR ROAD GRADES OVER 10% THE CUT DEPTH AND BERM HEIGHTS SHOULD REACH MAXIMUM VALUES.
2. WATERBARS SHALL BE PLACED FROM STA 4+00 TO STA 20+00 AT 200' SPACING ALONG THE NAR AT THE DOWN STREAM END OF ANY ADDITIONAL GRADING ALONG THE ROAD.
3. MAINTAIN A 3% SLOPE WITHIN THE RIP RAP AREA ALONG THE FLOW LINE.

WATERBAR (A)
NTS

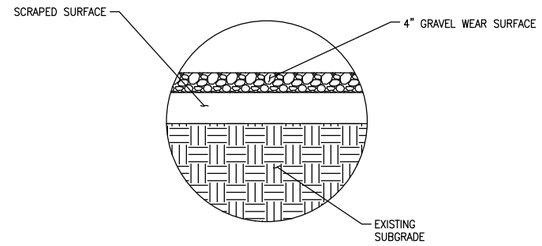


NOTE: SHOULD ANY CUT OR FILL BE REQUIRED, A MAX SLOPE OF 2:1 SHALL BE USED. UNLESS NOTED OTHERWISE.

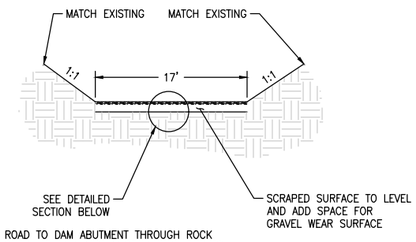
GUNITE V-DITCH (C)
NTS



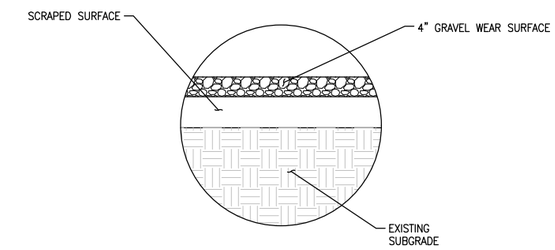
NOTE: SHOULD ANY CUT OR FILL BE REQUIRED, A MAX SLOPE OF 2:1 SHALL BE USED, UNLESS NOTED OTHERWISE.



NORTH ACCESS ROAD (TYPICAL) (B)
NTS



NOTE: NEW ACCESS ROAD TO DAM ABUTMENT THROUGH ROCK KNOB IS DESIGNED WITH 1:1 SIDE SLOPES; ENGINEER TO EVALUATE STABLE SIDE SLOPES IN EXPOSURE AFTER EXCAVATION.



ACCESS ROAD AT RIGHT ABUTMENT OF DAM - STA. 102+00 TO 103+79 (D)
NTS

90% SUBMITTAL - NOT FOR CONSTRUCTION

R.C.W.D. RECORD DWG NO.

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AECOM
999 TOWN & COUNTRY ROAD
ORANGE, CA 92868
TEL (714) 567-2400

Rancho Water
Rancho California Water District
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Phone: (951) 296-6900 Fax: (951) 296-6863

RANCHO CALIFORNIA WATER DISTRICT
APPROVED FOR CONSTRUCTION
Engineering Manager Date
Engineering Date

RANCHO CALIFORNIA WATER DISTRICT
VAIL DAM SEISMIC AND HYDROLOGIC REMEDIATION PROJECT
PROJECT NO. D1911

NORTH ACCESS ROAD DETAILS

SHEET
C-7
SHEET 49 OF XX

PROPOSED VEGETATED RIPRAP ALONG TOE OF SLOPE SEE DETAILS C, D & E, ON SHEET C-11

PROPOSED GRADING PER DETAIL A SHEET C-16

PROPOSED CANYON ACCESS ROAD, SEE PROFILE A ON SHEET C-16

PROPOSED DAYLIGHT LINE

STA -0+38.58 END CANYON ACCESS ROAD =
STA 9+13.35 BEGIN SOUTH ACCESS ROAD

EP: 9+13.35

PT: 6+77.07

Mid: 8+52.76

PROPOSED OUTLET WORKS VALVE VAULT ACCESS ROAD AND TURN-AROUND, SEE SHEET O-9

PROPOSED METER VALVE, SEE SHEET O-5 FOR PLAN AND SECTION

PC: 8+28.45

EXISTING 48" CML&C STL PIPE

PROPOSED CHANNEL

VEGETATED RIPRAP BEGINNING
N: 2124841.93
E: 6339714.09

VEGETATED RIPRAP END
N: 2124860.89
E: 6339593.23

24" RCP CULVERT

DOWNSTREAM RCC DAM FACE

PROPOSED OUTLET PIPE

EXISTING ARCH DAM

PROPOSED OUTLET WORKS VALVE VAULT, SEE SHEET O-6 FOR PLAN AND SECTION

PROPOSED ENERGY DISSIPATER BASIN

PT: 7+81.72

Mid: 7+64.30

PC: 7+46.88

VEGETATED RIPRAP BEGINNING
N: 2124804.55
E: 6339177.75

END GUNITE V-DITCH

END VEGETATED RIPRAP
N2124709.90
E6339225.40

PROPOSED SOUTH ACCESS ROAD REALIGNMENT

PROPOSED GUNITE V-DITCH PER DETAIL B SHEET C-11

PROPOSED RCC DAM

PROPOSED GRADING PER DETAIL A SHEET C-11

PROPOSED DAYLIGHT LINE

EXISTING SOUTH ACCESS ROAD

SCE POWER LINE EASEMENT

SCE POWER POLE (TYP.)

PROPOSED GUNITE V-DITCH PER DETAIL B SHEET C-11

PROPOSED GRADING PER DETAIL A SHEET C-11

PROPOSED DAYLIGHT LINE

PC: 2+59.36

PI: 2+37.45

PT: 1+73.85

PROPOSED GUNITE V-DITCH PER DETAIL B SHEET C-11

SCE POWER LINE EASEMENT

BEGIN GUNITE V-DITCH

RECONNECT PROPOSED SOUTH ACCESS ROAD TO EXISTING NARROW GRAVEL SERVICE ROAD
N2124464.80
E6339513.19

Mid: 0+86.47

EXISTING NARROW GRAVEL SERVICE ROAD (NOT FOR CONSTRUCTION ACCESS)

BP: -0+00.00

KEYMAP

C-2 C-3 C-12 C-13 C-17 C-18

0 15' 30' 60'
0 1" 2"

N

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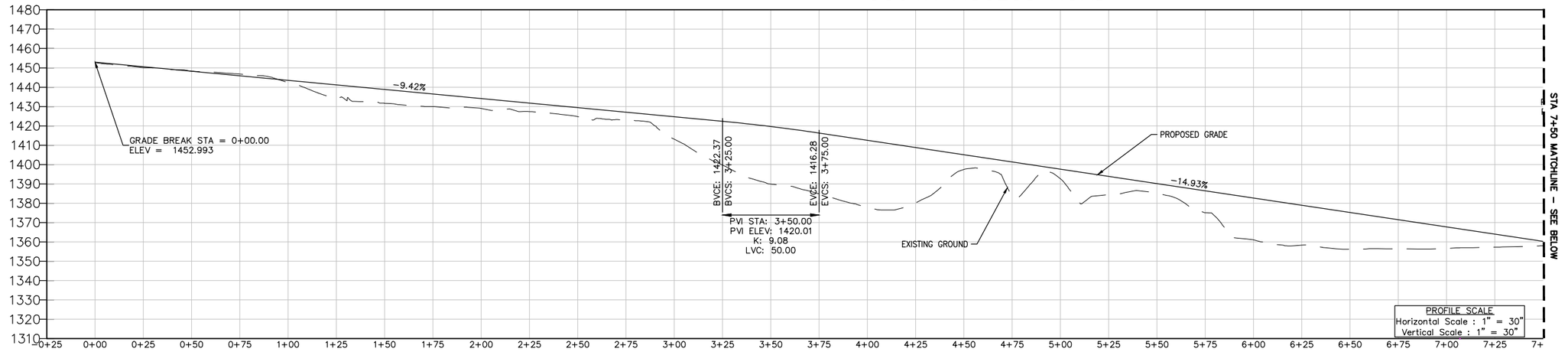
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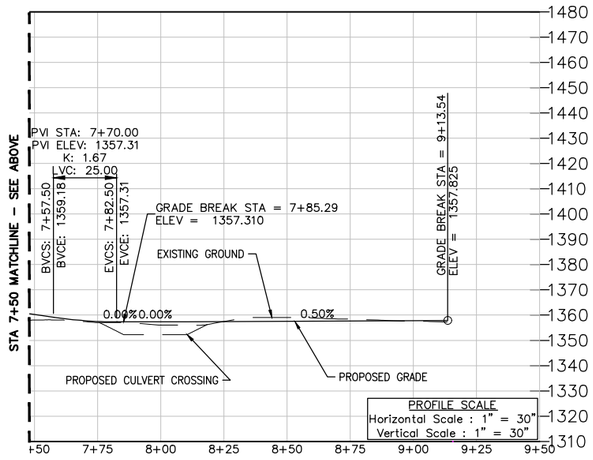
RANCHO CALIFORNIA WATER DISTRICT
VAIL DAM SEISMIC AND HYDROLOGIC REMEDIATION PROJECT
PROJECT NO. D1911

SOUTH ACCESS ROAD PLAN

SHEET
C-8
SHEET 50 OF XX

SOUTH ACCESS ROAD





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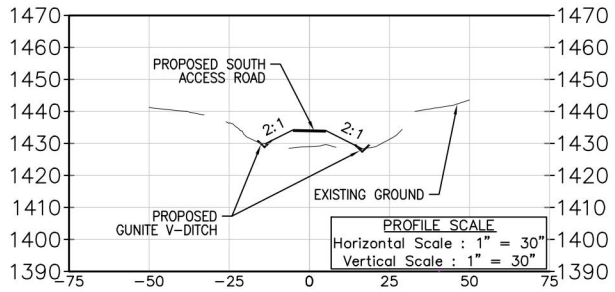
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Engineering Date

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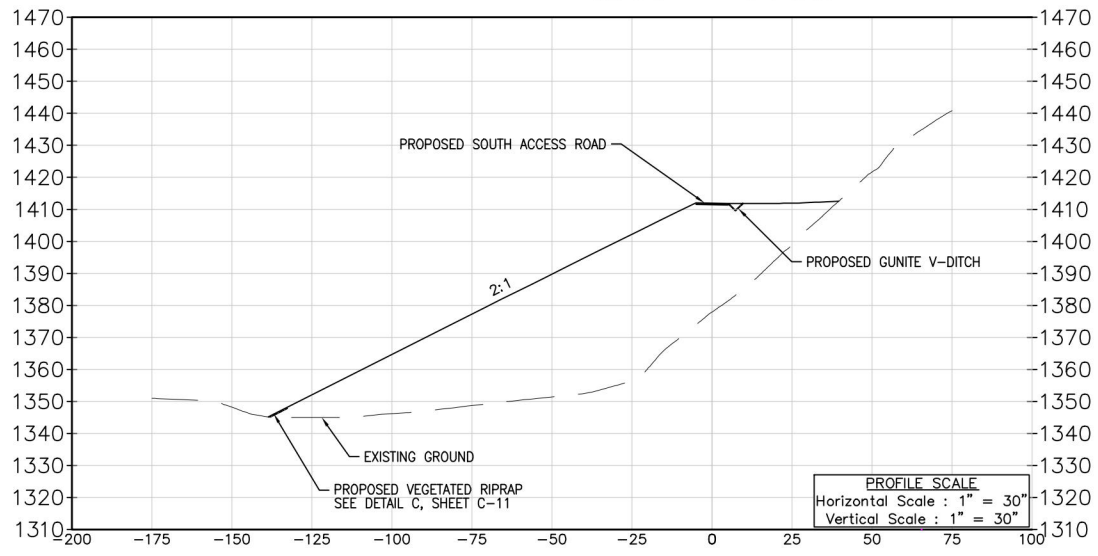
SOUTH ACCESS ROAD PROFILE

SHEET
C-9
SHEET 51 OF XX

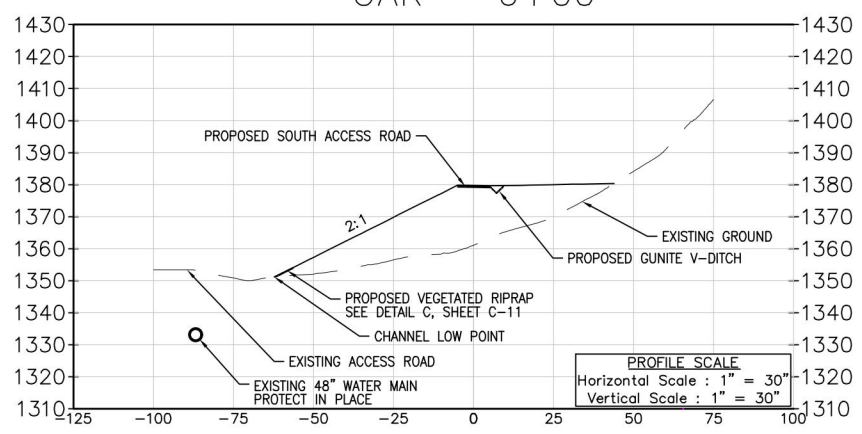
CAR – 2+00



CAR – 4+00



CAR – 6+00



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R.C.W.D. RECORD DWG NO.

REVISIONS			
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CHECKED: XXX

AECOM
999 TOWN & COUNTRY ROAD
ORANGE, CA 92868
TEL (714) 567-2400

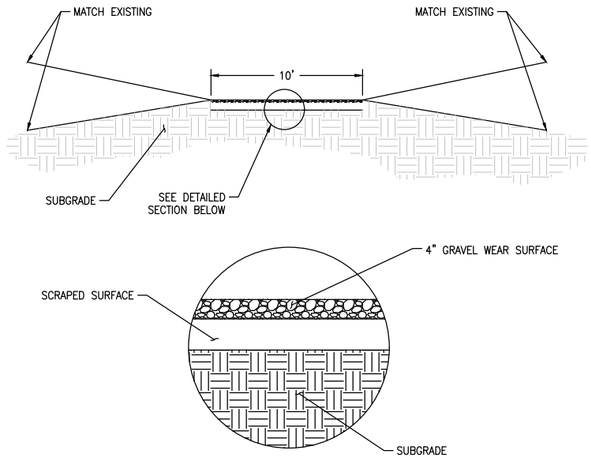
Rancho Water
Rancho California Water District
42135 Winchester Road
Temecula, CA 92590
Phone: (951) 296-6900 Fax: (951) 296-6863

RANCHO CALIFORNIA WATER DISTRICT
APPROVED FOR CONSTRUCTION
Engineering Manager Date
Engineering Date

RANCHO CALIFORNIA WATER DISTRICT
VAIL DAM SEISMIC AND HYDROLOGIC REMEDIATION PROJECT
PROJECT NO. D1911

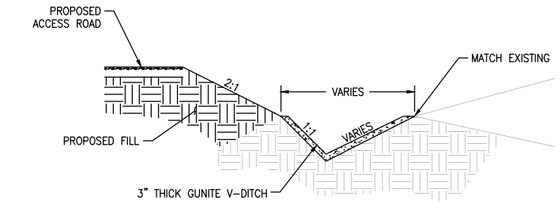
SOUTH ACCESS ROAD SECTIONS

SHEET
C-10
SHEET 52 OF XX



SOUTH ACCESS ROAD
NTS

A

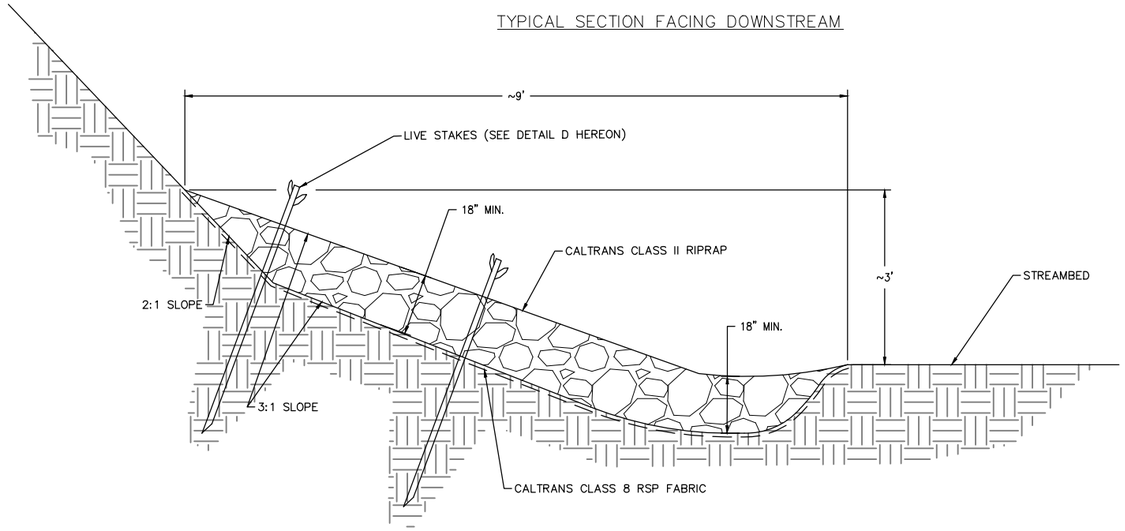


NOTE: SHOULD ANY CUT OR FILL BE REQUIRED, A MAX SLOPE OF 2:1 SHALL BE USED. UNLESS NOTED OTHERWISE.

GUNITE V-DITCH
NTS

B

TYPICAL SECTION FACING DOWNSTREAM



VEGETATED RIP RAP
NTS

C

PLANT MATERIAL NOTES:

1. RIPRAP WILL BE INSTALLED PRIOR TO CUTTING INSTALLATION.
2. AVOID STRIPPING THE BARK OR BRUISING OF LIVE STAKES DURING INSTALLATION. DO NOT USE AXE OR SLEDGE FOR DRIVING STAKES. IN HARD GROUND USE AN IRON BAR OR STAR DRILL TO PREPARE HOLES FOR THE LIVE STAKES. HOLES MAY NEED TO BE AUGERED THROUGH RIPRAP IF STAR DRILL WOULD NOT SUFFICE.
3. TAMP LIVE STAKE INTO THE GROUND AT RIGHT ANGLES TO THE SLOPE
4. DO NOT SPLIT THE STAKES DURING INSTALLATION. STAKES THAT SPLIT SHALL BE REMOVED AND REPLACED
5. PLANT MATERIAL MAY BE REJECTED AT ANY TIME BY THE PROJECT ENGINEER DUE TO HEALTH, FORM OR DAMAGE BEFORE OR AFTER PLANTING.
6. PLANTS SHALL BE CERTIFIED FREE OF EXOTIC PESTS BY THE NURSERY SUPPLIER PRIOR TO PLANT DELIVERY ONSITE.

PLANT MATERIAL INSTALLATION NOTES:

1. FILL HOLE WITH WATER AND ALLOW WATER TO INFILTRATE PRIOR TO INSTALLATION OF LIVE STAKES.
2. CONTRACTOR SHALL FLAG PROPOSED LIVE STAKES LOCATIONS AS DESCRIBED IN THE LEGEND. THE FINAL PLANT CUTTING LOCATIONS SHALL BE APPROVED BY THE PROJECT ENGINEER PRIOR TO INSTALLATION.
3. HOLE MUST BE FILLED TO ENSURE CONSTANT CONTACT BETWEEN LIVE STAKE AND SOIL

PLANT MATERIAL MAINTENANCE NOTES:

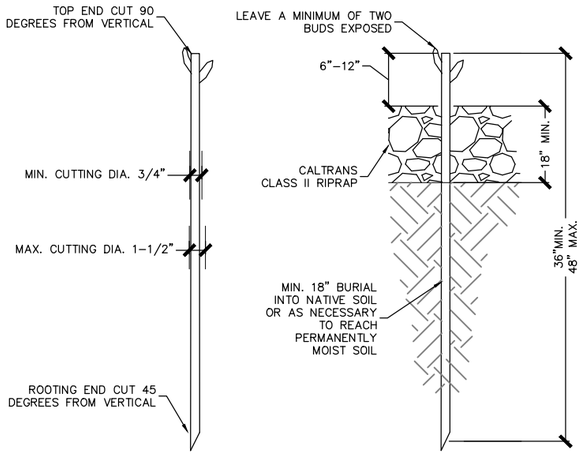
1. LANDSCAPE AREAS WILL NOT BE IRRIGATED WITH AN AUTOMATIC IRRIGATION SYSTEM. CONTRACTOR SHALL ENSURE THAT ALL PLANTS RECEIVE APPROPRIATE WATERING TO ESTABLISH HEALTHY AND DEEP ROOT GROWTH DURING THE PLANT ESTABLISHMENT PERIOD OF 120 DAYS. EACH WATERING SHALL BE OF SUCH QUANTITY AS TO PROVIDE OPTIMUM GROWTH CONDITIONS.
2. FOLLOWING THE PLANT ESTABLISHMENT PERIOD, THE CONTRACTOR SHALL PROVIDE A WARRANTY WHICH GUARANTEES ALL PLANTS FOR ONE (1) YEAR FROM DATE OF FINAL ACCEPTANCE OF THE CONTRACT. THE CONTRACTOR SHALL REPLACE ANY PLANT WHICH HAS DIED, AND THE PLANT REPLACEMENT SHALL BE THE SAME PLANT AS ORIGINALLY DESIGNATED ON THE PLANS.
3. CONTRACTOR IS RESPONSIBLE FOR MAINTAINING ALL AREAS IN A WEED AND DEBRIS-FREE CONDITION THROUGHOUT THE ESTABLISHMENT PERIOD.
4. THE LANDSCAPE AREAS SHALL BE MAINTAINED FREE OF DEBRIS AND LITTER AND ALL PLANT MATERIAL SHALL BE MAINTAINED IN A HEALTHY GROWING CONDITION. DISEASED OR DEAD PLANT MATERIAL SHALL BE SATISFACTORILY TREATED OR REPLACED AT NO ADDITIONAL COST TO THE RANCHO CALIFORNIA WATER DISTRICT.

LEGEND RIPARIAN PLANT MATERIAL (5,400 SQ FT)

SCIENTIFIC NAME	COMMON NAME	SPACING	QUANTITY
BACCHARIS SALICIFOLIA	MULEFLAT	4' O.C.	80
SALIX EXIGUA	NARROWLEAF WILLOW	4' O.C.	80
SALIX GOODDINGII	GOODDING'S BLACK WILLOW	4' O.C.	80
SALIX LAEVIGATA	RED WILLOW	4' O.C.	80
SALIX LASIOLEPSIS	ARROYO WILLOW	4' O.C.	80

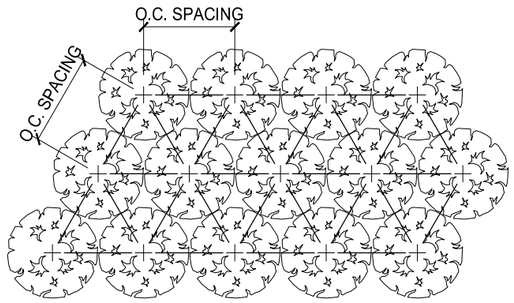
LANDSCAPE NOTES:

1. CONTRACTOR SHALL REVIEW PLANTING INSTALLATION DETAILS AND NOTES PRIOR TO BEGINNING WORK.
2. CONTRACTOR SHALL VISIT SITE AND BECOME FAMILIAR WITH CONDITIONS UNDER WHICH WORK SHALL BE DONE PRIOR TO BIDDING.
3. PRIOR TO PREPARING PLANTING AREAS, TRASH AND DEBRIS SHALL BE REMOVED FROM THESE AREAS.
4. THE PROJECT ENGINEER SHALL APPROVE ALL FINISH GRADING PRIOR TO PLACEMENT OF ANY PLANT MATERIAL.
5. PRIOR TO BEGINNING THE PLANTING OPERATION, MANUALLY IRRIGATE ALL PLANTING AREAS ON THE ANTICIPATED SCHEDULE FOR TWO WEEKS TO GERMINATE WEEDS. APPLY CONTACT HERBICIDE TO WEEDS ONLY WITH A GLYSOPHATE HERBICIDE.
6. PRIOR TO PLANTING ALL PLANTING AREAS SHALL BE THOROUGHLY WATERED.
7. ALL TEMPORARY CONSTRUCTION AREAS THAT WILL BE PLANTED SHALL BE DE-COMPACTED (BY RIPPING TO A DEPTH OF 6-18 INCHES AT THE JUDGEMENT OF THE PROJECT ENGINEER) SO COMPACTION DOES NOT EXCEED 85 PERCENT.
8. CONTRACTOR SHALL NOTIFY THE PROJECT ENGINEER OF ANY DISCREPANCIES IN THE EXISTING CONDITIONS OR WITHIN THE PLANS PRIOR TO BEGINNING WORK.
9. ANY REVISIONS MADE TO APPROVED PLANS SHALL NEED SUBSEQUENT APPROVAL BY THE PROJECT ENGINEER BEFORE STARTING THE WORK.
10. UPON AWARD OF THE CONTRACT, THE CONTRACTOR SHALL ENTER INTO CONTRACT WITH A QUALIFIED NATIVE PLANT NURSERY SO THAT PLANTMATERIAL FROM THE PROJECT VICINITY CAN BE COLLECTED, PROPAGATED, AND MADE AVAILABLE AT THE TIME OF LIVE STAKE INSTALLATION. THE CONTRACTOR SHALL SUBMIT COPIES OF THESE CONTRACTS TO THE PROJECT ENGINEER WITHIN 90 CALENDAR DAYS OF THE AWARD OF CONTRACT.
11. AT COMPLETION OF ALL WORK OUTLINED IN THESE PLANS, THE CONTRACTOR SHALL CONTACT THE PROJECT ENGINEER AND ARRANGE FOR A WALK THROUGH TO DETERMINE THAT ALL ASPECTS OF WORK ARE COMPLETED. WORK MUST BE FULLY COMPLETED ACCORDING TO THE PLANS AND MUST BE COMPLETED IN A GOOD WORKMANSHIP MANNER AND MUST BE ACCEPTED BY THE PROJECT ENGINEER IN WRITING.
12. ALL QUANTITIES LISTED IN THE PLANTING LEGEND ARE FOR THE CONVENIENCE OF THE CONTRACTOR. IN THE CASE OF ANY DISCREPANCIES, PLANS SHALL OVER RIDE THE LANDSCAPE LEGEND QUANTITIES. CONTRACTOR SHALL VERIFY QUANTITIES SHOWN ON THE PLANS AND BASE THEIR BID ACCORDINGLY.



LIVE STAKES
NTS

D



NOTES:

ALL SHRUBS/GROUNDCOVER TO BE TRIANGULAR SPACING.

PLANT SPACING
NTS

E

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R.C.W.D. RECORD DWG NO.

REVISIONS			
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AECOM
999 TOWN & COUNTRY ROAD
ORANGE, CA 92868
TEL (714) 567-2400

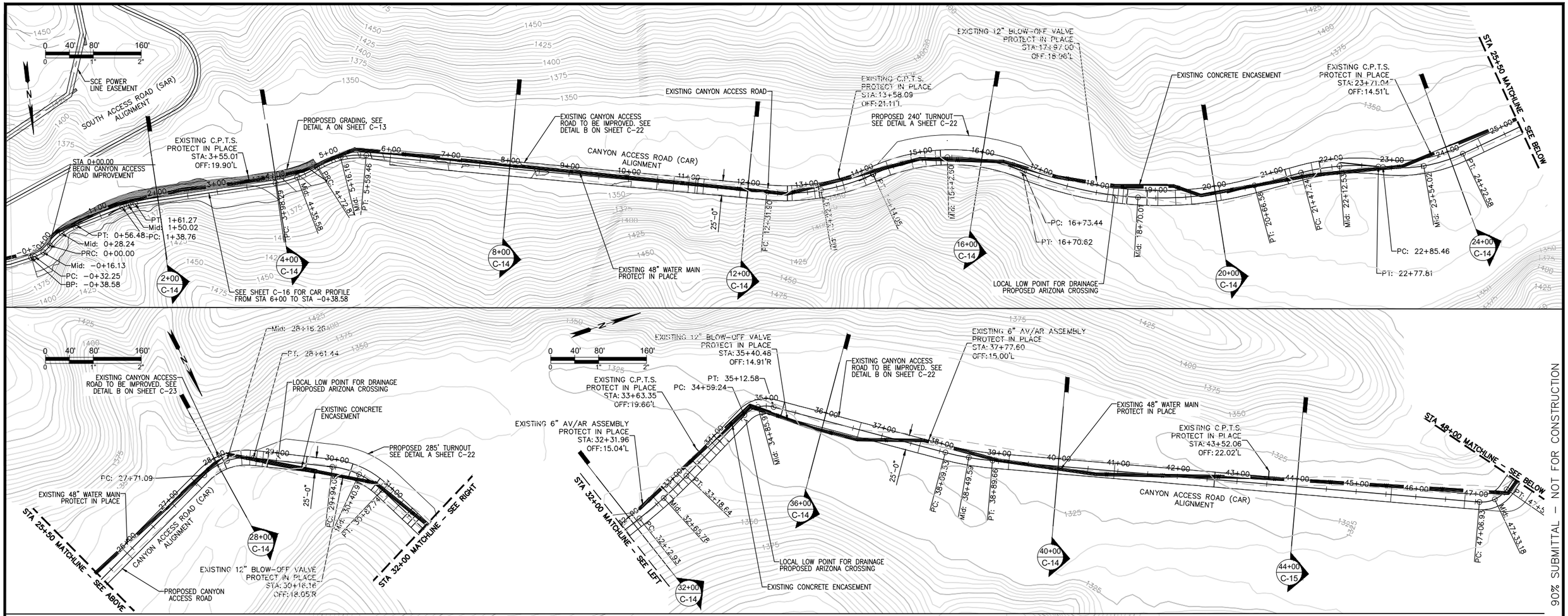
Rancho Water
Rancho California Water District
42135 Winchester Road
Temecula, CA 92590
Phone: (951) 296-6900 Fax: (951) 296-6863

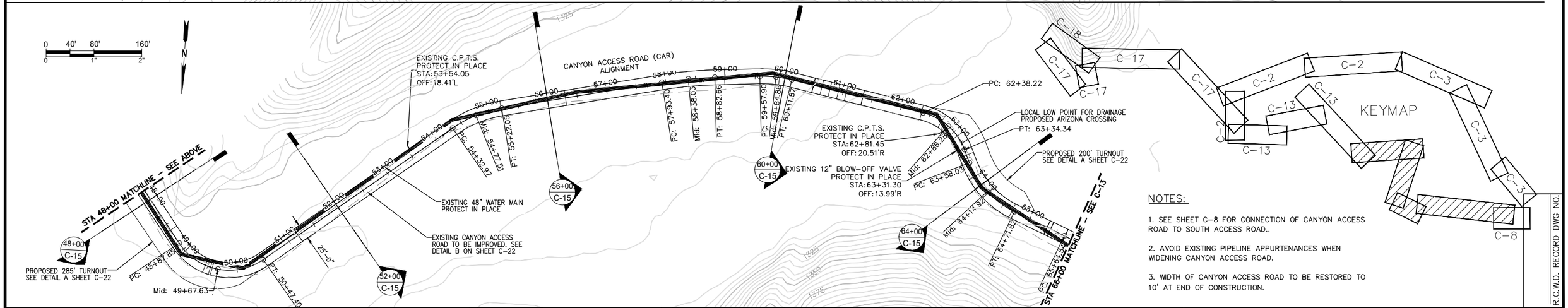
RANCHO CALIFORNIA WATER DISTRICT
APPROVED FOR CONSTRUCTION
Engineering Manager Date
Engineering Date

RANCHO CALIFORNIA WATER DISTRICT
VAIL DAM SEISMIC AND HYDROLOGIC REMEDIATION PROJECT
PROJECT NO. D1911

SOUTH ACCESS ROAD DETAILS

SHEET
C-11
SHEET 53 OF XX





NOTES:

1. SEE SHEET C-8 FOR CONNECTION OF CANYON ACCESS ROAD TO SOUTH ACCESS ROAD..
2. AVOID EXISTING PIPELINE APPURTENANCES WHEN WIDENING CANYON ACCESS ROAD.
3. WIDTH OF CANYON ACCESS ROAD TO BE RESTORED TO 10' AT END OF CONSTRUCTION.

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R.C.W.D. RECORD DWG NO.

REVISIONS			
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999 TOWN & COUNTRY ROAD
ORANGE, CA 92868
TEL (714) 567-2400

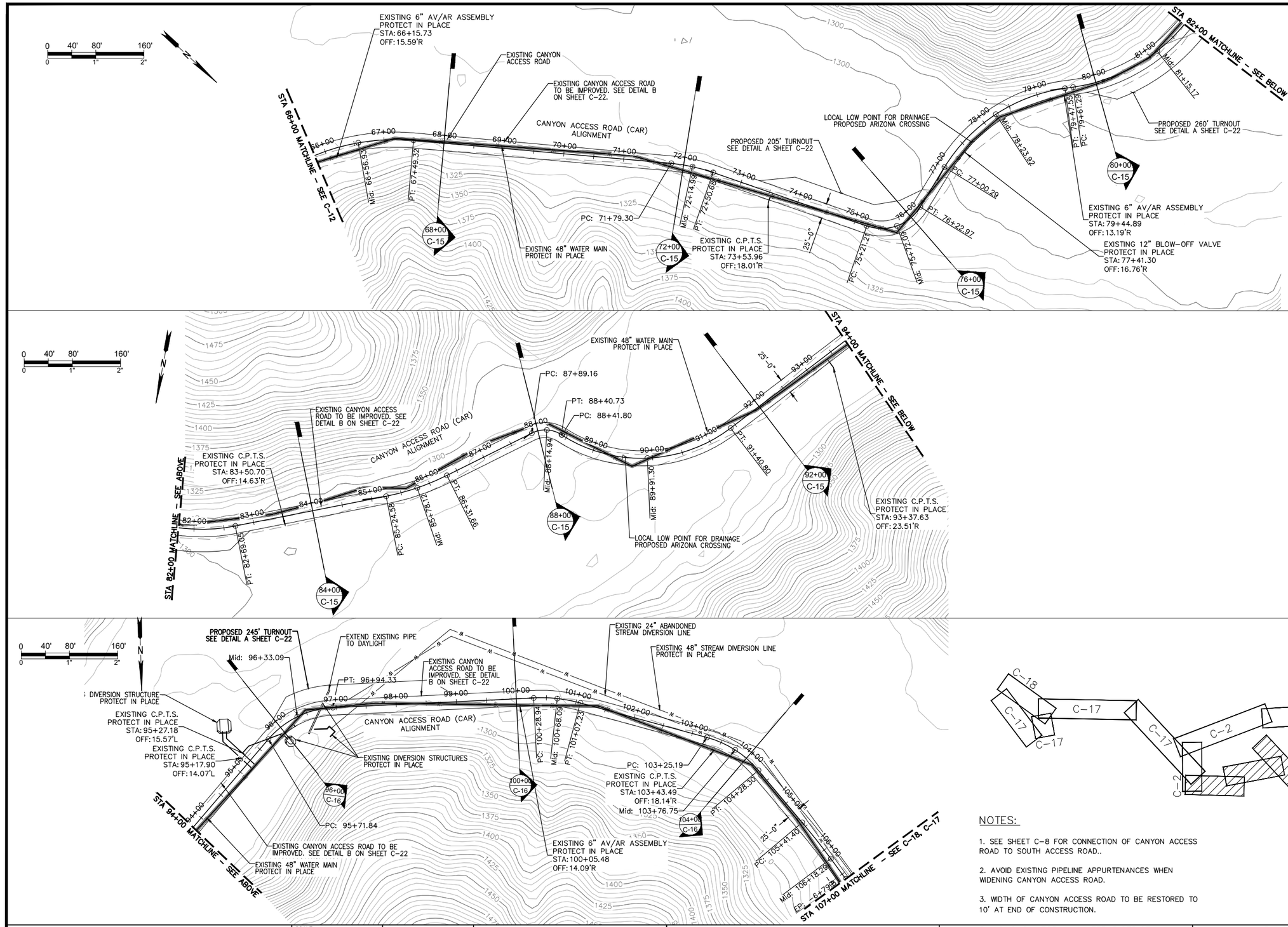
Rancho Water
Rancho California Water District
42135 Winchester Road
Temecula, CA 92590
Phone: (951) 296-6900 Fax: (951) 296-6863

RANCHO CALIFORNIA WATER DISTRICT
APPROVED FOR CONSTRUCTION
Engineering Manager Date
Engineering Date

RANCHO CALIFORNIA WATER DISTRICT
VAIL DAM SEISMIC AND HYDROLOGIC REMEDIATION PROJECT
PROJECT NO. D1911

CANYON ACCESS ROAD PLAN - 1

SHEET
C-12
SHEET 54 OF XX



NOTES:

1. SEE SHEET C-8 FOR CONNECTION OF CANYON ACCESS ROAD TO SOUTH ACCESS ROAD..
2. AVOID EXISTING PIPELINE APPURTENANCES WHEN WIDENING CANYON ACCESS ROAD.
3. WIDTH OF CANYON ACCESS ROAD TO BE RESTORED TO 10' AT END OF CONSTRUCTION.

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R.C.W.D. RECORD DWG NO.

REVISIONS			
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999 TOWN & COUNTRY ROAD
ORANGE, CA 92868
TEL (714) 567-2400

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Rancho California Water District
42135 Winchester Road
Temecula, CA 92590
Phone: (951) 296-6900 Fax: (951) 296-6863

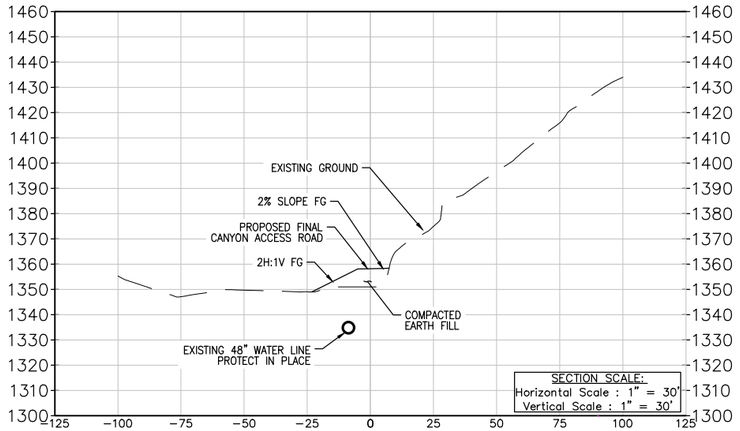
RANCHO CALIFORNIA WATER DISTRICT
APPROVED FOR CONSTRUCTION
Engineering Manager Date
Engineering Date

RANCHO CALIFORNIA WATER DISTRICT
VAIL DAM SEISMIC AND HYDROLOGIC REMEDIATION PROJECT
PROJECT NO. D1911

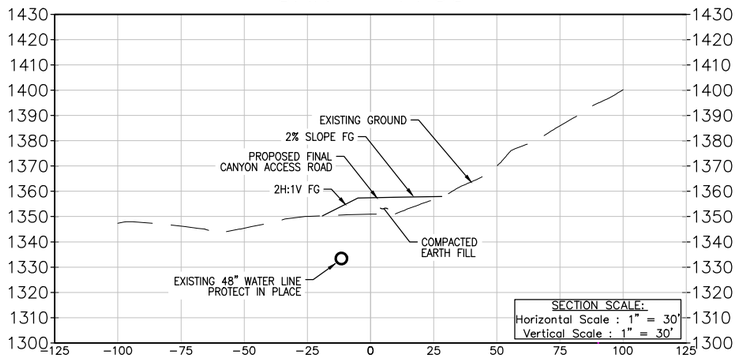
CANYON ACCESS ROAD PLAN - 2

SHEET
C-13
SHEET 55 OF XX

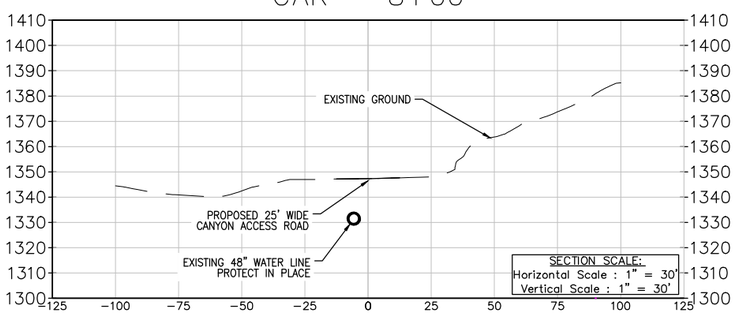
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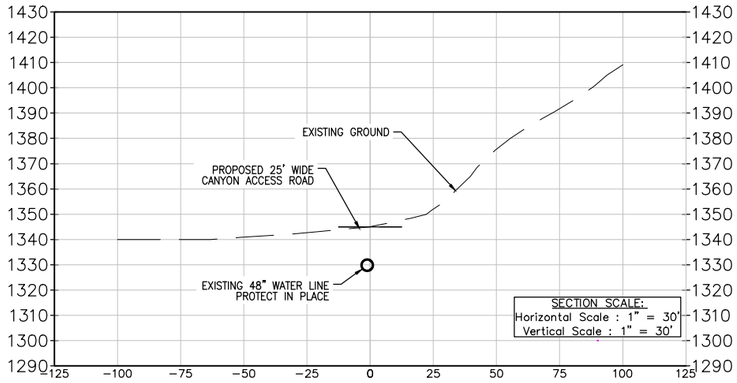
CAR – 4+00



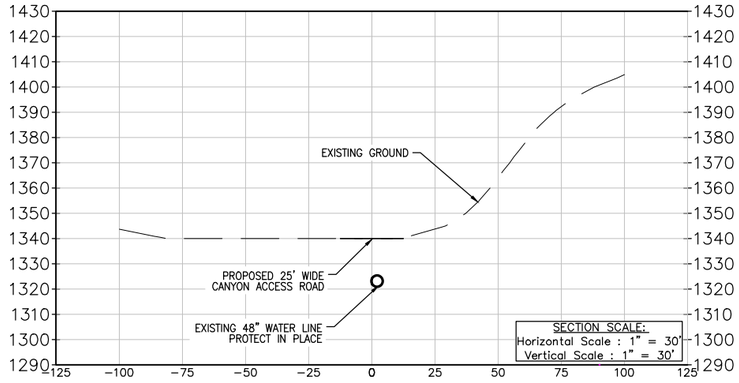
CAR – 8+00



CAR – 12+00

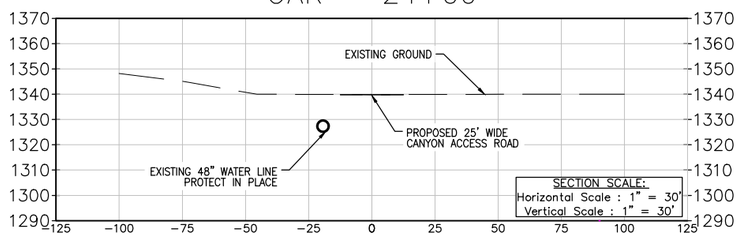


CAR – 16+00



CAR – 20+00

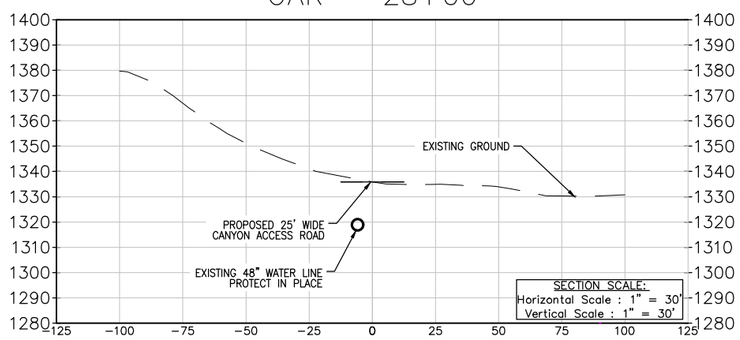
CAR – 24+00



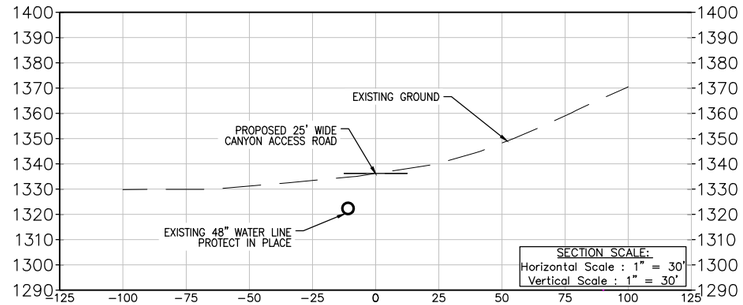
NOTES:

1. TO ALLOW FOR CONSTRUCTION TRAFFIC, CONSTRUCT RAISED CANYON ACCESS ROAD AFTER RCC PLACEMENT IN DAM IS COMPLETE.
2. WIDTH OF CANYON ACCESS ROAD TO BE RESTORED TO 12.5' AT END OF CONSTRUCTION.

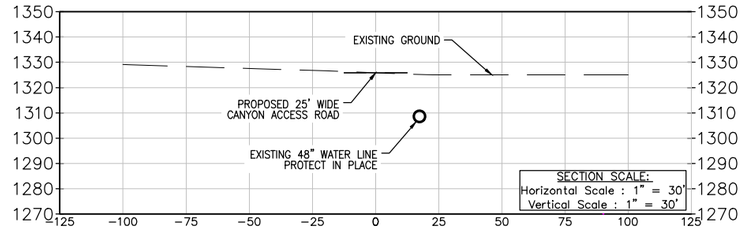
CAR – 28+00



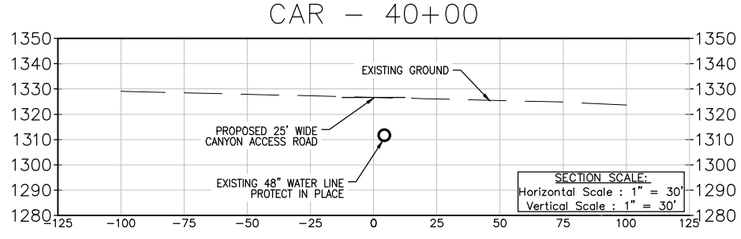
CAR – 32+00



CAR – 36+00



CAR – 40+00



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R.C.W.D. RECORD DWG NO.

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AECOM
999 TOWN & COUNTRY ROAD
ORANGE, CA 92868
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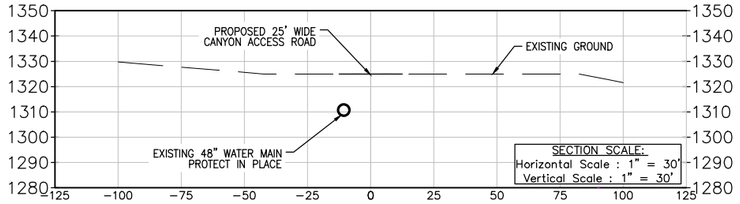
RANCHO CALIFORNIA WATER DISTRICT
APPROVED FOR CONSTRUCTION
Engineering Manager Date
Engineering Date

RANCHO CALIFORNIA WATER DISTRICT
VAIL DAM SEISMIC AND HYDROLOGIC REMEDIATION PROJECT
PROJECT NO. D1911

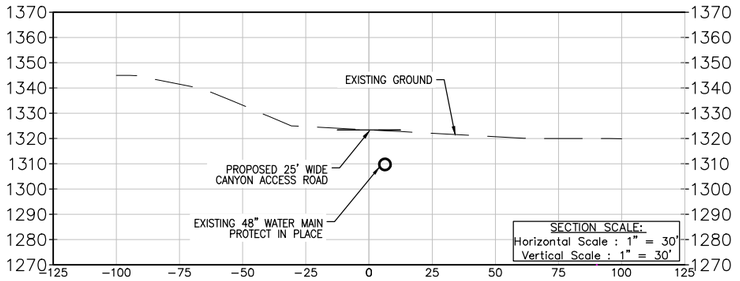
CANYON ACCESS ROAD SECTIONS - 1

SHEET
C-14
SHEET 56 OF XX

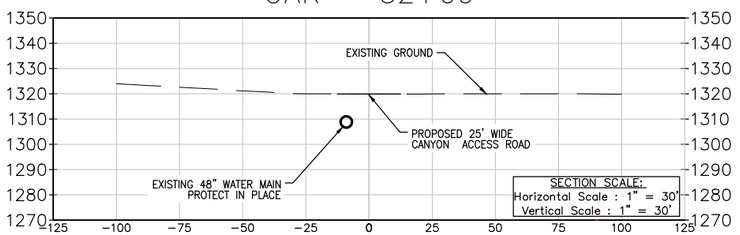
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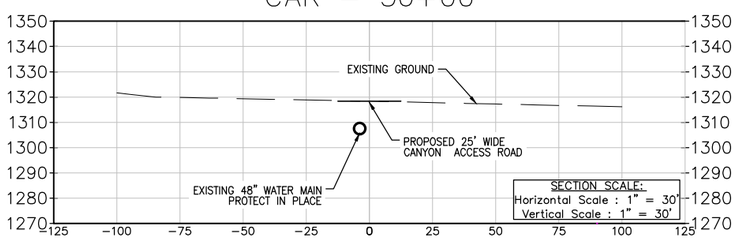
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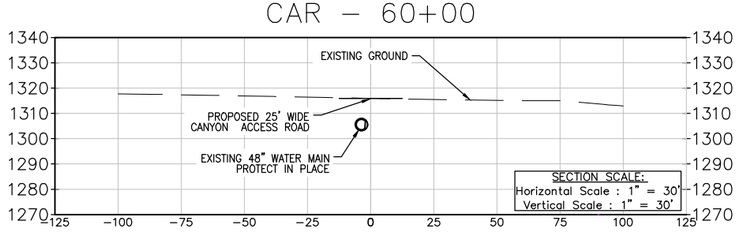
CAR – 52+00



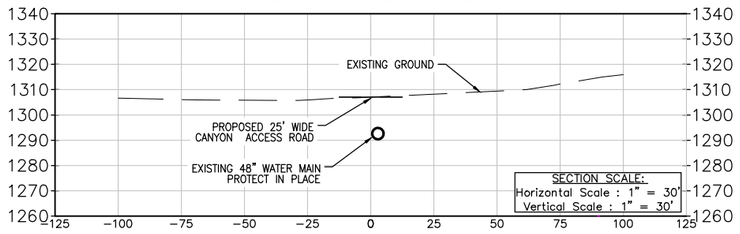
CAR – 56+00



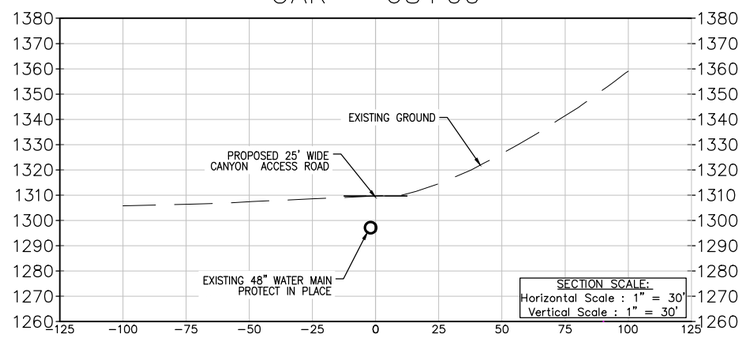
CAR – 60+00



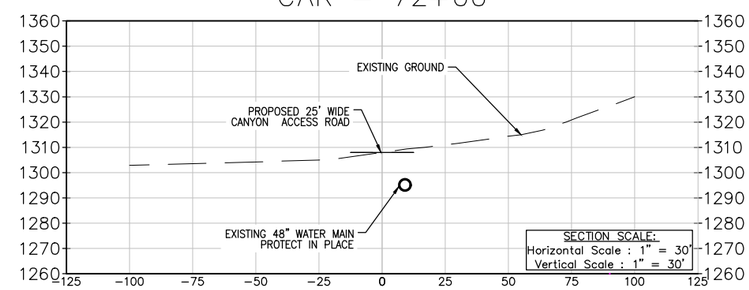
CAR – 64+00



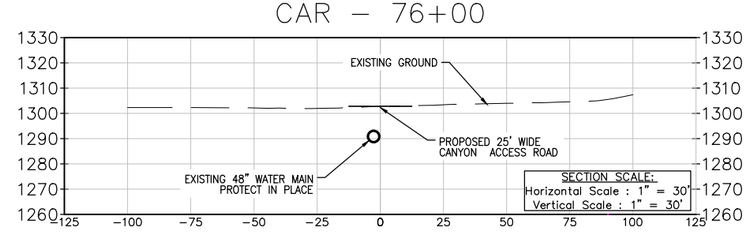
CAR – 68+00



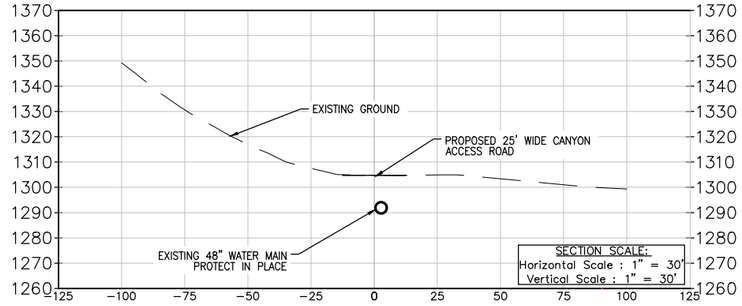
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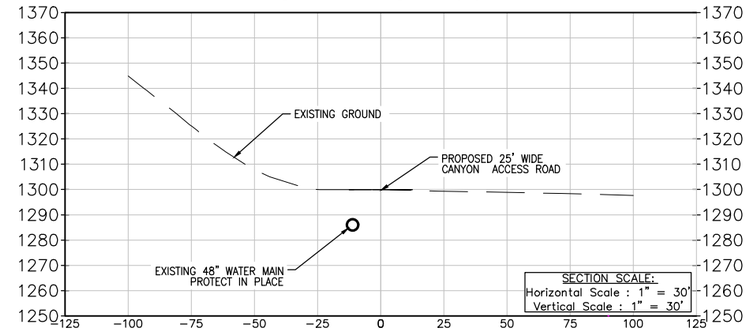
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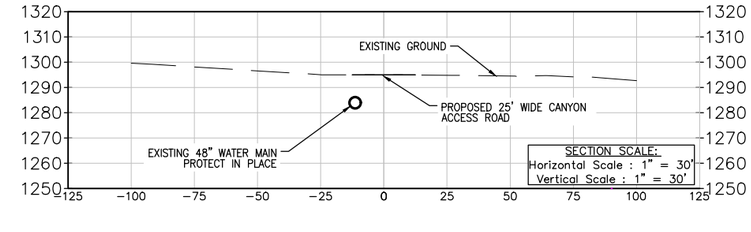
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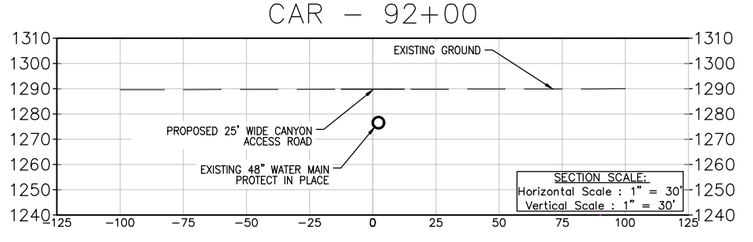
CAR – 84+00



CAR – 88+00



CAR – 92+00



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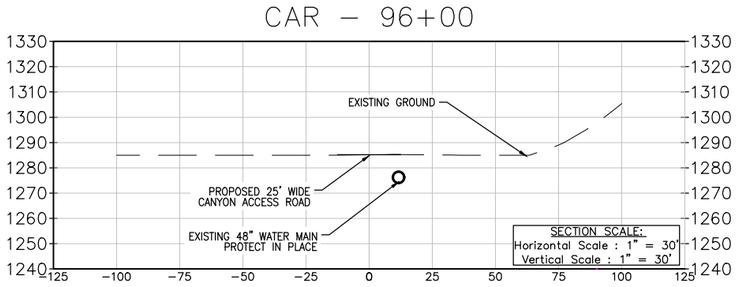
Rancho Water
Rancho California Water District
42135 Winchester Road
Temecula, CA 92590
Phone: (951) 296-6900 Fax: (951) 296-6863

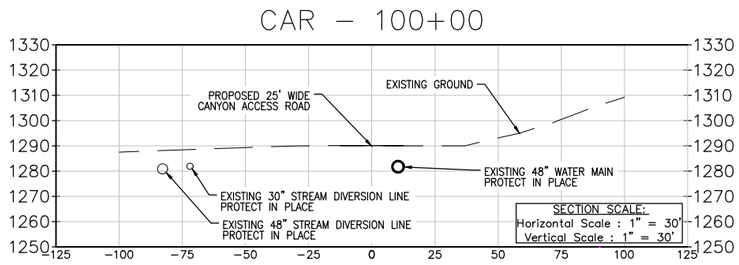
RANCHO CALIFORNIA WATER DISTRICT
APPROVED FOR CONSTRUCTION
Engineering Manager Date
Engineering Date

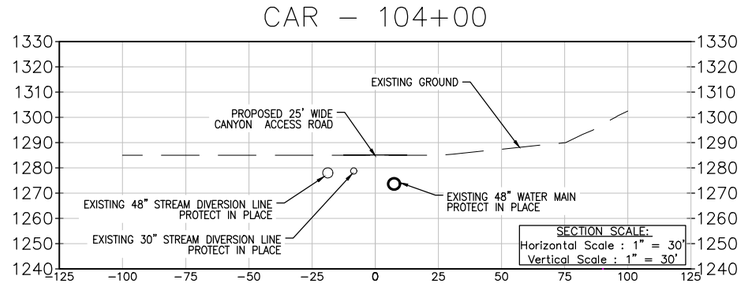
RANCHO CALIFORNIA WATER DISTRICT
VAIL DAM SEISMIC AND HYDROLOGIC REMEDIATION PROJECT
PROJECT NO. D1911

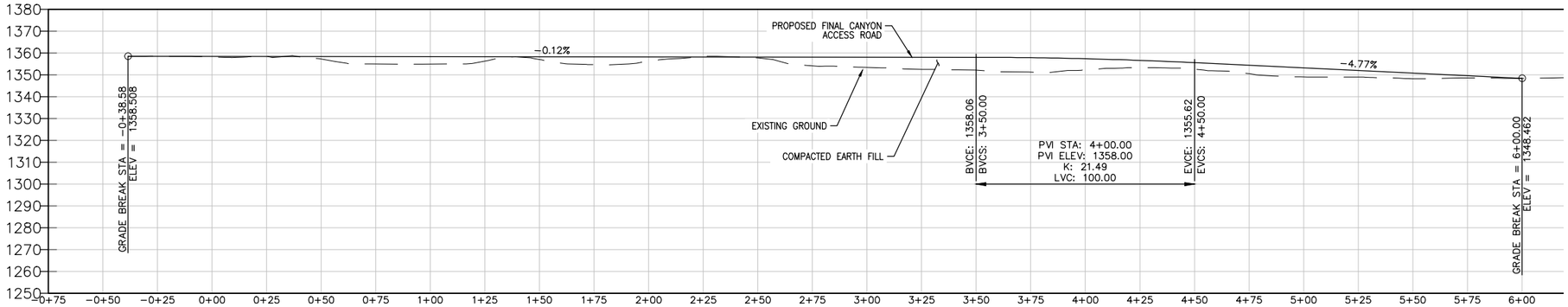
CANYON ACCESS ROAD SECTIONS - 2

SHEET
C-15
SHEET 57 OF XX

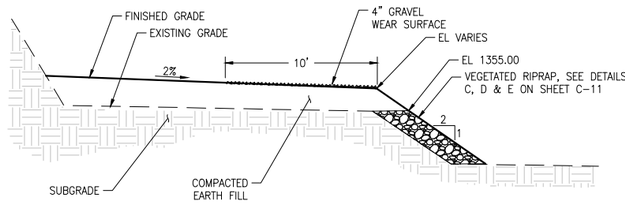








CAR PROFILE
STA -0+38.58 TO STA 6+00
HORIZ. SCALE: 1" = 30'
VERT. SCALE: 1" = 30'



CAR DETAIL
STA -0+38.58 TO STA 6+00
NTS

NOTES:

1. TO ALLOW FOR CONSTRUCTION TRAFFIC, CONSTRUCT RAISED CANYON ACCESS ROAD AFTER RCC PLACEMENT IN DAM IS COMPLETE.
2. WIDTH OF CANYON ACCESS ROAD TO BE RESTORED TO 12.5' AT END OF CONSTRUCTION.

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VAIL DAM SEISMIC AND HYDROLOGIC REMEDIATION PROJECT
PROJECT NO. D1911

CANYON ACCESS ROAD SECTIONS - 3

SHEET
C-16
SHEET 58 OF XX

EXISTING MONITORING WELL 482 PROTECT IN PLACE
EXISTING C.P.T.S. PROTECT IN PLACE
EXISTING INSULATED TEST CONNECTION AND INSULATED FLANGE PROTECT IN PLACE
EXISTING POND U-3
EXISTING POND ACCESS ROAD TO BE IMPROVED. SEE DETAIL C, SHEET C-22 AND NOTE 2 HEREON
STA 107+00 MATCHLINE - SEE C-13
STA 114+00 MATCHLINE - SEE C-2
STA 131+50 MATCHLINE - SEE BELOW
EXISTING 48" WATER MAIN PROTECT IN PLACE
EXISTING 30" STREAM DIVERSION LINE ~4' COVER. PROTECT IN PLACE
EXISTING 48" STREAM DIVERSION LINE ~4' COVER. PROTECT IN PLACE
PROPOSED 20' WIDE POND ACCESS ROAD. SEE DETAIL C SHEET C-22 AND NOTE 3 HEREON
POND ACCESS ROAD (PAR) ALIGNMENT
PC: 112+94.57
PT: 113+15.26
PC: 120+10.72
PT: 121+18.46
PC: 119+42.98
EXISTING FENCE
PROPOSED 200' TURNOUT SEE DETAIL A SHEET C-22
EXISTING PRIVATE DIRT ROAD
0 40' 80' 160' 0 1" 2"

EXISTING TEMECULA FLYERS FIELD
EXISTING 48" WATER MAIN PROTECT IN PLACE
EXISTING VAIL PUMP STATION
EXISTING 48" RAW WATER PIPELINE PROTECT IN PLACE
EXISTING 20" TREATED WATER PIPELINE PROTECT IN PLACE
EXISTING 36" RAW WATER PIPELINE PROTECT IN PLACE
EXISTING FENCE
EXISTING DIRT ROAD
EXISTING POND U-5
EXISTING POND ACCESS ROAD TO BE IMPROVED. SEE DETAIL C ON SHEET C-22 AND NOTE 2 HEREON
PROPOSED ROAD WIDENING AROUND CORNER SEE DETAIL A ON SHEET C-18
STA 131+50 MATCHLINE - SEE ABOVE
STA 157+00 MATCHLINE - SEE BELOW
PC: 136+00.69
Mid: 136+15.63
PT: 136+30.58
PC: 138+69.22
Mid: 138+92.59
PT: 139+15.95
POND ACCESS ROAD (PAR) ALIGNMENT
PC: 150+75.24
Mid: 152+35.59
PT: 153+95.95
PC: 154+93.30
Mid: 155+30.59
PT: 155+67.88
PROPOSED 200' TURNOUT SEE DETAIL A SHEET C-22
EXISTING ACCESS ROAD EASEMENT
EXISTING 6" AV/AR ASSEMBLY TO BE RELOCATED TO NEAR CONCRETE WALL ON SOUTH SIDE OF ROAD STA: ~132+50 OFF: ~15'R
EXISTING C.P.T.S. PROTECT IN PLACE STA: ~132+50 OFF: ~15'R
EXISTING SECONDARY ENTRY ROAD, TO BE IMPROVED FOR LIMITED USE. SEE C-18
0 40' 80' 160' 0 1" 2" N

EXISTING POND ACCESS ROAD TO BE IMPROVED. SEE DETAIL C ON SHEET C-22 AND NOTE 2 HEREON
Mid: 160+87.61
PC: 160+10.80
PT: 159+76.46
Mid: 159+51.48
PC: 159+26.50
EXISTING UTILITY GUY POLE PROTECT IN PLACE
EXISTING UTILITY POLE PROTECT IN PLACE (SEE NOTE 4)
POND ACCESS ROAD (PAR) ALIGNMENT
PROPOSED GRADING SEE PROFILE, SHEET C-20
PROPOSED PRIMARY ENTRY ROAD SEE DETAIL D, SHEET C-22 AND NOTE 1 HEREON
EXISTING SALT STRUCTURE PROTECT IN PLACE
GRADING BY OTHERS
EXISTING DIRT ROAD
25'-0"
PC: 164+78.85
STA 157+00 MATCHLINE - SEE ABOVE
STA 165+00 MATCHLINE - SEE RIGHT
0 40' 80' 160' 0 1" 2"

PROPOSED MIXING PLANT AREA
EXISTING ROW
DE PORTOLA RD
PT: 170+38.61
PRIMARY ENTRY ROAD ALIGNMENT
EP: 178+03.95
PROPOSED 25' WIDE CHAIN LINK MANUAL DUAL SWING GATE WITH 2-STRAND BARBED WIRE PER SPPWC 600-3, HEIGHT TO MATCH EXISTING FENCE
EXISTING FENCE
GRADING BY OTHERS
Mid: 167+58.72
PROPOSED PRIMARY ENTRY ROAD SEE DETAIL D, SHEET C-22 AND NOTE 1 HEREON
EXISTING STABLE BUILDING STRUCTURE TO BE DEMOLISHED SEE SHEET X-10
EXISTING DIRT ROAD
STA 165+00 MATCHLINE - SEE LEFT
0 40' 80' 160' 0 1" 2"

KEYMAP

NOTES:

1. PROPOSED PRIMARY ENTRY ROAD TO BE CONSTRUCTED. SUBGRADE FOR PRIMARY ACCESS ROAD TO BE OVEREXCAVATED TO A DEPTH OF 2 FEET BELOW BOTTOM OF GRAVEL WEAR SURFACE AND RECOMPACTED TO 95% RELATIVE COMPACTION.

2. EXISTING POND ACCESS ROAD (STA 113+00 TO 162+50) TO BE LIGHTLY GRADED TO 20 FEET WIDE.

3. PROPOSED CONNECTION BETWEEN POND ACCESS ROAD AND CANYON ACCESS ROAD (STA 107+00 TO 113+00).

4. PROTECT UTILITY POLE AND GUY POLE BY PLACING K-RAIL BETWEEN AND AROUND POLES TO FORCE TRAFFIC AROUND RATHER THAN BETWEEN POLES.

R.C.W.D. RECORD DWG NO.

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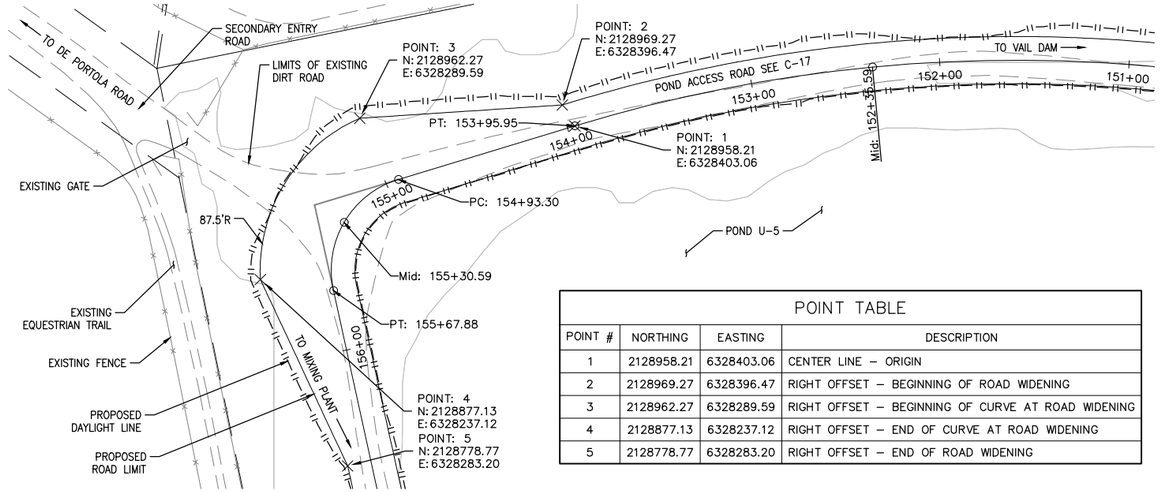
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VAIL DAM SEISMIC AND HYDROLOGIC REMEDIATION PROJECT
PROJECT NO. D1911

PRIMARY ENTRY ROAD AND POND ACCESS ROAD PLAN

SHEET C-17
SHEET 59 OF XX



ROAD CORNER WIDENING

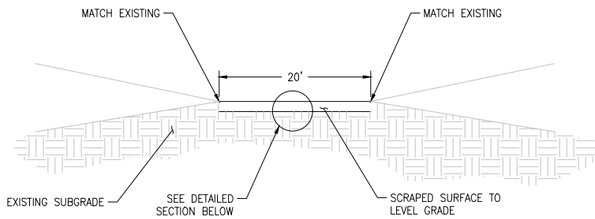
SCALE: 1" = 40'

A

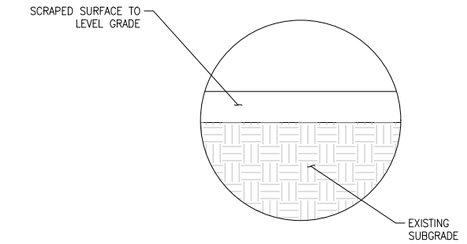
POINT TABLE			
POINT #	NORTHING	EASTING	DESCRIPTION
1	2128958.21	6328403.06	CENTER LINE – ORIGIN
2	2128969.27	6328396.47	RIGHT OFFSET – BEGINNING OF ROAD WIDENING
3	2128962.27	6328289.59	RIGHT OFFSET – BEGINNING OF CURVE AT ROAD WIDENING
4	2128877.13	6328237.12	RIGHT OFFSET – END OF CURVE AT ROAD WIDENING
5	2128778.77	6328283.20	RIGHT OFFSET – END OF ROAD WIDENING

0 20' 40' 80'
0 1" 2"

N



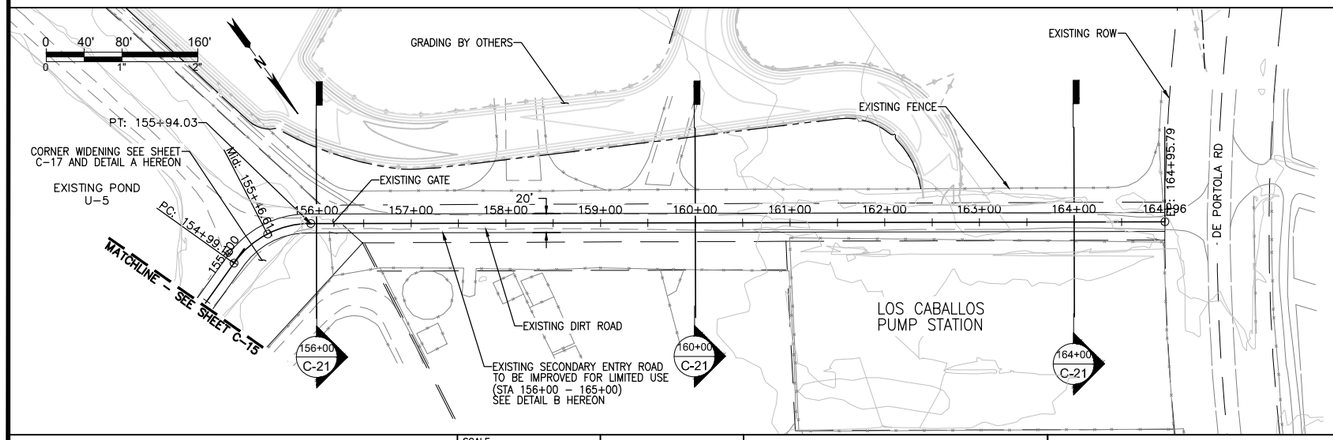
NOTE: SHOULD ANY CUT OR FILL BE REQUIRED, A MAX SLOPE OF 2:1 SHALL BE USED. UNLESS NOTED OTHERWISE.

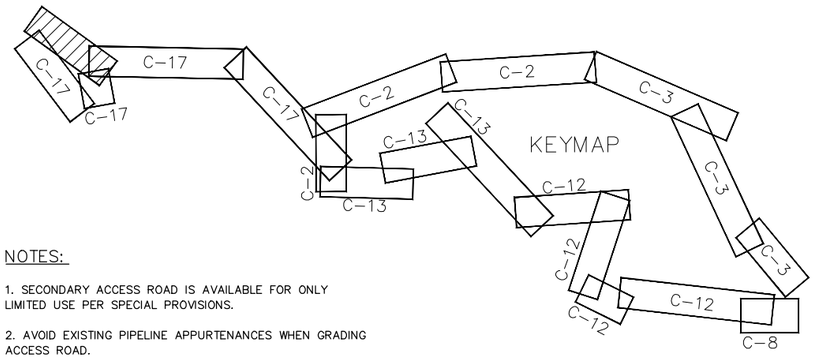


SECONDARY ENTRY ROAD

NTS

B





NOTES:

1. SECONDARY ACCESS ROAD IS AVAILABLE FOR ONLY LIMITED USE PER SPECIAL PROVISIONS.
2. AVOID EXISTING PIPELINE APPURTENANCES WHEN GRADING ACCESS ROAD.

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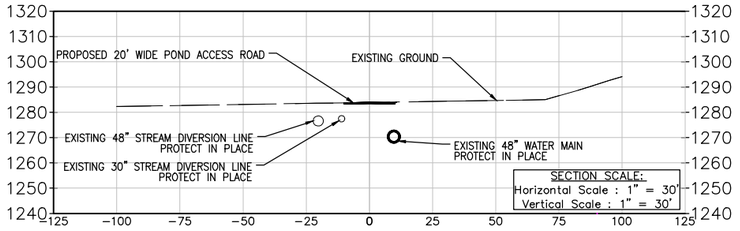
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PROJECT NO. D1911

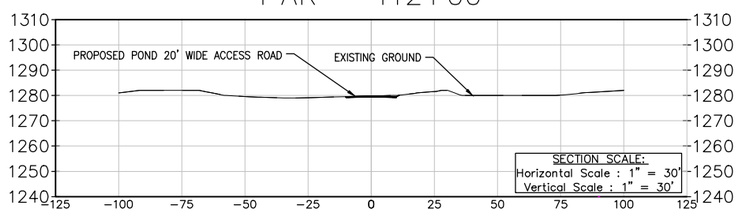
SECONDARY ENTRY ROAD PLAN

SHEET
C-18
SHEET 60 OF XX

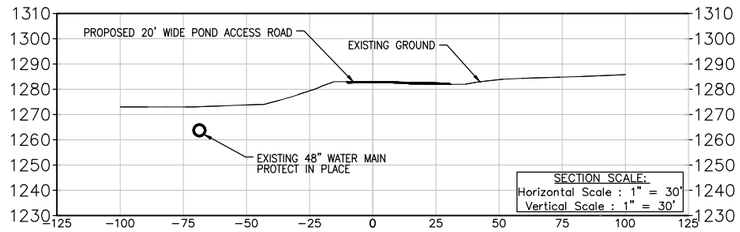
PAR – 108+00



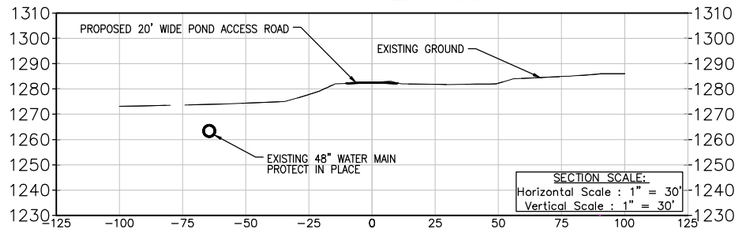
PAR – 112+00



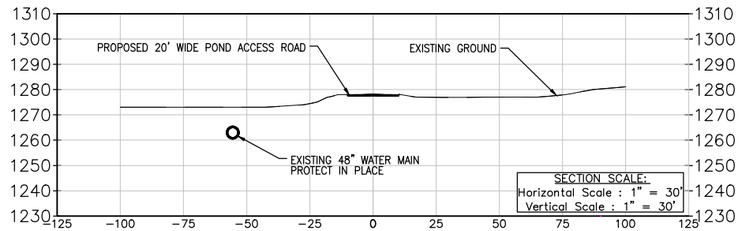
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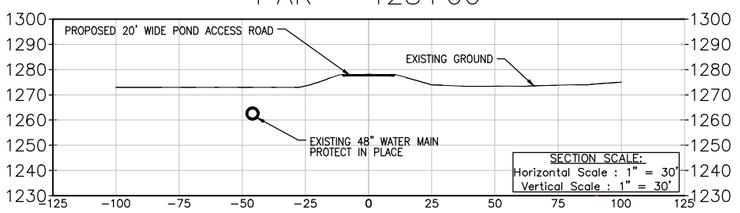
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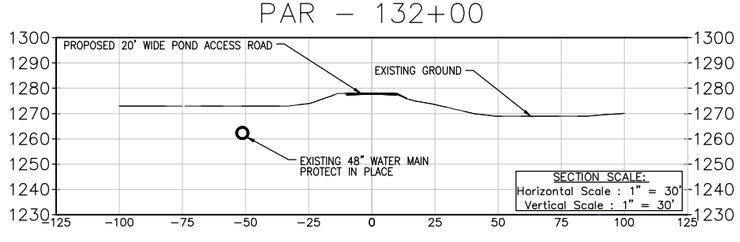
PAR – 124+00



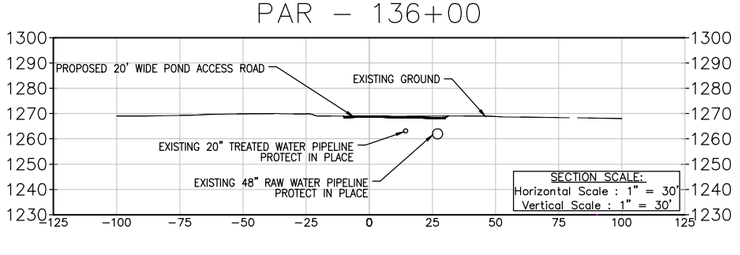
PAR – 128+00



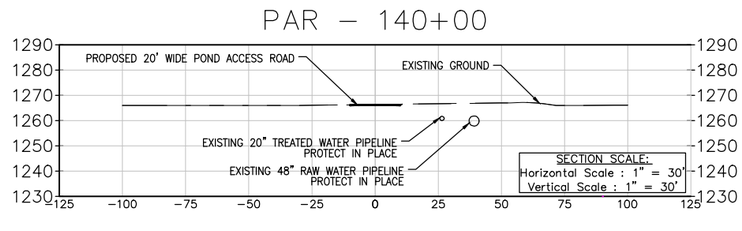
PAR – 132+00



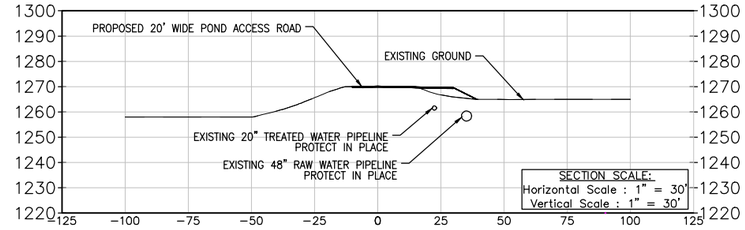
PAR – 136+00



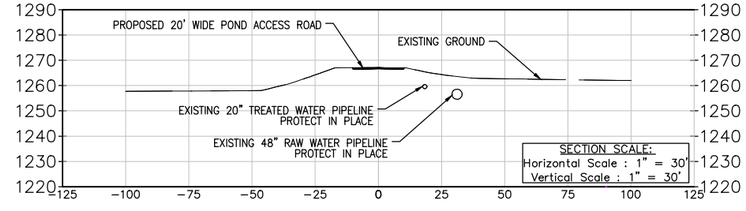
PAR – 140+00



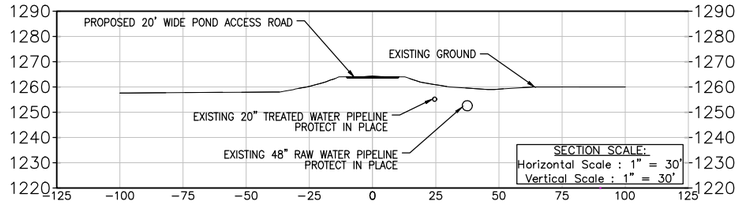
PAR – 144+00



PAR – 148+00



PAR – 152+00



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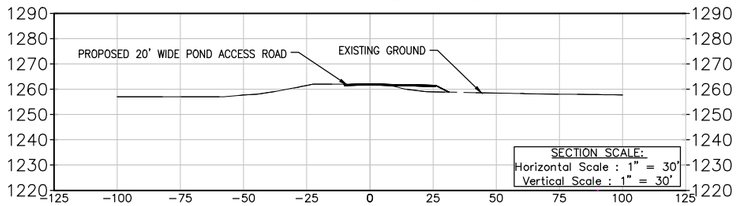
RANCHO CALIFORNIA WATER DISTRICT
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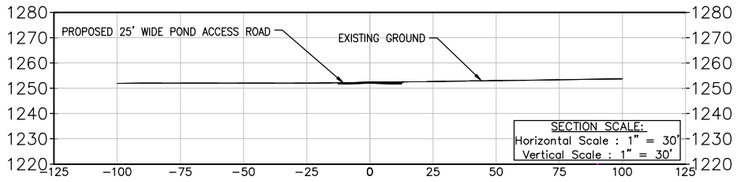
POND ACCESS ROAD SECTIONS

SHEET
C-19
SHEET 61 OF XX

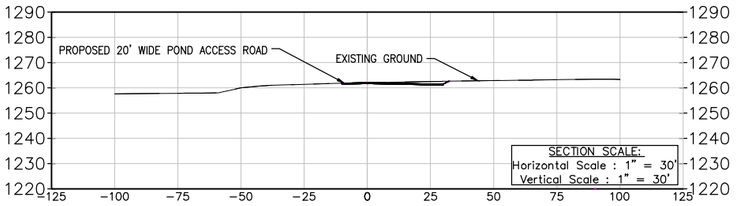
PAR – 156+00



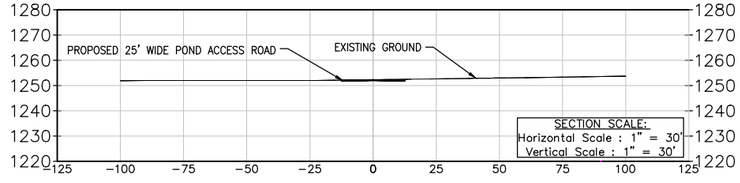
PRIMARY ENTRY ROAD – 172+00



PAR – 160+00

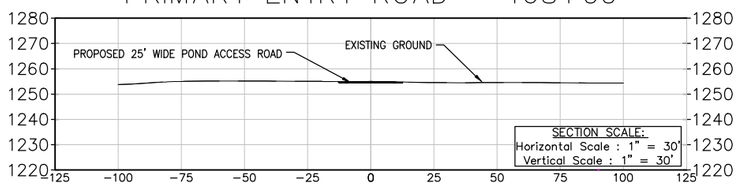


PRIMARY ENTRY ROAD – 176+00

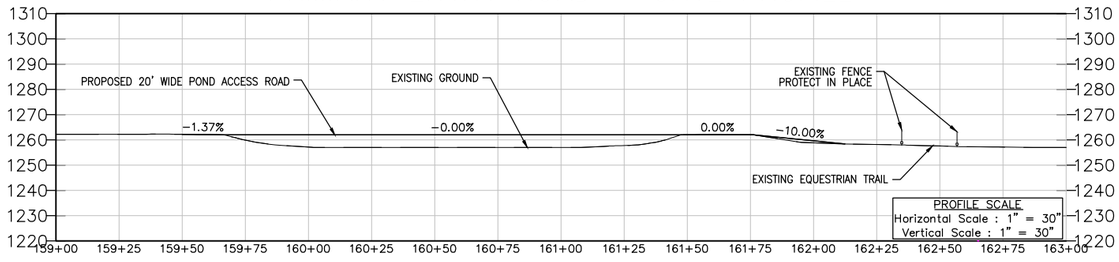


PRIMARY ENTRY ROAD – 164+00

PRIMARY ENTRY ROAD – 168+00



PRIMARY ENTRY ROAD – GATE PROFILE



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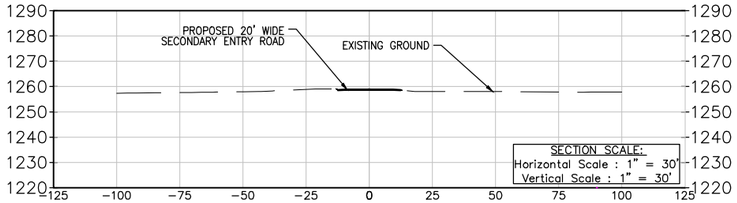
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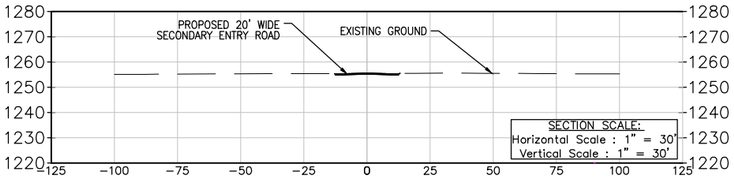
PRIMARY ENTRY ROAD AND POND ACCESS ROAD SECTIONS

SHEET
C-20
SHEET 62 OF XX

SECONDARY ENTRY ROAD – 156+00



SECONDARY ENTRY ROAD – 160+00



SECONDARY ENTRY ROAD – 164+00

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RANCHO CALIFORNIA WATER DISTRICT
APPROVED FOR CONSTRUCTION

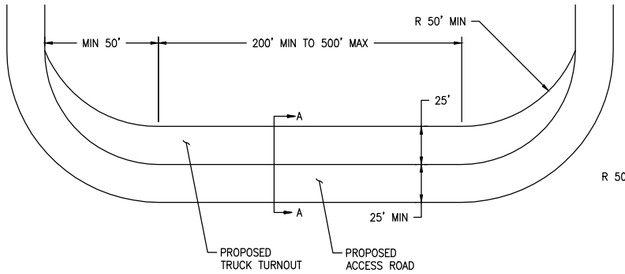
Engineering Manager Date

Engineering Date

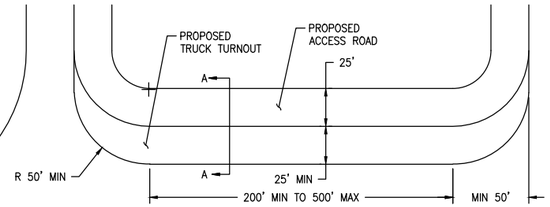
RANCHO CALIFORNIA WATER DISTRICT
VAIL DAM SEISMIC AND HYDROLOGIC REMEDIATION PROJECT
PROJECT NO. D1911

SECONDARY ENTRY ROAD SECTIONS

SHEET
C-21
SHEET 63 OF XX

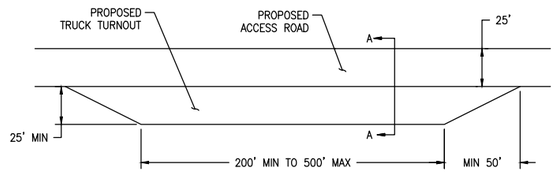


INTERIOR CURVE TURNOUT

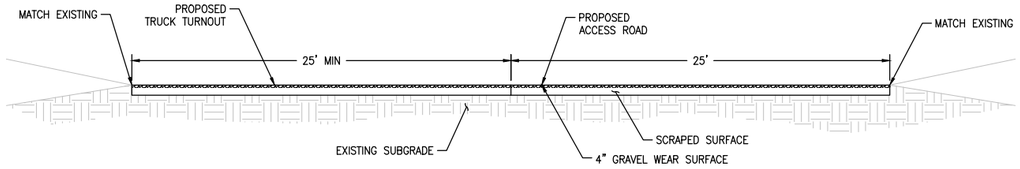


EXTERIOR CURVE TURNOUT

NOTES:
1. SHOULD ANY CUT OR FILL BE REQUIRED, A MAX SLOPE OF 2:1 SHALL BE USED. UNLESS NOTED OTHERWISE.



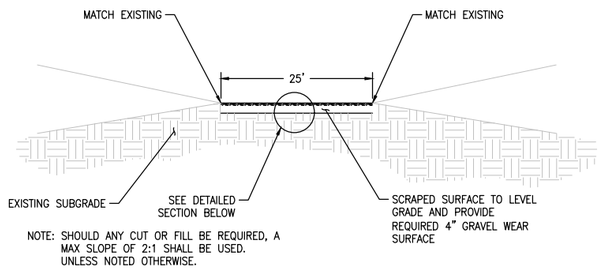
STRAIGHTAWAY TURNOUT



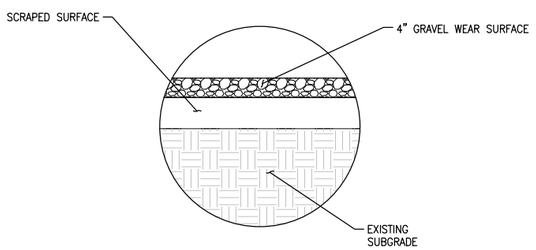
SECTION A–A

PROPOSED TRUCK TURNOUT (A)

NTS NTS

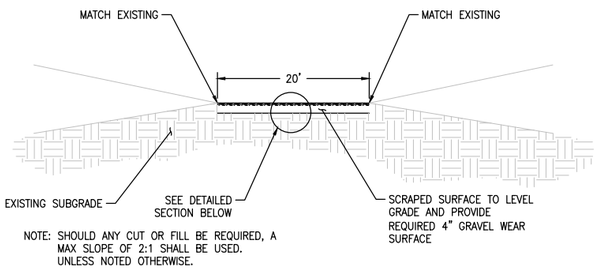


NOTE: SHOULD ANY CUT OR FILL BE REQUIRED, A MAX SLOPE OF 2:1 SHALL BE USED. UNLESS NOTED OTHERWISE.

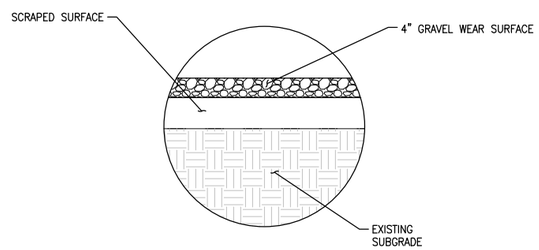


CANYON ACCESS ROAD (B)

NTS

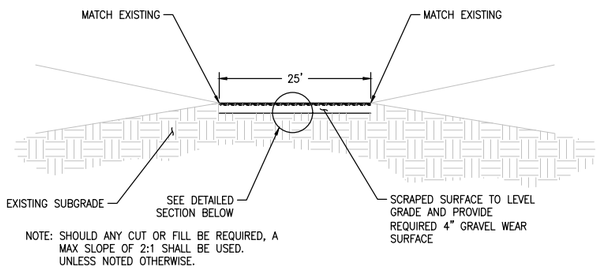


NOTE: SHOULD ANY CUT OR FILL BE REQUIRED, A MAX SLOPE OF 2:1 SHALL BE USED. UNLESS NOTED OTHERWISE.

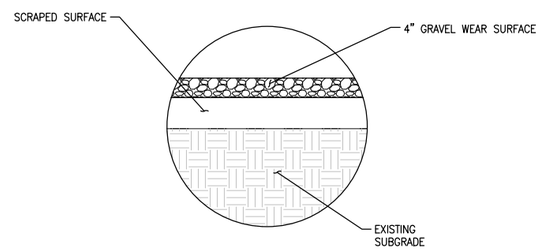


POND ACCESS ROAD (C)

NTS



NOTE: SHOULD ANY CUT OR FILL BE REQUIRED, A MAX SLOPE OF 2:1 SHALL BE USED. UNLESS NOTED OTHERWISE.



PRIMARY ENTRY ROAD (D)

NTS

90% SUBMITTAL – NOT FOR CONSTRUCTION

R.C.W.D. RECORD DWG NO. –

REVISIONS			
NUMBER	DATE	INITIALS	DESCRIPTION

SCALE: AS SHOWN
DESIGNED: XXX
DRAWN: XXX
CHECKED: XXX

AECOM
999 TOWN & COUNTRY ROAD
ORANGE, CA 92868
TEL (714) 567-2400

Rancho Water
Rancho California Water District
42135 Winchester Road
Temecula, CA 92590
Phone: (951) 296-6900 Fax: (951) 296-6863

RANCHO CALIFORNIA WATER DISTRICT
APPROVED FOR CONSTRUCTION
Engineering Manager Date
Engineering Date

RANCHO CALIFORNIA WATER DISTRICT
VAIL DAM SEISMIC AND HYDROLOGIC REMEDIATION PROJECT
PROJECT NO. D1911

CANYON AND POND ACCESS ROAD DETAILS

SHEET
C-22
SHEET 64 OF XX

NAR ALIGNMENT DATA

No.	Type	Length	Radius	Direction	Start Station	End Station	Delta angle	Chord length	Chord Direction	Start Direction	End Direction	Start Point	End Point
1	Curve	34.88'	44.80'		-6+44.99'	-6+79.87'	44.6061 °	34.00'	S10° 50' 11"E	S11° 28' 00"W	S33° 08' 22"E	(6332216.8410',2127121.2293')	(6332223.2339',2127087.8315')
2	Curve	45.68'	100.00'		-5+99.31'	-6+44.99'	26.1718 °	45.28'	S1° 37' 10"E	S14° 42' 20"E	S11° 27' 59"W	(6332215.5612',2127166.4936')	(6332216.8410',2127121.2293')
3	Curve	249.94'	1000.00'		-3+49.37'	-5+99.31'	14.3208 °	249.29'	S7° 32' 42"E	S0° 23' 05"E	S14° 42' 20"E	(6332182.8274',2127413.6297')	(6332215.5612',2127166.4936')
4	Line	10.88'		S0° 23' 05"E	-3+38.48'	-3+49.37'						(6332182.7543',2127424.5111')	(6332182.8274',2127413.6297')
5	Curve	338.48'	650.00'		0+00.00'	-3+38.48'	29.8364 °	334.67'	S14° 32' 01"W	S29° 27' 06"W	S0° 23' 05"E	(6332266.7391',2127748.4739')	(6332182.7543',2127424.5111')
6	Curve	94.42'	650.00'		0+00.00'	0+94.42'	8.3229 °	94.34'	N33° 39' 31"E	N29° 29' 50"E	N37° 49' 12"E	(6332266.9210',2127748.8300')	(6332319.2066',2127827.3520')
7	Line	280.18'		N37° 49' 12"E	0+94.42'	3+74.60'						(6332319.2066',2127827.3520')	(6332491.0111',2128048.6814')
8	Curve	58.26'	100.00'		3+74.60'	4+32.87'	33.3809 °	57.44'	N21° 07' 46"E	N37° 49' 12"E	N4° 26' 21"E	(6332491.0111',2128048.6814')	(6332511.7170',2128102.2598')
9	Line	124.22'		N4° 26' 21"E	4+32.87'	5+57.08'						(6332511.7170',2128102.2598')	(6332521.3314',2128226.1053')
10	Curve	160.46'	100.00'		5+57.08'	7+17.55'	91.9384 °	143.79'	N50° 24' 30"E	N4° 26' 21"E	S83° 37' 21"E	(6332521.3314',2128226.1053')	(6332632.1392',2128317.7466')
11	Line	137.33'		S83° 37' 21"E	7+17.55'	8+54.88'						(6332632.1392',2128317.7466')	(6332768.6204',2128302.4921')
12	Curve	168.10'	280.00'		8+54.88'	10+22.98'	34.3981 °	165.59'	N79° 10' 42"E	S83° 37' 21"E	N61° 58' 46"E	(6332768.6204',2128302.4921')	(6332931.2633',2128333.5814')
13	Line	207.29'		N61° 58' 46"E	10+22.98'	12+30.27'						(6332931.2633',2128333.5814')	(6333114.2579',2128430.9660')
14	Curve	46.10'	85.00'		12+30.27'	12+76.37'	31.0721 °	45.53'	N77° 30' 55"E	N61° 58' 46"E	S86° 56' 55"E	(6333114.2579',2128430.9660')	(6333158.7148',2128440.8093')
15	Line	151.00'		S86° 56' 55"E	12+76.37'	14+27.37'						(6333158.7148',2128440.8093')	(6333309.5031',2128432.7711')
16	Curve	33.11'	100.00'		14+27.37'	14+60.48'	18.9729 °	32.96'	S77° 27' 44"E	S86° 56' 55"E	S67° 58' 32"E	(6333309.5031',2128432.7711')	(6333341.6799',2128425.6154')
17	Line	47.84'		S67° 58' 32"E	14+60.48'	15+08.32'						(6333341.6799',2128425.6154')	(6333386.0254',2128407.6768')
18	Curve	100.72'	100.00'		15+08.32'	16+09.04'	57.7066 °	96.51'	N83° 10' 16"E	S67° 58' 32"E	N54° 19' 04"E	(6333386.0254',2128407.6768')	(6333481.8544',2128419.1528')
19	Curve	68.75'	300.00'		16+09.04'	16+77.79'	13.1301 °	68.60'	N60° 52' 58"E	N54° 19' 04"E	N67° 26' 52"E	(6333481.8544',2128419.1528')	(6333541.7840',2128452.5328')
20	Line	449.77'		N67° 26' 52"E	16+77.79'	21+27.56'						(6333541.7840',2128452.5328')	(6333957.1611',2128625.0307')
21	Curve	74.97'	200.00'		21+27.56'	22+02.53'	21.4767 °	74.53'	N78° 11' 10"E	N67° 26' 52"E	N88° 55' 28"E	(6333957.1611',2128625.0307')	(6334030.1120',2128640.2893')
22	Line	114.86'		N88° 55' 28"E	22+02.53'	23+17.39'						(6334030.1120',2128640.2893')	(6334144.9527',2128642.4452')
23	Curve	105.23'	75.00'		23+17.39'	24+22.61'	80.3871 °	96.81'	S50° 52' 55"E	N88° 55' 28"E	S10° 41' 18"E	(6334144.9527',2128642.4452')	(6334220.0592',2128581.3685')
24	Line	40.79'		S10° 41' 18"E	24+22.61'	24+63.41'						(6334220.0592',2128581.3685')	(6334227.6253',2128541.2815')
25	Curve	141.17'	75.00'		24+63.41'	26+04.58'	107.8464 °	121.23'	S64° 36' 42"E	S10° 41' 18"E	N61° 27' 55"E	(6334227.6253',2128541.2815')	(6334337.1510',2128489.3020')
26	Line	48.26'		N61° 27' 55"E	26+04.58'	26+52.84'						(6334337.1510',2128489.3020')	(6334379.5522',2128512.3573')
27	Curve	92.26'	100.00'		26+52.84'	27+45.10'	52.8583 °	89.02'	N35° 02' 10"E	N61° 27' 55"E	N8° 36' 25"E	(6334379.5522',2128512.3573')	(6334430.6570',2128585.2445')
28	Curve	96.24'	100.00'		27+45.10'	28+41.34'	55.1438 °	92.57'	N36° 10' 44"E	N8° 36' 25"E	N63° 45' 03"E	(6334430.6570',2128585.2445')	(6334485.3031',2128659.9668')
29	Line	42.87'		N63° 45' 03"E	28+41.34'	28+84.21'						(6334485.3031',2128659.9668')	(6334523.7506',2128678.9265')
30	Curve	172.32'	400.00'		28+84.21'	30+56.53'	24.6828 °	170.99'	N76° 05' 32"E	N63° 45' 03"E	N88° 26' 01"E	(6334523.7506',2128678.9265')	(6334689.7268',2128720.0256')
31	Curve	49.98'	100.00'		30+56.53'	31+06.50'	28.6344 °	49.46'	N74° 06' 59"E	N88° 26' 01"E	N59° 47' 57"E	(6334689.7268',2128720.0256')	(6334737.2964',2128733.5616')
32	Line	49.54'		N59° 47' 57"E	31+06.50'	31+56.04'						(6334737.2964',2128733.5616')	(6334780.1101',2128758.4806')
33	Curve	73.57'	100.00'		31+56.04'	32+29.61'	42.1537 °	71.92'	N80° 52' 34"E	N59° 47' 57"E	S78° 02' 50"E	(6334780.1101',2128758.4806')	(6334851.1241',2128769.8857')
34	Line	96.19'		S78° 02' 50"E	32+29.61'	33+25.80'						(6334851.1241',2128769.8857')	(6334945.2239',2128749.9651')
35	Curve	128.30'	500.00'		33+25.80'	34+54.10'	14.7019 °	127.95'	S85° 23' 53"E	S78° 02' 50"E	N87° 15' 03"E	(6334945.2239',2128749.9651')	(6335072.7583',2128739.6998')
36	Line	47.02'		N87° 15' 03"E	34+54.10'	35+01.12'						(6335072.7583',2128739.6998')	(6335119.7283',2128741.9552')
37	Curve	164.17'	200.00'		35+01.12'	36+65.29'	47.0306 °	159.60'	N63° 44' 08"E	N87° 15' 03"E	N40° 13' 13"E	(6335119.7283',2128741.9552')	(6335262.8494',2128812.5794')
38	Line	64.91'		N40° 13' 13"E	36+65.29'	37+30.20'						(6335262.8494',2128812.5794')	(6335304.7649',2128862.1442')
39	Curve	103.51'	100.00'		37+30.20'	38+33.71'	59.3046 °	98.95'	N69° 52' 21"E	N40° 13' 13"E	S80° 28' 30"E	(6335304.7649',2128862.1442')	(6335397.6692',2128896.1928')
40	Line	336.74'		S80° 28' 30"E	38+33.71'	41+70.45'						(6335397.6692',2128896.1928')	(6335729.7680',2128840.4703')
41	Line	348.88'		S80° 28' 31"E	41+70.45'	45+19.33'						(6335729.7680',2128840.4703')	(6336073.8359',2128782.7410')
42	Curve	90.48'	200.00'		45+19.33'	46+09.81'	25.9209 °	89.71'	S67° 30' 54"E	S80° 28' 31"E	S54° 33' 16"E	(6336073.8359',2128782.7410')	(6336156.7272',2128748.4316')
43	Curve	271.44'	300.00'		46+09.81'	48+81.25'	51.8421 °	262.28'	S80° 28' 32"E	S54° 33' 16"E	N73° 36' 13"E	(6336156.7272',2128748.4316')	(6336415.3909',2128705.0323')
44	Curve	90.48'	200.00'		48+81.25'	49+71.73'	25.9208 °	89.71'	N86° 33' 50"E	N73° 36' 13"E	S80° 28' 33"E	(6336415.3909',2128705.0323')	(6336504.9406',2128710.4092')
45	Line	355.66'		S80° 28' 33"E	49+71.73'	53+27.40'						(6336504.9406',2128710.4092')	(6336855.7012',2128651.5592')
46	Curve	27.19'	100.00'		53+27.40'	53+54.59'	15.5786 °	27.11'	S72° 41' 11"E	S80° 28' 33"E	S64° 53' 50"E	(6336855.7012',2128651.5592')	(6336881.5791',2128643.4924')
47	Curve	163.13'	300.00'		53+54.59'	55+17.72'	31.1558 °	161.13'	S80° 28' 30"E	S64° 53' 50"E	N83° 56' 49"E	(6336881.5791',2128643.4924')	(6337040.4869',2128616.8293')
48	Curve	27.19'	100.00'		55+17.72'	55+44.91'	15.5775 °	27.10'	S88° 15' 51"E	N83° 56' 49"E	S80° 28' 32"E	(6337040.4869',2128616.8293')	(6337067.5787',2128616.0083')
49	Line	647.26'		S80° 28' 32"E	55+44.91'	61+92.16'						(6337067.5787',2128616.0083')	(6337705.9152',2128508.9068')
50	Curve	264.95'	200.00'		61+92.16'	64+57.11'	75.9031 °	246.00'	S42° 31' 26"E	S80° 28' 32"E	S4° 34' 21"E	(6337705.9152',2128508.9068')	(6337872.1838',2128327.6088')
51	Curve	142.86'	100.00'		64+57.11'	65+99.98'	81.8554 °	131.02'	S45° 30' 00"E	S4° 34' 21"E	S86° 25' 40"E	(6337872.1838',2128327.6088')	(6337965.6348',2128235.7749')
52	Curve	79.86'	100.00'		65+99.98'	66+79.84'	45.7567 °	77.76'	S63° 32' 58"E	S86° 25' 40"E	S40° 40' 16"E	(6337965.6348',2128235.7749')	(6338035.2505',2128201.1408')
53	Line	135.72'		S40° 40' 16"E	66+79.84'	68+15.56'						(6338035.2505',2128201.1408')	(6338123.6992',2128098.2046')
54	Curve	87.91'	200.00'		68+15.56'	69+03.46'	25.1835 °	87.20'	S28° 04' 46"E	S40° 40' 16"E	S15° 29' 15"E	(6338123.6992',2128098.2046')	(6338164.7442',2128021.2674')
55	Curve	54.12'	200.00'		69+03.46'	69+57.59'	15.5054 °	53.96'	S23° 14' 25"E	S15° 29' 15"E	S30° 59' 35"E	(6338164.7442',2128021.2674')	(6338186.0357',2127971.6867')
56	Line	151.91'		S30° 59' 35"E	69+57.59'	71+09.49'						(6338186.0357',2127971.6867')	(6338264.2574',2127841.4678')
57	Curve	22.39'	100.00'		71+09.49'	71+31.88'	12.8268 °	22.34'	S37° 24' 23"E	S30° 59' 35"E	S43° 49' 11"E	(6338264.2574',2127841.4678')	(6338277.8283',2127823.7220')
58	Line	50.95'		S43° 49' 11"E	71+31.88'	71+82.83'						(6338277.8283',2127823.7220')	(6338313.1038',2127786.9624')
59	Curve	34.96'	100.00'		71+82.83'	72+17.79'	20.0320 °	34.78'	S33° 48' 13"E	S43° 49' 11"E	S23° 47' 16"E	(6338313.1038',2127786.9624')	(6338332.4562',2127758.0582')
60	Line	278.52'		S23° 47' 16"E	72+17.79'	74+96.31'						(6338332.4562',2127758.0582')	(6338444.7956',2127503.2031')
61	Curve	34.75'	100.00'		74+96.31'	75+31.06'	19.9125 °	34.58'	S13° 49' 53"E	S23° 47' 16"E	S3° 52' 31"E	(6338444.7956',2127503.2031')	(6338453.0624',2127469.6266')
62	Line	61.93'		S3° 52' 31"E	75+31.06'	75+92.99'						(6338453.0624',2127469.6266')	(6338457.2478',2127407.8389')
63	Curve	36.76'	100.00'		75+92.99'	76+29.75'	21.0615 °	36.55'	S14° 24' 22"E	S3° 52' 31"E	S24° 56' 12"E	(6338457.2478',2127407.8389')	(6338466.3418',2127372.4356')
64	Line	56.75'		S24° 56' 12"E	76+29.75'	76+86.50'						(6338466.3418',2127372.4356')	(6338490.2684',2127320.9767')
65	Curve	37.61'	100.00'		76+86.50'	77+24.11'	21.5507 °	37.39'	S14° 09' 41"E	S24° 56' 12"E	S3° 23' 10"E	(6338490.2684',2127320.9767')	(6338499.4165',2127284.7213')
66	Line	106.61'		S3° 23' 10"E	77+24.11'	78+30.72'						(6338499.4165',2127284.7213')	(6338505.7132',2127178.3002')
67	Curve	57.37'	100.00'		78+30.72'	78+88.09'	32.8692 °	56.58'	S19° 49' 15"E	S3° 23' 10"E	S36° 15' 19"E	(6338505.7132',2127178.3002')	(6338524.8996',2127125.0681')
68	Curve	53.15'	100.00'		78+88.09'	79+41.24'	30.4549 °	52.53'	S21° 01' 40"E	S36° 15' 19"E	S5° 48' 02"E	(6338524.8996',2127125.0681')	(6338543.7487',2127076.0360')
69	Curve	32.59'	100.00'		79+41.24'	79+73.83'	18.6710 °	32.44'	S15° 08' 09"E	S5° 48' 02"E	S24° 28' 17"E	(6338543.7487',2127076.0360')	(6338552.2199',2127044.7184')
70	Line	61.67'		S24° 28' 17"E	79+73.83'	80+35.50'						(6338552.2199',2127044.7184')	(6338577.7667',2126988.5868')
71	Curve	89.68'	200.00'		80+35.50'	81+25.18'	25.6904 °	88.93'	S37° 19' 00"E	S24° 28' 17"E	S50° 09' 43"E	(6338577.7667',2126988.5868')	(6338631.6760',2126917.8634')
72	Curve	150.95'	200.00'		81+25.18'	82+76.13'	43.2443 °	147.39'	S28° 32' 23"E	S50° 09' 43"E	S6° 55' 03"E	(6338631.6760',2126917.8634')	(6338702.0959',2126788.3800')
73	Line	105.77'		S6° 55' 03"E	82+76.13'	83+81.90'						(6338702.0959',2126788.3800')	(6338714.8348',2126683.3800')
74	Curve	61.70'	200.00'		83+81.90'	84+43.60'	17.6757 °	61.46'	S15° 45' 19"E	S6° 55' 03"E	S24° 35' 36"E	(6338714.8348',2126683.3800')	(6338731.5219',2126624.2333')
75	Line	114.77'		S24° 35' 36"E	84+43.60'	85+58.36'						(6338731.5219',2126624.2333')	(6338779.2846',2126519.8781')
76	Curve	28.02'	100.00'		85+58.36'	85+86.38'	16.0532 °	27.93'	S16° 34' 00"E	S24° 35' 36"E	S8° 32' 24"E	(6338779.2846',2126519.8781')	(6338787.2473',2126493.1108')
77	Line	68.90'		S8° 32' 24"E	85+86.38'	86+55.29'						(6338787.2473',2126493.1108')	(6338797.4797',2126424.9702')
78	Curve	162.24'	100.00'		86+55.29'	88+17.52'	92.9544 °	145.02'	S55° 01' 02"E	S8° 32' 24"E	N78° 30' 20"E	(6338797.4797',2126424.9702')	(6338916.2983',2126341.8259')
79	Curve	52.79'	100.00'		88+17.52'	88+70.31'	30.2475 °	52.18'	S86° 22' 15"E	N78° 30' 20"E	S71° 14' 49"E	(6338916.2983',2126341.8259')	(6338968.3746',2126338.5228')
80	Line	93.01'		S71° 14' 49"E	88+70.31'	89+63.32'						(6338968.3746',2126338.5228')	(6339056.4432',2126308.6223')
81	Curve	22.16'	291.94'		89+63.32'	89+85.48'	4.3492 °	22.16'	S69° 04' 20"E	S71° 14' 49"E	S66° 53' 52"E	(6339056.4432',2126308.6223')	(6339077.1368',2126300.7087')
82	Curve	97.67'	100.19'		89+85.48'	90+83.15'	55.8524 °	93.85'	S38° 58' 18"E	S66° 53' 52"E	S11° 02' 43"E	(6339077.1368',2126300.7087')	(6339136.1612',2126227.7456')
83	Curve	102.42'	173.05'		90+83.15'	91+85.57'	33.9099 °	100.93'	S28° 00' 01"E	S11° 02' 43"E	S44° 57' 19"E	(6339136.1612',2126227.7456')	(6339183.5450',2126138.6308')
84	Line	498.57'		S44° 57' 19"E	91+85.57'	96+84.14'						(6339183.5450',2126138.6308')	(6339535.8116',2125785.8133')
85	Curve	85.95'	100.00'		96+84.14'	97+70.08'	49.2434 °	83.32'	S20° 20' 01"E	S44° 57' 19"E	S4° 17' 17"W	(6339535.8116',2125785.8133')	(6339564.7657',2125707.6807')

NAR ALIGNMENT DATA

No.	Type	Length	Radius	Direction	Start Station	End Station	Delta angle	Chord length	Chord Direction	Start Direction	End Direction	Start Point	End Point
86	Curve	70.94'	100.00'		97+70.08'	98+41.02'	40.6466 °	69.46'	S16° 02' 07"E	S4° 17' 17"W	S36° 21' 31"E	(6339564.7657',2125707.6807')	(6339583.9534',2125640.9199')
87	Line	189.55'		S36° 21' 31"E	98+41.02'	100+30.58'						(6339583.9534',2125640.9199')	(6339696.3277',2125488.2678')
88	Curve	87.98'	500.00'		100+30.58'	101+18.56'	10.0817 °	87.87'	S31° 19' 03"E	S36° 21' 31"E	S26° 16' 36"E	(6339696.3277',2125488.2678')	(6339741.9988',2125413.2039')
89	Line	64.62'		S26° 16' 36"E	101+18.56'	101+83.18'						(6339741.9988',2125413.2039')	(6339770.6065',2125355.2616')
90	Curve	68.32'	200.00'		101+83.18'	102+51.50'	19.5725 °	67.99'	S16° 29' 26"E	S26° 16' 36"E	S6° 42' 15"E	(6339770.6065',2125355.2616')	(6339789.9058',2125290.0686')
91	Line	16.71'		S6° 42' 15"E	102+51.50'	102+68.21'						(6339789.9058',2125290.0686')	(6339791.8570',2125273.4701')
92	Curve	57.12'	100.00'		102+68.21'	103+25.33'	32.7284 °	56.35'	S23° 04' 07"E	S6° 42' 15"E	S39° 25' 58"E	(6339791.8570',2125273.4701')	(6339813.9361',2125221.6275')
93	Line	54.07'		S39° 25' 58"E	103+25.33'	103+79.40'						(6339813.9361',2125221.6275')	(6339848.2804',2125179.8647')

SAR ALIGNMENT DATA

No.	Type	Length	Radius	Direction	Start Station	End Station	Delta angle	Chord length	Chord Direction	Start Direction	End Direction	Start Point	End Point
1	Curve	172.84'	190.73'		-0+00.00'	1+72.84'	51.9235 °	166.99'	N33° 17' 38"W	N7° 19' 56"W	N59° 15' 20"W	(6339551.4784',2124381.2338')	(6339459.8115',2124520.8156')
2	Line	64.64'		N59° 15' 20"W	1+72.84'	2+37.49'						(6339459.8115',2124520.8156')	(6339404.2529',2124553.8621')
3	Line	22.13'		N56° 04' 29"W	2+37.49'	2+59.62'						(6339404.2529',2124553.8621')	(6339385.8902',2124566.2131')
4	Curve	162.02'	75.00'		2+59.62'	4+21.64'	123.7746 °	132.30'	N5° 48' 45"E	N56° 04' 29"W	N67° 42' 00"E	(6339385.8902',2124566.2131')	(6339399.2892',2124697.8362')
5	Line	325.24'		N67° 42' 00"E	4+21.64'	7+46.88'						(6339399.2892',2124697.8362')	(6339700.2087',2124821.2530')
6	Curve	34.84'	35.00'		7+46.88'	7+81.72'	57.0319 °	33.42'	N39° 11' 02"E	N67° 42' 00"E	N10° 40' 05"E	(6339700.2087',2124821.2530')	(6339721.3228',2124847.1563')
7	Line	46.73'		N10° 40' 05"E	7+81.72'	8+28.45'						(6339721.3228',2124847.1563')	(6339729.9733',2124893.0785')
8	Curve	48.62'	25.00'		8+28.45'	8+77.07'	111.4195 °	41.31'	N45° 02' 30"W	N10° 40' 05"E	S79° 14' 54"W	(6339729.9733',2124893.0785')	(6339700.7416',2124922.2676')
9	Line	36.29'		S79° 14' 54"W	8+77.07'	9+13.35'						(6339700.7416',2124922.2676')	(6339665.0927',2124915.4984')

90% SUBMITTAL – NOT FOR CONSTRUCTION

R.C.W.D. RECORD DWG NO.

REVISIONS			
NUMBER	DATE	INITIALS	DESCRIPTION

SCALE AS SHOWN
DESIGNED XXX
DRAWN XXX
CHECKED XXX

AECOM
999 TOWN & COUNTRY ROAD
ORANGE, CA 92868
TEL (714) 567-2400

Rancho Water
Rancho California Water District
42135 Winchester Road
Temecula, CA 92590
Phone: (951) 296-6900 Fax: (951) 296-6863

RANCHO CALIFORNIA WATER DISTRICT
APPROVED FOR CONSTRUCTION
Engineering Manager Date
Engineering Date

RANCHO CALIFORNIA WATER DISTRICT
VAIL DAM SEISMIC AND HYDROLOGIC REMEDIATION PROJECT
PROJECT NO. D1911

ALIGNMENT DATA TABLES

SHEET
C-23
SHEET 65 OF XX

CAR ALIGNMENT DATA

No.	Type	Length	Radius	Direction	Start Station	End Station	Delta angle	Chord length	Chord Direction	Start Direction	End Direction	Start Point	End Point
1	Line	6.33'		S79° 14' 54"W	-0+38.58'	-0+32.25'						(6339665.0927',2124915.4984')	(6339658.8732',2124914.3174')
2	Curve	32.25'	50.00'		-0+32.25'	0+00.00'	36.9564 °	31.69'	S60° 46' 13"W	S79° 14' 54"W	S42° 17' 31"W	(6339658.8732',2124914.3174')	(6339631.2145',2124898.8406')
3	Curve	48.01'	100.00'		0+00.00'	0+48.01'	27.5080 °	47.55'	S56° 02' 46"W	S42° 17' 31"W	S69° 48' 00"W	(6339631.2145',2124898.8406')	(6339591.7718',2124872.2823')
4	Line	67.98'		S69° 48' 00"W	0+66.86'	1+34.85'						(6339591.7718',2124872.2823')	(6339527.9725',2124848.8087')
5	Curve	30.03'	100.00'		1+34.85'	1+64.88'	17.2075 °	29.92'	S78° 24' 13"W	S69° 48' 00"W	S87° 00' 27"W	(6339527.9725',2124848.8087')	(6339498.6631',2124842.7943')
6	Line	276.93'		S87° 00' 27"W	1+64.88'	4+41.80'						(6339498.6631',2124842.7943')	(6339222.1143',2124828.3372')
7	Curve	59.12'	175.00'		4+41.80'	5+00.92'	19.3549 °	58.84'	S77° 19' 48"W	S87° 00' 27"W	S67° 39' 09"W	(6339222.1143',2124828.3372')	(6339164.7112',2124815.4325')
8	Curve	77.37'	130.00'		5+00.92'	5+78.29'	34.0977 °	76.23'	S84° 42' 05"W	S67° 39' 09"W	N78° 14' 59"W	(6339164.7112',2124815.4325')	(6339088.8084',2124808.3931')
9	Line	672.45'		N78° 14' 59"W	5+78.29'	12+50.73'						(6339088.8084',2124808.3931')	(6338430.4546',2124945.3337')
10	Curve	182.14'	350.00'		12+50.73'	14+32.87'	29.8172 °	180.09'	S86° 50' 30"W	N78° 14' 59"W	S71° 55' 59"W	(6338430.4546',2124945.3337')	(6338250.6338',2124935.4113')
11	Line	0.52'		S71° 55' 59"W	14+32.87'	14+33.40'						(6338250.6338',2124935.4113')	(6338250.1376',2124935.2494')
12	Curve	256.06'	315.00'		14+33.40'	16+89.45'	46.5744 °	249.06'	N84° 46' 47"W	S71° 55' 59"W	N61° 29' 33"W	(6338250.1376',2124935.2494')	(6338002.1061',2124957.9106')
13	Line	2.81'		N61° 29' 33"W	16+89.45'	16+92.27'						(6338002.1061',2124957.9106')	(6337999.6330',2124959.2538')
14	Curve	393.14'	605.00'		16+92.27'	20+85.41'	37.2322 °	386.26'	N80° 06' 31"W	N61° 29' 33"W	S81° 16' 31"W	(6337999.6330',2124959.2538')	(6337619.1114',2125025.6064')
15	Line	80.66'		S81° 16' 31"W	20+85.41'	21+66.07'						(6337619.1114',2125025.6064')	(6337539.3858',2125013.3715')
16	Curve	130.57'	350.00'		21+66.07'	22+96.64'	21.3748 °	129.82'	N88° 02' 14"W	S81° 16' 31"W	N77° 21' 00"W	(6337539.3858',2125013.3715')	(6337409.6465',2125017.8174')
17	Line	7.65'		N77° 21' 00"W	22+96.64'	23+04.29'						(6337409.6465',2125017.8174')	(6337402.1807',2125019.4931')
18	Curve	137.11'	250.00'		23+04.29'	24+41.41'	31.4243 °	135.40'	S86° 56' 17"W	N77° 21' 00"W	S71° 13' 33"W	(6337402.1807',2125019.4931')	(6337266.9718',2125012.2603')
19	Line	348.51'		S71° 13' 33"W	24+41.41'	27+89.92'						(6337266.9718',2125012.2603')	(6336937.0059',2124900.0965')
20	Curve	90.35'	100.00'		27+89.92'	28+80.27'	51.7680 °	87.31'	N82° 53' 25"W	S71° 13' 33"W	N57° 00' 22"W	(6336937.0059',2124900.0965')	(6336850.3672',2124910.9029')
21	Line	132.64'		N57° 00' 22"W	28+80.27'	30+12.90'						(6336850.3672',2124910.9029')	(6336739.1209',2124983.1299')
22	Curve	93.67'	145.00'		30+12.90'	31+06.57'	37.0118 °	92.05'	N38° 30' 01"W	N57° 00' 22"W	N19° 59' 40"W	(6336739.1209',2124983.1299')	(6336681.8202',2125055.1660')
23	Line	125.18'		N19° 59' 40"W	31+06.57'	32+31.76'						(6336681.8202',2125055.1660')	(6336639.0158',2125172.8053')
24	Curve	105.71'	750.00'		32+31.76'	33+37.47'	8.0759 °	105.63'	N24° 01' 57"W	N19° 59' 40"W	N28° 04' 13"W	(6336639.0158',2125172.8053')	(6336595.9994',2125269.2747')
25	Line	140.60'		N28° 04' 13"W	33+37.47'	34+78.07'						(6336595.9994',2125269.2747')	(6336529.8394',2125393.3360')
26	Curve	53.34'	50.00'		34+78.07'	35+31.41'	61.1262 °	50.85'	N2° 29' 34"E	N28° 04' 13"W	N33° 03' 21"E	(6336529.8394',2125393.3360')	(6336532.0509',2125444.1366')
27	Line	296.94'		N33° 03' 21"E	35+31.41'	38+28.36'						(6336532.0509',2125444.1366')	(6336694.0207',2125693.0166')
28	Curve	80.13'	460.00'		38+28.36'	39+08.48'	9.9807 °	80.03'	N28° 03' 56"E	N33° 03' 21"E	N23° 04' 31"E	(6336694.0207',2125693.0166')	(6336731.6726',2125763.6347')
29	Line	817.27'		N23° 04' 31"E	39+08.48'	47+25.75'						(6336731.6726',2125763.6347')	(6337051.9923',2126515.5159')
30	Curve	52.50'	50.00'		47+25.75'	47+78.26'	60.1652 °	50.12'	N7° 00' 27"W	N23° 04' 31"E	N37° 05' 24"W	(6337051.9923',2126515.5159')	(6337045.8772',2126565.2662')
31	Line	128.42'		N37° 05' 24"W	47+78.26'	49+06.68'						(6337045.8772',2126565.2662')	(6336968.4285',2126667.7088')
32	Curve	159.54'	100.00'		49+06.68'	50+66.23'	91.4116 °	143.15'	N82° 47' 45"W	N37° 05' 24"W	S51° 29' 54"W	(6336968.4285',2126667.7088')	(6336826.4060',2126685.6610')
33	Line	385.57'		S51° 29' 54"W	50+66.23'	54+51.80'						(6336826.4060',2126685.6610')	(6336524.6593',2126445.6272')
34	Curve	89.07'	200.00'		54+51.80'	55+40.87'	25.5180 °	88.34'	S64° 15' 27"W	S51° 29' 54"W	S77° 00' 59"W	(6336524.6593',2126445.6272')	(6336445.0865',2126407.2585')
35	Line	271.35'		S77° 00' 59"W	55+40.87'	58+12.22'						(6336445.0865',2126407.2585')	(6336180.6737',2126346.2938')
36	Curve	89.27'	650.00'		58+12.22'	59+01.49'	7.8685 °	89.20'	S80° 57' 02"W	S77° 00' 59"W	S84° 53' 06"W	(6336180.6737',2126346.2938')	(6336092.5883',2126332.2647')
37	Line	75.23'		S84° 53' 06"W	59+01.49'	59+76.72'						(6336092.5883',2126332.2647')	(6336017.6547',2126325.5573')
38	Curve	53.98'	200.00'		59+76.72'	60+30.70'	15.4638 °	53.82'	N87° 22' 59"W	S84° 53' 06"W	N79° 39' 05"W	(6336017.6547',2126325.5573')	(6335963.8958',2126328.0143')
39	Line	226.35'		N79° 39' 05"W	60+30.70'	62+57.05'						(6335963.8958',2126328.0143')	(6335741.2306',2126368.6751')
40	Curve	96.12'	100.00'		62+57.05'	63+53.17'	55.0730 °	92.46'	N52° 06' 53"W	N79° 39' 05"W	N24° 34' 42"W	(6335741.2306',2126368.6751')	(6335668.2551',2126425.4547')
41	Line	23.68'		N24° 34' 42"W	63+53.17'	63+76.85'						(6335668.2551',2126425.4547')	(6335658.4038',2126446.9935')
42	Curve	113.79'	150.00'		63+76.85'	64+90.65'	43.4658 °	111.08'	N46° 18' 40"W	N24° 34' 42"W	N68° 02' 39"W	(6335658.4038',2126446.9935')	(6335578.0786',2126523.7238')
43	Line	92.72'		N68° 02' 39"W	64+90.65'	65+83.37'						(6335578.0786',2126523.7238')	(6335492.0836',2126558.3910')
44	Curve	184.78'	350.00'		65+83.37'	67+68.15'	30.2488 °	182.64'	N52° 55' 11"W	N68° 02' 39"W	N37° 47' 43"W	(6335492.0836',2126558.3910')	(6335346.3742',2126668.5114')
45	Line	429.98'		N37° 47' 43"W	67+68.15'	71+98.13'						(6335346.3742',2126668.5114')	(6335082.8631',2127008.2851')
46	Curve	71.38'	290.00'		71+98.13'	72+69.51'	14.1030 °	71.20'	N30° 44' 38"W	N37° 47' 43"W	N23° 41' 32"W	(6335082.8631',2127008.2851')	(6335046.4648',2127069.4804')
47	Line	270.52'		N23° 41' 32"W	72+69.51'	75+40.03'						(6335046.4648',2127069.4804')	(6334937.7617',2127317.2035')
48	Curve	101.76'	75.00'		75+40.03'	76+41.80'	77.7400 °	94.13'	N62° 33' 44"W	N23° 41' 32"W	S78° 34' 04"W	(6334937.7617',2127317.2035')	(6334854.2172',2127360.5786')
49	Line	77.32'		S78° 34' 04"W	76+41.80'	77+19.12'						(6334854.2172',2127360.5786')	(6334778.4305',2127345.2529')
50	Curve	247.26'	280.00'		77+19.12'	79+66.37'	50.5956 °	239.30'	N76° 08' 04"W	S78° 34' 04"W	N50° 50' 12"W	(6334778.4305',2127345.2529')	(6334546.1025',2127402.6000')
51	Line	13.74'		N50° 50' 12"W	79+66.37'	79+80.11'						(6334546.1025',2127402.6000')	(6334535.4490',2127411.2774')
52	Curve	307.76'	290.00'		79+80.11'	82+87.88'	60.8056 °	293.52'	N81° 14' 22"W	N50° 50' 12"W	S68° 21' 28"W	(6334535.4490',2127411.2774')	(6334245.3493',2127455.9827')
53	Line	255.53'		S68° 21' 28"W	82+87.88'	85+43.41'						(6334245.3493',2127455.9827')	(6334007.8350',2127361.7414')
54	Curve	107.08'	400.00'		85+43.41'	86+50.49'	15.3381 °	106.76'	S60° 41' 19"W	S68° 21' 28"W	S53° 01' 11"W	(6334007.8350',2127361.7414')	(6333914.7425',2127309.4762')
55	Line	157.50'		S53° 01' 11"W	86+50.49'	88+07.99'						(6333914.7425',2127309.4762')	(6333788.9244',2127214.7330')
56	Curve	51.57'	50.00'		88+07.99'	88+59.55'	59.0911 °	49.31'	S82° 33' 55"W	S53° 01' 11"W	N67° 53' 22"W	(6333788.9244',2127214.7330')	(6333740.0275',2127208.3521')
57	Line	1.08'		N67° 53' 22"W	88+59.55'	88+60.63'						(6333740.0275',2127208.3521')	(6333739.0304',2127208.7573')
58	Curve	298.99'	245.00'		88+60.63'	91+59.62'	69.9229 °	280.78'	S77° 08' 57"W	N67° 53' 22"W	S42° 11' 16"W	(6333739.0304',2127208.7573')	(6333465.2808',2127146.3077')
59	Line	431.04'		S42° 11' 16"W	91+59.62'	95+90.67'						(6333465.2808',2127146.3077')	(6333175.8079',2126826.9266')
60	Curve	122.49'	150.00'		95+90.67'	97+13.16'	46.7888 °	119.12'	S65° 34' 56"W	S42° 11' 16"W	S88° 58' 36"W	(6333175.8079',2126826.9266')	(6333067.3448',2126777.6848')
61	Line	334.61'		S88° 58' 36"W	97+13.16'	100+47.77'						(6333067.3448',2126777.6848')	(6332732.7923',2126771.7086')
62	Curve	78.29'	250.00'		100+47.77'	101+26.06'	17.9434 °	77.97'	N82° 03' 06"W	S88° 58' 36"W	N73° 04' 48"W	(6332732.7923',2126771.7086')	(6332655.5680',2126782.4907')
63	Line	217.96'		N73° 04' 48"W	101+26.06'	103+44.02'						(6332655.5680',2126782.4907')	(6332447.0428',2126845.9252')
64	Curve	103.11'	170.00'		103+44.02'	104+47.13'	34.7512 °	101.54'	N55° 42' 16"W	N73° 04' 48"W	N38° 19' 44"W	(6332447.0428',2126845.9252')	(6332363.1600',2126903.1368')
65	Line	113.10'		N38° 19' 44"W	104+47.13'	105+60.23'						(6332363.1600',2126903.1368')	(6332293.0203',2126991.8574')
66	Curve	153.79'	1400.00'		105+60.23'	107+14.02'	6.2939 °	153.71'	N35° 10' 55"W	N38° 19' 44"W	N32° 02' 06"W	(6332293.0203',2126991.8574')	(6332204.4558',2127117.4902')

PAR ALIGNMENT DATA

No.	Type	Length	Radius	Direction	Start Station	End Station	Delta angle	Chord length	Chord Direction	Start Direction	End Direction	Start Point	End Point
1	Line	67.77'		N32° 27' 16"W	107+14.02'	107+81.79'						(6332204.4558',2127117.4902')	(6332168.0861',2127174.6795')
2	Curve	67.11'	150.00'		107+81.79'	108+48.91'	25.6349 °	66.55'	N19° 38' 13"W	N32° 27' 16"W	N6° 49' 10"W	(6332168.0861',2127174.6795')	(6332145.7201',2127237.3624')
3	Line	396.86'		N6° 49' 10"W	108+48.91'	112+45.76'						(6332145.7201',2127237.3624')	(6332098.5963',2127631.4100')
4	Curve	97.50'	150.00'		112+45.76'	113+43.26'	37.2428 °	95.79'	N25° 26' 28"W	N6° 49' 10"W	N44° 03' 45"W	(6332098.5963',2127631.4100')	(6332057.4450',2127717.9148')
5	Line	599.72'		N44° 03' 45"W	113+43.26'	119+42.98'						(6332057.4450',2127717.9148')	(6331640.3758',2128148.8624')
6	Curve	175.47'	1000.00'		119+42.98'	121+18.46'	10.0540 °	175.25'	N49° 05' 22"W	N44° 03' 45"W	N54° 06' 59"W	(6331640.3758',2128148.8624')	(6331507.9338',2128263.6301')
7	Line	663.94'		N54° 06' 59"W	121+18.46'	127+82.40'						(6331507.9338',2128263.6301')	(6330970.0043',2128652.7919')
8	Curve	441.60'	850.00'		127+82.40'	132+23.99'	29.7668 °	436.65'	N68° 59' 59"W	N54° 06' 59"W	N83° 52' 59"W	(6330970.0043',2128652.7919')	(6330562.3579',2128809.2748')
9	Line	376.70'		N83° 52' 59"W	132+23.99'	136+00.69'						(6330562.3579',2128809.2748')	(6330187.8062',2128849.4143')
10	Curve	29.88'	500.00'		136+00.69'	136+30.58'	3.4246 °	29.88'	N85° 35' 43"W	N83° 52' 59"W	N87° 18' 28"W	(6330187.8062',2128849.4143')	(6330158.0139',2128851.7091')
11	Line	238.65'		N87° 18' 28"W	136+30.58'	138+69.22'						(6330158.0139',2128851.7091')	(6329919.6311',2128862.9189')
12	Curve	46.73'	800.00'		138+69.22'	139+15.95'	3.3469 °	46.73'	N85° 38' 03"W	N87° 18' 28"W	N83° 57' 39"W	(6329919.6311',2128862.9189')	(6329873.0417',2128866.4758')
13	Line	1159.28'		N83° 57' 39"W	139+15.95'	150+75.24'						(6329873.0417',2128866.4758')	(6328720.1940',2128998.4429')
14	Curve	320.72'	800.00'		150+75.24'	153+95.95'	22.9698 °	318.58'	S84° 33' 16"W	N83° 57' 39"W	S73° 04' 10"W	(6328720.1940',2128998.4429')	(6328403.0567',2128958.2095')
15	Line	97.34'		S73° 04' 10"W	153+95.95'	154+93.30'						(6328403.0567',2128958.2095')	(6328309.9319',2128929.8618')
16	Curve	74.59'	50.00'		154+93.30'	155+67.88'	85.4694 °	67.86'	S30° 20' 05"W	S73° 04' 10"W	S12° 24' 00"E	(6328309.9319',2128929.8618')	(6328275.6589',2128871.2921')
17	Line	358.61'		S12° 24' 00"E	155+67.88'	159+26.50'						(6328275.6589',2128871.2921')	(6328352.6657',2128521.0438')
18	Curve	49.97'	65.00'		159+26.50'	159+76.46'	44.0444 °	48.75'	S34° 25' 20"E	S12° 24' 00"E	S56° 26' 40"E	(6328352.6657',2128521.0438')	(6328380.2209',2128480.8338')
19	Line	34.42'		S56° 26' 40"E	159+76.46'	160+10.89'						(6328380.2209',2128480.8338')	(6328408.9066',2128461.8071')
20	Curve	153.44'	65.00'		160+10.89'	161+64.33'	135.2564 °	120.22'	S11° 11' 02"W	S56° 26' 40"E	S78° 48' 43"W	(6328408.9066',2128461.8071')	(6328385.5899',2128343.8746')

PRIMARY ENTRY ROAD ALIGNMENT DATA

No.	Type	Length	Radius	Direction	Start Station	End Station	Delta angle	Chord length	Chord Direction	Start Direction	End Direction	Start Point	End Point
1	Line	314.52'		S78° 48' 43"W	161+64.33'	164+78.85'						(6328385.5899',2128343.8746')	(6328077.0427',2128282.8481')
2	Curve	559.76'	500.00'		164+78.85'	170+38.61'	64.1433 °	530.98'	N69° 06' 59"W	S78° 48' 43"W	N37° 02' 41"W	(6328077.0427',2128282.8481')	(6327580.9458',2128472.1271')
3	Line	765.34'		N37° 02' 41"W	170+38.61'	178+03.95'						(6327580.9458',2128472.1271')	(6327119.8788',2129082.9917')

SECONDARY ENTRY ROAD ALIGNMENT DATA

No.	Type	Length	Radius	Direction	Start Station	End Station	Delta angle	Chord length	Chord Direction	Start Direction	End Direction	Start Point	End Point
1	Curve	94.84'	100.00'		154+99.19'	155+94.03'	54.3373 °	91.32'	N81° 16' 47"W	S71° 33' 06"W	N54° 06' 40"W	(6328305.0029',2128926.1097')	(6328214.7364',2128939.9553')
2	Line	901.76'		N54° 06' 40"W	155+94.03'	164+95.79'						(6328214.7364',2128939.9553')	(6327484.1753',2129468.5799')

90% SUBMITTAL – NOT FOR CONSTRUCTION

R.C.W.D. RECORD DWG NO.

REVISIONS			
NUMBER	DATE	INITIALS	DESCRIPTION

SCALE AS SHOWN

DESIGNED XXX

DRAWN XXX

CHECKED XXX

AECOM
999 TOWN & COUNTRY ROAD
ORANGE, CA 92868
TEL (714) 567-2400

Rancho Water
Rancho California Water District
42135 Winchester Road
Temecula, CA 92590
Phone: (951) 296-6900 Fax: (951) 296-6863

RANCHO CALIFORNIA WATER DISTRICT
APPROVED FOR CONSTRUCTION

Engineering Manager Date

Engineering Date

RANCHO CALIFORNIA WATER DISTRICT
VAIL DAM SEISMIC AND HYDROLOGIC REMEDIATION PROJECT
PROJECT NO. D1911

ALIGNMENT DATA TABLES

SHEET
C-24
SHEET 66 OF XX

Appendix 3: Soils Information

Geotechnical Study, Other Infiltration Testing Data, and/or Other Documentation

Geotechnical Study/Report is available upon RCWD request.



Geotechnical Data Report Vail Dam Seismic and Hydrologic Remediation Project

(Volume 1 of 2)

Prepared for:
Rancho California Water District
42135 Winchester Road
Temecula, California
RCWD Project No. D1911

Prepared by:
AECOM Technical Services, Inc.
Orange, California
AECOM Project No. 60580537

December 12, 2021

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AECOM
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Orange, CA 92868
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714-567-2400 tel
714-567-2594 fax

December 12, 2021

Mr. Jacob Wiley, P.E.
Rancho California Water District
42135 Winchester Road
Temecula, California 92390

Subject: **Geotechnical Data Report**
Vail Dam Seismic and Hydrologic Remediation Project
Riverside County, California
AECOM Project No. 60580537
District Project No. D1911

Dear Mr. Wiley:

This letter transmits the Geotechnical Data Report (GDR) for the Vail Dam Seismic and Hydrologic Remediation Geotechnical Investigation. This investigation was completed in accordance with the Rancho California Water District (District) agreement dated March 27, 2017. The test pits performed in 2021 were completed in accordance with Amendment No. 4 of the District's agreement dated June 20, 2018.

The investigations that are summarized in this report were performed to support the design of the proposed new dam downstream of the existing dam. The geotechnical data presented herein provides the necessary geologic/geotechnical information for design of the Roller Compacted Concrete (RCC) dam that is proposed for the project. The investigations included a proposed borrow area for the RCC aggregates. This proposed borrow area, which was investigated in an earlier phase of the project, is no longer being considered as an aggregate source for the RCC. The investigations also characterized the geologic materials at the spillway of the dam. The field and laboratory data presented in this GDR provides information needed for the Geotechnical Basis of Design Report (GBDR) which will provide geotechnical recommendations for design of the new dam and the borrow area.

We appreciate the opportunity to be part of this project. If you have any questions, please contact us.

Sincerely,

AECOM Technical Services, Inc.

REGISTERED PROFESSIONAL ENGINEER
LEO DAVID HANDFELT
GE373
Expires 12/31/2022
GEOTECHNICAL
STATE OF CALIFORNIA

Leo D. Handfelt, RGE 373
Senior Principal Engineer

CERTIFIED ENGINEERING GEOLOGIST
CHRISTOPHER W. GOETZ
No.EG 1833
Exp. 1-31-23
STATE OF CALIFORNIA

Christopher W. Goetz, CEG 1833
Principal Geologist

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Appendix 4: Historical Site Conditions

Phase I Environmental Site Assessment or Other Information on Past Site Use

Environmental Site Assessments are available upon RCWD request.

Phase I Environmental Site Assessment Vail Dam Seismic and Hydrologic Remediation Project 37115 De Portola Road Temecula, California

LSA Associates, Inc. and
Rancho California Water District

Project Number: Project Number 60623135

November 2022

Quality Information

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Revision History

Revision	Revision Date	Details	Authorized	Name	Position
01	9/7/22	LSA Review	Project Manager	Jimmy Medellin	Project Manager
02	11/28/22	Final Report	Project Manager	Jimmy Medellin	Project Manager

Distribution List

# Hard Copies	PDF Required	Association / Company Name
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00	01	Rancho California Water District

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Appendix 5: LID Feasibility Supplemental Information

Information that supports or supplements the determination of LID technical feasibility documented in Section D

For the Final WQMP, Appendix 5 may include additional information if available to support Section C & D of the WQMP:

Appendix 6: LID BMP Design Details

BMP Sizing, Design Details and other Supporting Documentation to supplement Section D

Appendix 6 includes the following:

- DCV calculations,
- LID BMP sizing calculations from Exhibit C of the SMR WQMP

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

Legend: Required Entries / Calculated Cells

(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)

Company Name	AECOM	Date	5/1/2020
Designed by		County/City Case No	
Company Project Number/Name			
Drainage Area Number/Name	DMA 1		

Enter the Area Tributary to this Feature A_T = 1.16 acres

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township
Range
Section

Enter the 85th Percentile, 24-hour Rainfall Depth D_{85} = 0.65

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Concrete or Asphalt

Effective Impervious Fraction I_f = 1.00

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ C = 0.89

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ V_u = 0.58 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

V_{BMP} = 2,442 ft^3

Notes:

Appendix 7:
Hydromodification & Critical Coarse Sediment

Supporting Detail for Hydromodification compliance & Exhibit G - CCSY & PSS Areas with the project location.

Following maps are included in this Appendix

- Hydromodification Exemption Exhibit
- Potential Critical Coarse Sediment Yield Area Mapping

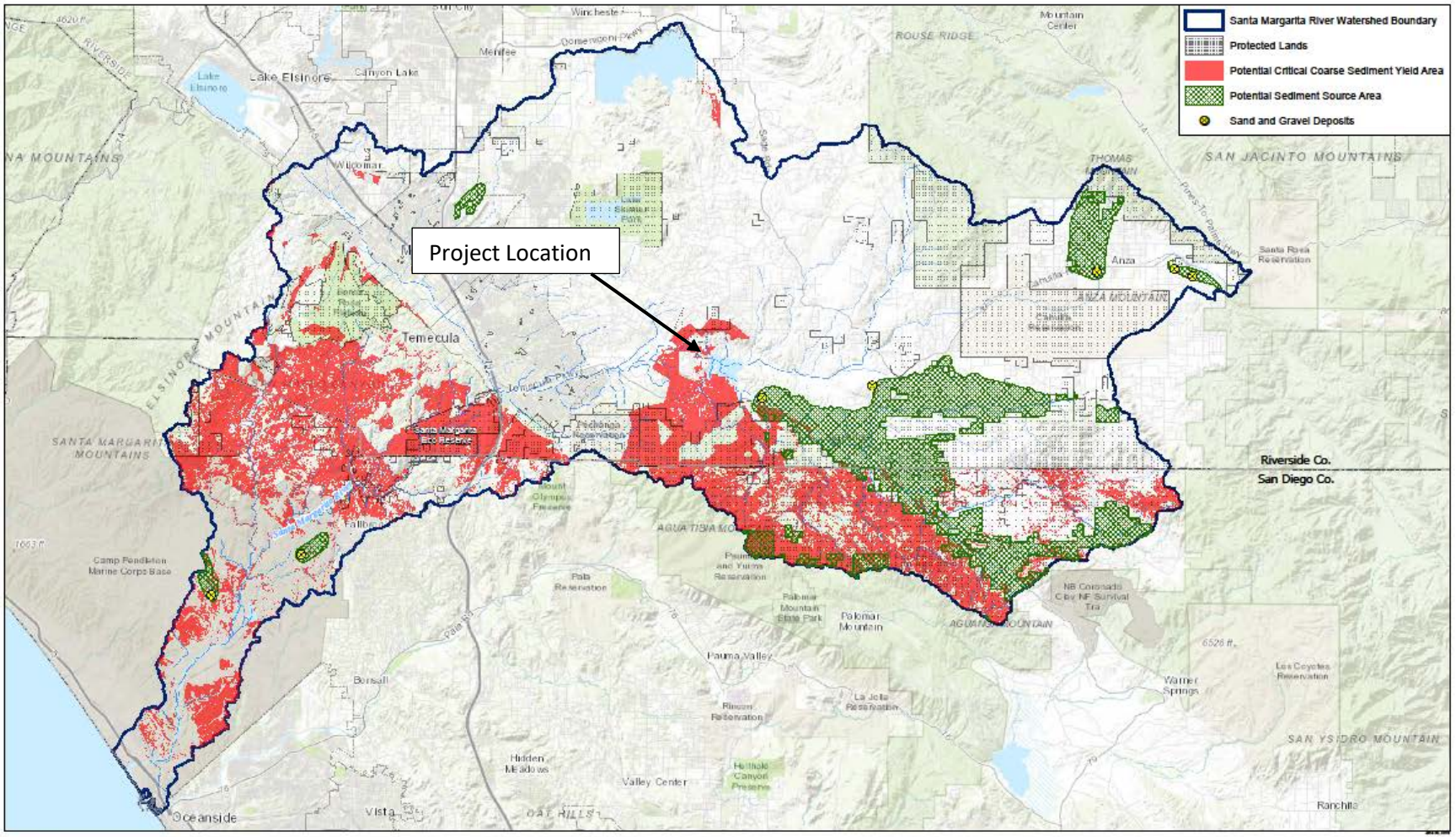
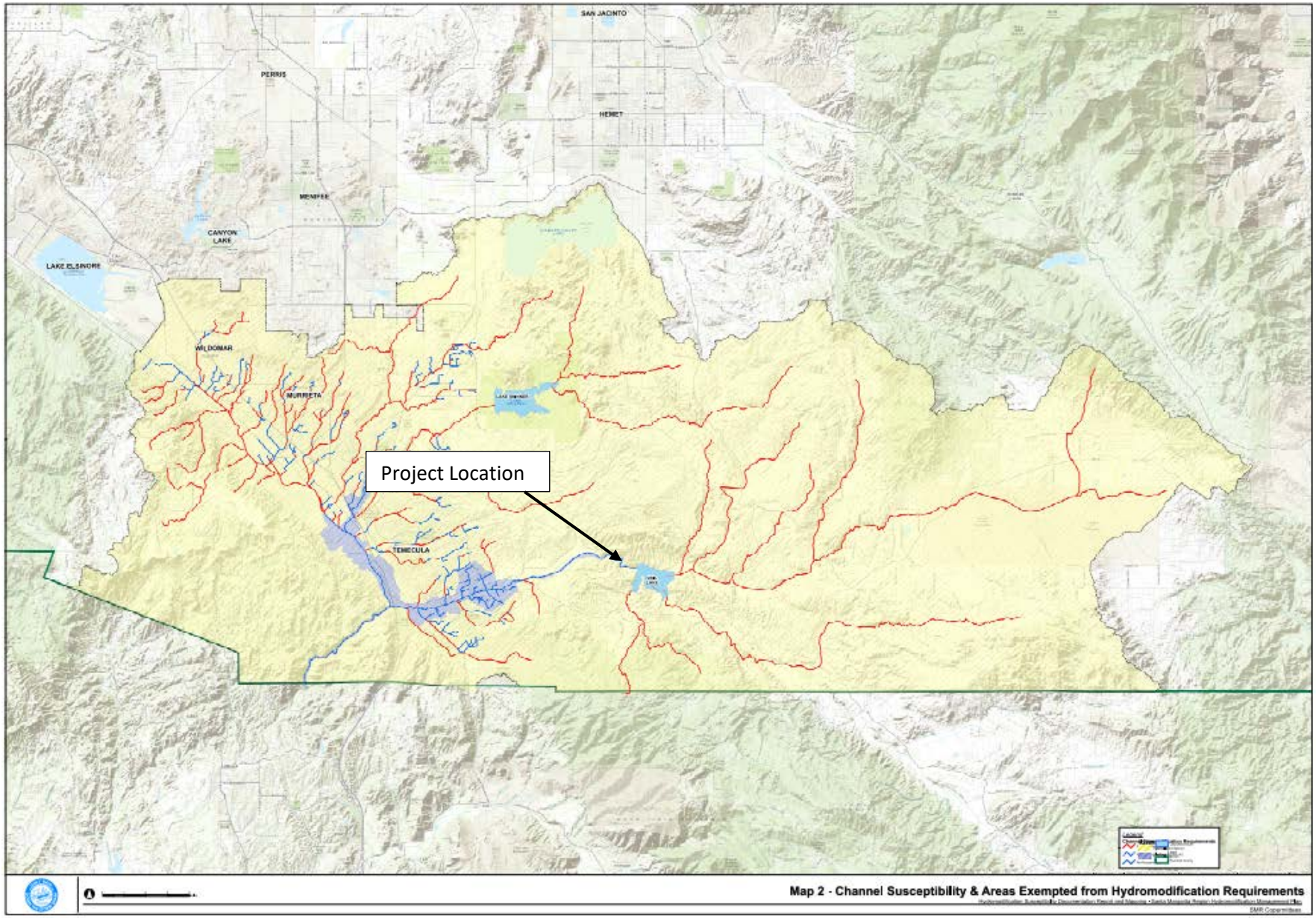


Exhibit G-1

SANTA MARGARITA RIVER WATERSHED
POTENTIAL CRITICAL COARSE SEDIMENT YIELD AREAS AND POTENTIAL SEDIMENT SOURCE AREAS


SAN JACINTO
PERRIS
HEMET
MENIFEE
CANYON LAKE
LAKE ELSINORE
WILDOMAR
MURRIETA
TEMECULA
Project Location
Map 2 - Channel Susceptibility & Areas Exempted from Hydromodification Requirements

Appendix 8: Source Control

Pollutant Sources/Source Control Checklist

For Final WQMP, include Pollutant Sources/Source Control Checklist and summarize Source Control BMPs in Section H of this WQMP.

For Trash Storage Areas refer to CASQA Factsheet SD-32

For Housekeeping Practices refer to CASQA Factsheet SC-60

Appendix 9: O&M

Operation and Maintenance Plan and Documentation of Finance, Maintenance and Recording Mechanisms

For the Final WQMP the following information shall be provided as applicable:

1. Maintenance Plan per Section 5.3.5 of the WQMP Guidance Document. County will regularly inspect BMPs, so BMPs without access will be rejected. Due to liability, the County does not allow for overlapping private maintenance in the public right-of-way.
2. For all projects, include one wet-signed and notarized hardcopy of the BMP Maintenance agreement. Please note, references to Exhibit A and B on Page 1can be struck out if the entire parcel is mentioned in the "Legal Description" on Page 1 of the agreement. Otherwise see below for Exhibit A and B standards. For BMP agreement, ensure that the name on the agreement matches throughout and the notary sheet, Notary shall be the latest California format, the date of the agreement is the date of the notary, all text does not exceed the margins, then the County will sign, attest & record

Appendix 10: Educational Materials

BMP Fact Sheets, Maintenance Guidelines and Other End-User BMP Information

For the Final WQMP, Appendix 10 may include the following:

- BMP Fact Sheets for proposed BMPs form Exhibit C: LID BMP Design Handbook of the SMR WQMP,
- Source control information and training material for site owners and operators,
- O&M training material,
- Other educational/training material related to site drainage and BMPs.

APPENDIX I

NOISE REPORT

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NOISE AND VIBRATION IMPACT ANALYSIS

RANCHO CALIFORNIA WATER DISTRICT

VAIL DAM SEISMIC AND HYDROLOGIC REMEDIATION PROJECT [PROJECT NO. D1911]

RIVERSIDE COUNTY, CALIFORNIA



LSA

October 2022

NOISE AND VIBRATION IMPACT ANALYSIS

RANCHO CALIFORNIA WATER DISTRICT

VAIL DAM SEISMIC AND HYDROLOGIC REMEDIATION PROJECT [PROJECT NO. D1911]

RIVERSIDE COUNTY, CALIFORNIA

Submitted to:

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October 2022

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B: SOUNDPLAN CONSTRUCTION NOISE GRAPHICS

LIST OF ABBREVIATIONS AND ACRONYMS

µin	microinches
µin/sec	microinches per second
ADT	average daily traffic
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
CNEL	Community Noise Equivalent Level
County	County of Riverside
cy	cubic yard(s)
dB	decibel(s)
dBA	A-weighted decibel(s)
DSOD	(California Department of Water Resources) Division of Safety of Dams
EPA	U.S. Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
ft	foot/feet
FTA	Federal Transit Administration
I-15	Interstate 15
in/sec	inch/inches per second
L_{dn}	day-night average noise level
L_{eq}	equivalent continuous sound level
L_{max}	maximum instantaneous noise level
L_V	velocity in decibels

lbs	pounds
NAVD88	North American Vertical Datum of 1988
NEPA	National Environmental Policy Act
OPR	Governor's Office of Planning and Research
OSM	(U.S. Department of the Interior) Office of Surface Mining Reclamation and Enforcement
PMF	Probable Maximum Flood
PPV	peak particle velocity
Proposed Project	Vail Dam Seismic and Hydrologic Remediation Project
RBK	French Valley Airport
RCC	roller compacted concrete
RCWD	Rancho California Water District
RMS	root-mean-square (velocity)
SCE	Southern California Edison
SR-76	State Route 76
SR-79	State Route 79
VdB	vibration velocity decibels
VDC	Valle De Los Caballos

1.0 INTRODUCTION

This Noise and Vibration Impact Analysis has been prepared to evaluate the potential noise and vibration impacts and mitigation measures associated with the proposed Vail Dam Seismic and Hydrologic Remediation Project (Proposed Project) in Riverside County, California. This report is intended to satisfy the County of Riverside's (County) requirements for a project-specific noise and vibration impact analysis by examining the impacts of the proposed uses on the Project site and identifies any necessary mitigation measures to reduce Project noise impacts.

1.1 PROJECT LOCATION AND EXISTING FACILITIES DESCRIPTION

Vail Dam and Vail Lake are located in unincorporated southwestern Riverside County, east of the City of Temecula, in Southern California, as shown in Figure 1, Project Location and Vicinity.

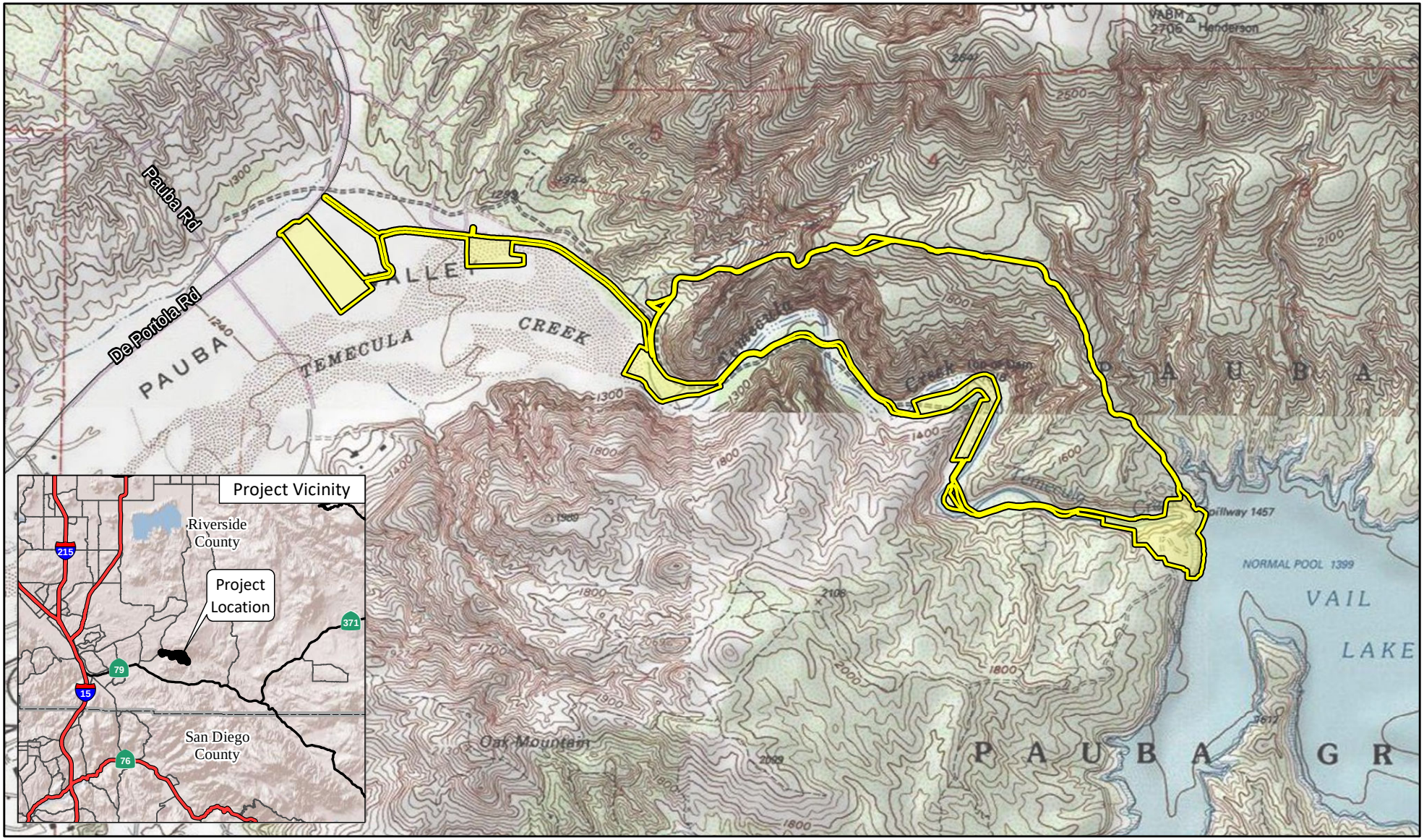
1.1.1 Vail Dam and Reservoir

Vail Lake was created through the construction of the existing Vail Dam by the Vail Company in 1948 and 1949 to store local runoff for irrigation and water supply. The lake and dam were acquired by the Rancho California Water District (RCWD) in 1978 and have been used since that time for water supply and replenishment of RCWD's groundwater basins. In addition, Vail Dam has provided passive downstream flood protection for the City of Temecula and the United States Marine Corps Base Camp Pendleton under more frequently recurring storm conditions. Vail Lake is also utilized for recreation.

Vail Dam spans Temecula Creek, a northwesterly draining tributary of the Santa Margarita River that drains the north side of Palomar Mountain. The existing Vail Dam is a concrete arch dam spanning between concrete and rock abutments[1], approximately 120 feet (ft) high in the middle. The dam has a maximum height of 152 ft from the dam crest to the lowest point in the foundation and has a 3.5 ft high concrete parapet wall extending above the upstream dam crest. The dam has eight outlets, including a low-level outlet. Access to the dam is currently available from De Portola Road via the Upper Valle De Los Caballos (VDC) Pond Access Road, and from that point, along the Canyon Access Road to access the left side of the dam or the North Access Road to access the right side of the dam. The left side of the dam can also be accessed from State Route 79 (SR-79) at Vail Lake Road, then via the campground area to Vail Dam Road (a gated access road) and then to the South Access Road.

Vail Lake impounds up to 42,680 acre-feet (ac-ft) of water with the reservoir at the spillway crest. The reservoir has a 318-square-mile drainage area, which rapidly fills the reservoir in wet years.

[1] Abutment refers to the substructure at each end of the dam. Left or right side refers to the side when looking downstream.



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Project Location

FIGURE 1

0 1000 2000

FEET

SOURCE: USGS 7.5' Quad - *Bachelor Mtn, CA* (1978), *Pechanga, CA* (1988), *Sage, CA* (1954), and *Vail Lake, CA* (1988); AECOM (6/2022)

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Vail Dam Seismic and Hydrologic Remediation Project

Project Location and Vicinity

Water released from Vail Lake is typically re-stored in the Pauba Valley groundwater basin via the Upper VDC Recharge Basins. The average water level from 1978 (the year during which RCWD took ownership of Vail Dam) through May 2020 has been 1,445.1 ft NAVD88.[2] The operating level of the reservoir is dependent on a variety of factors, including restrictions on pumping into the reservoir to prevent the introduction of quagga mussel,[3] requirements to recharge groundwater to reduce evaporation of stored water, mandated releases between May and October to maintain the water flow in the creek, and the amount of precipitation.

1.2 PROPOSED PROJECT DESCRIPTION

RCWD proposes to remediate seismic and hydrologic hazards associated with the existing Vail Dam, a concrete arch dam, by constructing a new straight-axis gravity concrete dam[4] immediately downstream of the existing dam. The new dam would connect to the existing concrete dam abutments and would be 6.8 ft higher than the original dam in order to route the Probable Maximum Flood (PMF) entirely through the existing spillway system. The maximum water level in the reservoir would remain at the spillway elevation of 1,472.6 NAVD88. A 3.5 ft high parapet wall would be located on both sides of the crest. Reservoir water would not normally be against the upstream parapet wall, but the parapet wall would prevent overtopping of the dam during the PMF. The downstream parapet wall would be constructed to serve primarily as a guardrail for vehicles traversing the crest.

The width of the dam crest (between parapet walls) would be 16 ft to 20 ft. The crest width would allow vehicular access for construction and maintenance of the dam structure. Vehicular access would be provided by wrapping the dam around the existing right gravity abutment and providing access from the North Access Road (see below for additional description of access roads). The existing left gravity abutment downstream of the new dam would also need to be raised. The surface area of the lake would increase slightly (approximately 0.66 acre) with the addition of the area between the existing arch dam and the proposed straight-axis gravity dam.

The upstream face of the new gravity dam would be vertical. The downstream face of the dam would be stepped concrete. The new dam would include new outlet works that would be designed to meet the emergency reservoir drawdown requirements. The existing spillway would be used as the spillway for the new gravity dam. A concrete apron would be installed to armor the area below the existing ogee[5] weir[6] and overpour weir within the spillway. Figure 2, Project Plans, shows the elements of the Proposed Project.

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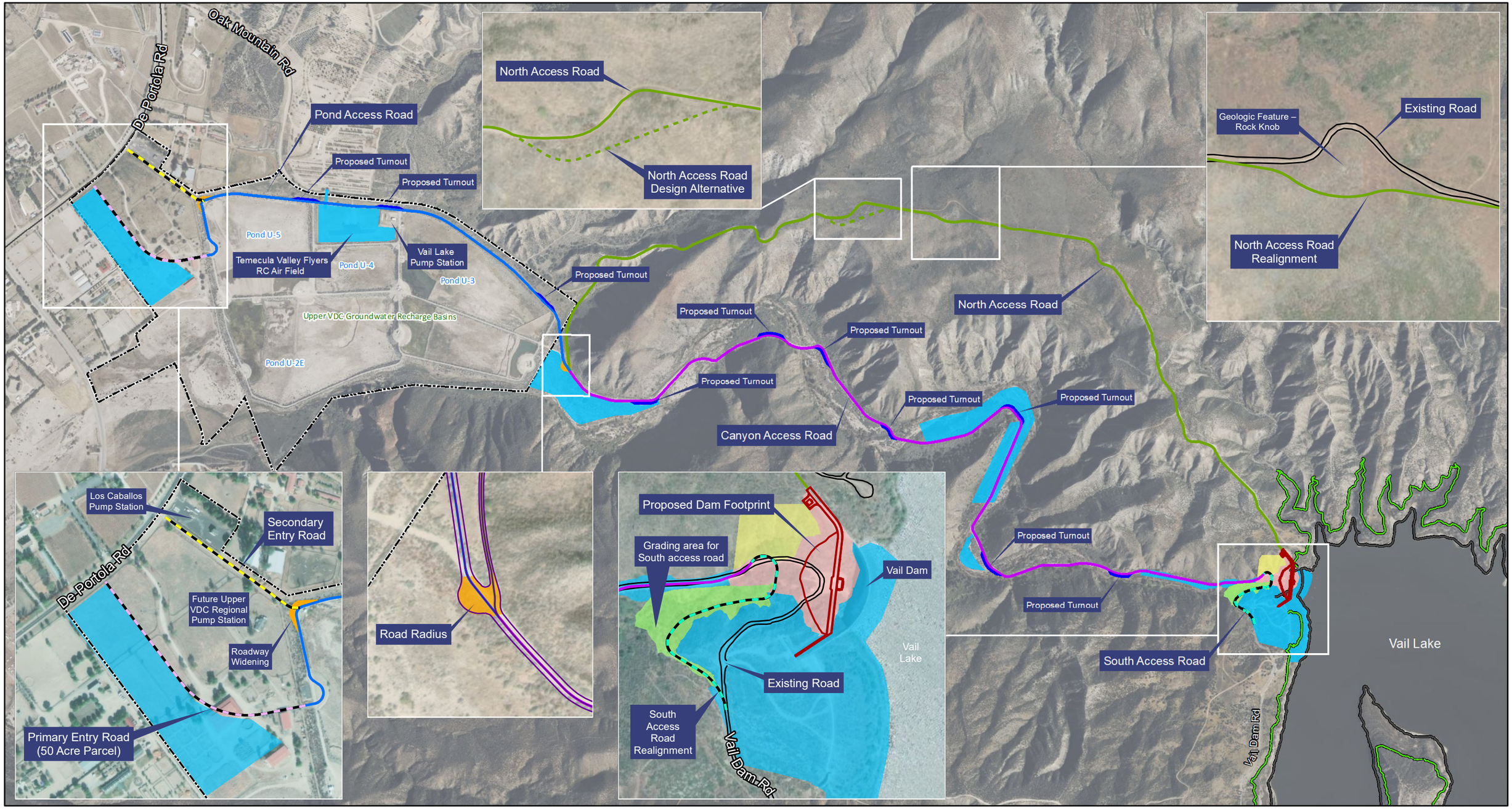
2 NAVD88 = North American Vertical Datum of 1988.

3 The quagga mussel is an aquatic invasive species, which is known to clog water intake structures (e.g., pipes and screens), disrupt native ecosystems, and inhibit recreational activities.

4 A gravity dam is a designed to hold back water primarily by using the weight of the dam material to resist the horizontal water pressure. Each gravity dam section is designed to be stable and independent of any other dam section.

5 Ogee refers to the weir shape. An ogee is a curve shaped similar to the letter S, consisting of two arcs that curve in opposite directions.

6 A weir is a dam across the width of a river or stream to raise the water level or divert its flow.



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- Canyon Access Road
- North Access Road
- North Access Road Design Alternative
- Primary Entry Road (50 Acre Parcel)
- Secondary Entry Road
- Pond Access Road
- Realigned South Access Road
- Proposed Truck Turnout
- Roadway Radius
- Proposed Dam Footprint
- Property Boundary
- Dam Construction Area
- South Access Road Construction Area
- Staging and Laydown Area
- Temporary Construction Area
- Spillway Crest Elevation (1472.6' NAVD88)
- Current Water Level (1428.2' NAVD88)

0 500 1000
FEET

SOURCE: Bing Maps (2020); AECOM (6/2022)

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FIGURE 2

Vail Dam Seismic and Hydrologic Remediation Project

Project Plans

Construction materials and methods used for the Proposed Project would take into account local seismic activity. The added straight-axis concrete gravity structure would be constructed of roller compacted concrete (RCC).

In addition to the proposed straight-axis gravity concrete dam, the Proposed Project includes improvements to several existing unpaved access roads to Vail Dam (via De Portola Road and SR-79), provision for on-site construction staging and material disposal areas, rerouting of Southern California Edison (SCE) electrical lines, and partial demolition of the existing arch dam.

1.2.1 Access Roads

Existing on-site roadways that provide access from De Portola Road to the dam include the Secondary Entry Road (the existing, unpaved access road from De Portola Road to the Pond Access Road), the Pond Access Road, the Canyon Access Road, and the North Access Road. The South Access Road connects to Vail Dam Road, providing access to Vail Lake Road (which connects to SR-79) via the campground area. Construction access from SR-79 is limited to delivery of modular barges to Vail Lake; improvements to the South Access Road would consist of realigning the existing road, and no improvements are proposed to Vail Dam Road or Vail Lake Road. Oak Mountain Road, an existing private dirt road accessed off De Portola Road, would not be used for construction access. Improvements would be required to existing access roads to accommodate construction traffic; however, no improvements to public roadways are required. Refer to Figure 2, Project Plans, for a depiction of the construction areas, as well as Project access.

One new road segment would be constructed. The Primary Entry Road (50 Acre Parcel) is a proposed alternate access point from De Portola Road which would connect to the Pond Access Road at the edge of the Upper VDC Recharge Basins. Once the Primary Entry Road (50 Acre Parcel) has been completed, all construction access for the Project area would be provided along that route. The existing Secondary Entry Road at De Portola Road would provide a secondary access point for RCWD light-duty service vehicles. RCWD intends to maintain both the Primary Entry Road (50 Acre Parcel) and the Secondary Entry Road after completion of the Proposed Project. Improvements are described in more detail below.

1.2.1.1 Primary Entry Road (50 Acre Parcel)

The Primary Entry Road (50 Acre Parcel) is a short segment across the RCWD's 50 Acre Parcel that would connect the Pond Access Road to De Portola Road (an existing, paved roadway) and would be constructed within property owned by RCWD, south of the future Upper VDC Regional Pump Station and Chlorine Contact Tank Project (RCWD Project No. D1903) to avoid conflict with that project. The first order of work will be to construct this access road for construction access to the dam. The Primary Entry Road (50 Acre Parcel) would provide two travel lanes (25 ft total width) and include gravel surfacing, and it would also provide access to one of the construction staging areas. RCWD would demolish one unused building, formerly a horse stable, to allow construction of the Primary Entry Road.

1.2.1.2 Secondary Entry Road

An existing unpaved access road from De Portola Road located adjacent to RCWD's Los Caballos Pump Station will continue to provide access for RCWD vehicles only from De Portola Road to the Pond Access Road. This unpaved roadway is 20 ft wide in the existing condition; improvements would be limited to scraping the surface and placing a 4-inch gravel wear surface within the existing road limits. This road would be used during daytime hours and would not provide routine construction access. Construction-related activities would be limited to installation of a noise barrier and potential occasional delivery of oversized equipment; daily construction traffic would be routed along the Primary Entry Road (50 Acre Parcel). Upon completion of the Primary Entry Road, the Secondary Entry Road would no longer be used for routine construction access.

1.2.1.3 North Access Road

An existing unimproved North Access Road traverses approximately 2 miles from the northeast corner of the Upper VDC percolation ponds to the right abutment of the existing dam. The existing connection between the North Access Road and the Pond Access Road would be improved to facilitate the turning radius of a truck with a 40 ft wheelbase. The details of the proposed improvement to this area are shown on Figure 2. The existing North Access Road would be improved to provide vehicular access to the crest of the proposed dam. The North Access Road would be the primary vehicular access route to the crest of the proposed dam after Project completion. Vehicular access is not feasible from the left abutment due to the height of the existing left gravity abutment.

Project improvements would include gravel surfacing and improvement of drainage. The road would remain a single-lane road. As shown in Figure 2, realignment would be needed where the road is outside of the property boundary and where excavation through a rock knob would be required.

1.2.1.4 Canyon Access Road

The existing unpaved access road through the canyon below the dam is approximately 2 miles long and is currently a single-lane road bound on both sides by vegetation with limited sight lines (Figure 2)**.** This access road would need to be widened to two lanes (25 ft total width) for construction traffic, with several turnouts to allow vehicles to pass. Widening would be accomplished through removal of the existing vegetation on both sides of the current roadway. This widening would be only for the purpose of construction, and the sides of the access road would be revegetated after the completion of construction. The roadway would be restored to its existing single-lane configuration after construction of the dam is complete. Other improvements to the Canyon Access Road would include gravel surfacing, which would remain within the single-lane road following construction. The existing five Arizona type crossings of the creek would remain. However, temporary culverts or placement of clean rock within the channel may be required during construction at the five Arizona crossings to provide adequate support for construction vehicle crossings. Any temporary culverts or fill would be removed following completion of construction, and the creek would be restored to approximate pre-Project contours and habitat conditions or better. Within approximately 550 feet of the new dam, the elevation of the Canyon Access Road would be raised by up to 7 feet to avoid overtopping during high-volume lake water release. Vegetated riprap would be placed within the Temecula Creek channel along the southern side of the raised road portion to reduce potential erosion.

1.2.1.5 Pond Access Road

The Pond Access Road is an existing unpaved road providing access to the Upper VDC Recharge Basins and connecting to the North Access Road and Canyon Access Road. It is 20 to 25 ft wide in the existing condition. The roadway surface would be scraped or lightly graded to smooth the roadway surface, and vegetation that has encroached onto the roadway from the slopes of the road would be removed as part of the Proposed Project. Vegetated slopes on the sides of the roadway would not be scraped or graded. The Pond Access Road would not be widened as part of the Proposed Project with the exception of three turnouts to allow trucks to pass and a small area near the northeast corner of the ponds where there is insufficient turning radius for the larger trucks turning onto the North Access Road. At the maximum curve, this area would be widened from approximately 25 ft (including shoulders) to 50 ft as part of the Proposed Project; the location of the widening is shown on Figure 2. The Pond Access Road would provide two travel lanes for light utility vehicles and one travel lane for the heavy hauling trucks. During construction, on-site construction flag persons may be required to facilitate heavy hauling truck use of the Pond Access Road.

1.2.1.6 South Access Road

The existing South Access Road connects to Vail Dam Road, which is a gravel one-lane roadway used by RCWD service vehicles that connects to Vail Lake Road via the campground (this route would not be used for construction purposes except as a possible delivery route for the modular barge system). The South Access Road would need to be relocated as it is within the footprint of the foundation excavation of the new dam. A new roadway embankment would be constructed along the north-facing slope of the canyon, approximately 150 ft downstream of the existing access road. The proposed realignment of the new South Access Road is shown on Figure 2. This location was selected to provide access from the spillway area and to provide a construction staging area immediately downstream of the new dam. After relocation, the South Access Road would maintain a connection to Vail Dam Road for use by RCWD service vehicles. Following construction, the graded slopes on the side of the South Access Road would be revegetated with appropriate native vegetation. Vegetated riprap would be placed at the foot of the embankment that would support the realigned road to reduce potential erosion associated with the release of water from the dam from Vail Lake into Temecula Creek.

It is anticipated that the South Access Road embankment would be constructed using materials excavated from the new dam foundation. This road would also have gravel surfacing and drainage improvements. The South Access Road would be inundated in the event the reservoir spills; therefore, during operation, major erosion would need to be repaired on this road in the event of spill events. Implementation of the Project would give RCWD greater control over the lake water level in the event of an emergency release and would substantially decrease the likelihood of a spill event. Therefore, damage to the South Access Road during a major weather event is considered to be a low risk.

1.2.2 Construction Staging and On-Site Disposal

The site development would include staging areas to support construction and demolition activities. Material disposal areas are also planned for placement of excess foundation excavation spoils. It is currently estimated that dam construction would require approximately 81,600 cubic yards (cy) of

RCC, which would utilize approximately 147,000 tons of aggregate that would need to be imported and stored on site prior to use. However, this volume would increase if additional foundation excavation is required to enhance the seismic response of the dam. Potential quarries for aggregate include a quarry located in the community of Fallbrook east of Interstate 15 (I-15) along State Route 76 (SR-76), approximately 25 miles from the Project site, as well as a quarry located in the City of Corona. Concrete and cement would also be imported from the City of Victorville. Fly ash, a byproduct of coal power generation, would be imported from out of state.

1.2.2.1 Staging Areas

Limited area is available immediately adjacent to the proposed dam and downstream due to the narrow width of this portion of the canyon. Therefore, staging areas have been identified in various locations, including the relatively level area downstream of the spillway, wider portions of the canyon downstream of the dam, within a vacant portion of RCWD's property adjacent to De Portola Road, and within the Temecula Valley Flyers RC Air Field ("Flyers Field") north of Basin U-4 in the Upper VDC Recharge Basins, which is currently leased to the Temecula Flyers for remote-controlled aircraft use. The proposed staging areas are shown on Figure 2. Staging areas include aggregate stockpile areas, laydown areas, and access and staging areas. It is anticipated that the Project contractor would determine the optimal locations within the staging areas for each activity. Staging areas would be required to provide the following:

1. **RCC Mix Plant Area:** This area would contain a portable concrete mix plant (RCC batch plant) with silos of cement and fly ash and stockpiles of aggregate in 3 to 4 sizes. This mix plant area is anticipated to be located at the Flyers Field (see Figure 2) in the Upper VDC Recharge Basins. The RCC would be hauled from the mix plant to the dam site with off-road trucks.
2. **Foundation Grout Mix Plant:** This area would contain a small mix plant for the grout used in the foundation grouting. This grout mix plant would be located adjacent to the dam site.
3. **Crushing Plant:** This area would contain a portable rock crushing plant for crushing materials excavated from the dam foundation. Because of the limited space available adjacent to the dam, it is likely that the crushing plant would be located in a mid-canyon area.
4. **Contractor Trailers:** Both the contractor's and engineer's field offices would be located within staging areas.
5. **Laydown Areas:** These areas would provide material laydown/storage areas and space for activities such as fabricating rebar and assembling concrete forms, etc.
6. **Crane Access Areas:** Portions of the staging and laydown area near the dam spillway may be graded to provide flat areas for crane access during the partial demolition of the existing arch dam. Cranes may be used to lift modular barge components from flatbed trucks into the lake and to move demolition debris from barges onto trucks for disposal.
7. **Topsoil Stockpile Areas:** Topsoil from areas within the impact limits that support native vegetation will be salvaged and stockpiled during construction. Following construction, the salvaged topsoil will be spread onto areas to be restored to native habitat

1.2.2.2 Disposal Areas

As discussed previously, approximately 64,900 cy of materials (including the previous foundation spoils, alluvium, fill, and moderately weathered rock) would be generated from excavation for the dam foundation. Most of this material would be used to grade the new alignment of the South Access Road and to provide flat areas near Vail Dam to support crane access for demolition activities. The balance of the excavation materials would require removal from the dam area and subsequent disposal. RCWD currently plans to keep the excess materials on its property for possible future re-use. The disposal areas are anticipated to be located within the staging and laydown area near De Portola Road on RCWD's 50 Acre parcel as shown on Figure 2. Off-site disposal, if needed, would be at a nearby licensed landfill.

1.2.3 Electrical, Mechanical, and Instrumentation for the Dam

The existing dam facilities have overhead electrical service provided by SCE. The existing overhead service would need to be rerouted to accommodate the footprint of the new dam and outlet works facilities. New power poles would be provided to route the existing service up the downstream side of the right abutment to the new Dam Control Building. All new electrical utility facilities would be designed per SCE standards. Power is used for lighting, security cameras, gate actuators, trash rack hoists, and monitoring and control systems.

1.2.4 Existing Dam Demolition

The three central monoliths of the existing arch dam would be partially removed after the new dam and outlet works are functional to allow for hydraulic connection of the reservoir with the new outlet tower. The remainder of the existing arch dam would remain in place. The demolition would likely include saw cutting the arch monoliths into manageable sizes that can be removed with a barge-supported crane. Auxiliary barges would transport the demolition debris to the shoreline, likely to the spillway staging area. All the demolition debris will be removed from the site for off-site disposal via the Canyon Access Road. It is anticipated that the demolition will occur over a period of 3 to 4 months.

It is anticipated that the contractor would support the demolition equipment on a modular pontoon system that would be trucked to the site and then assembled to form a larger barge. Multiple barges may be required to transport equipment and demolition debris to/from the shoreline and the dam. The barges could be launched from the existing launch ramp (in the southeast part of the reservoir) or lofted into the reservoir with a crane located in the staging area planned in the spillway area. Use of the existing launch ramp will not be feasible if the water level in the reservoir is too low. No improvements are planned to the existing launch ramp, Vail Lake Road (the access road to the ramp), or Vail Dam Road. Any grading performed in the vicinity of the staging area to prepare a flat area for crane access will use on-site materials (e.g., dam foundation excavation materials) and will be restored with native vegetation at the end of the demolition.

It is estimated the barge mobilization and demobilization would require about 10 flatbed truck trips to/from the site. Removing the estimated 1,250 cy of demolition debris would require about 105 trips with dump trucks and would occur via the Canyon Access Road.

Demolition of the existing gravity abutments would occur where the new dam contacts the abutments. This would consist of hydroblasting and removing 2–3 inches of concrete on the sloping downstream faces of the abutments and removing the upper 6 inches of the crests of both the right and left gravity abutments.

1.2.5 Spillway Modifications

The existing spillway would be used as the spillway for the new gravity dam. Concrete aprons would be installed to armor the area below the ogee and overpour weirs.

1.2.6 Construction Schedule

Construction of the new dam is anticipated to be initiated in the fall of 2023 and completed in late 2025. It is anticipated that the new dam and outlet works would be substantially complete in approximately 23 months. The existing dam would then be partially demolished after completion of the tower, and it is expected that construction would be complete in approximately 31 months (Preliminary Design Report (30% Design), AECOM 2019). Once the Proposed Project is complete, Vail Lake and Vail Dam would not require any part-time construction workers or full-time, dedicated RCWD staff on site. The Project would be constructed in 14 phases as shown in Table A, below. Overlapping phases are shown in Table B, below.

Table A: Construction Phase Timetable

Phase Number	Description	Duration
1	Mobilization	16 Weeks (Months 1–4)
2	Access Roads and Staging Areas	24 Weeks (Months 2–8)
3	Demolition of Facilities at New Dam	10 Weeks (Months 5–9)
4	Foundation Excavation	48 Weeks (Months 5–16)
5	Temporary Energy Dissipation Vault	18 Weeks (Months 5–9)
6	Armor Spillway	6 Weeks (Months 8–10)
7	Foundation Treatment and Grouting	20 Weeks (Months 10–15)
8	Roller-Compacted Concrete Placement	31 Weeks (Months 12–19)
9	Outlet Tower	28 Weeks (Months 17–23)
10	Dam Drainage	19 Weeks (Months 18–22)
11	Dam Instrumentation	10 Weeks (Months 22–24)
12	Permanent Energy Dissipation Vault	8 Weeks (Months 23–25)
13	Demolition of Existing Facilities	19 Weeks (Months 25–29)
14	Site Reclamation and Demobilization	6 Weeks (Months 30–31)

Source: AECOM (2020).

Table B: Overlapping Construction Phases

Overlapping Phases	Duration
1 and 2	10 Weeks (Months 2–4)
3, 4, and 5	6 Weeks (Months 5–6)
7 and 8	8 Weeks (Months 13–15)
8 and 9	4 Weeks (Months 17–18)
8, 9, and 10	11 Weeks (Months 18–20)
9 and 10	5 Weeks (Months 21–22)
9, 10, and 11	2 Weeks (Month 22)
9 and 11	4 Weeks (Months 22–23)
11 and 12	7 Weeks (Months 23–24)

Source: AECOM (2020).

1.3 EXISTING LAND USES IN THE PROJECT AREA

The Project site is surrounded primarily by residential uses and vacant land. Numerous hiking, equestrian, and mountain biking trails occur within the surrounding area. The land uses in proximity to the Project are as follows:

- **North:** NexStar Ranch (horse ranch, residential), agricultural areas, and undeveloped areas; equestrian trails north of and outside of the Upper VDC Recharge Basins to the Secondary Entry Road and via RCWD property along the south side of the NexStar Ranch property to Oak Mountain Road
- **East:** Vail Lake, including boat launch
- **South:** Rancho Pacifica Ranch (horse ranch, residential), Vail Lake Village and RV Resort and associated recreational facilities
- **West:** Residential (single-family homes) west of De Portola Road

Of the abovementioned land uses, the areas comprised of horse ranches and residential uses are considered noise sensitive.

2.0 NOISE AND VIBRATION FUNDAMENTALS

2.1 STATE OF CALIFORNIA

The Governor's Office of Planning and Research (OPR) Noise Element Guidelines of the State of California General Plan Guidelines (2017) include recommended exterior and interior noise level standards for local jurisdictions to identify and prevent the creation of incompatible land uses due to noise. The Noise Element Guidelines contain a land use compatibility table that describes the compatibility of various land uses with a range of environmental noise levels in terms of the community noise equivalent level (CNEL).

2.1.1 Characteristics of Sound

Noise is usually defined as unwanted sound. Noise consists of any sound that may produce physiological or psychological damage and/or interfere with communication, work, rest, recreation, and sleep.

To the human ear, sound has two significant characteristics: pitch and loudness. Pitch is generally an annoyance, while loudness can affect the ability to hear. Pitch is the number of complete vibrations, or cycles per second, of a sound wave, which results in the tone's range from high to low. Loudness is the strength of a sound, and it describes a noisy or quiet environment; it is measured by the amplitude of the sound wave. Loudness is determined by the intensity of the sound wave combined with the reception characteristics of the human ear. Sound intensity refers to the power carried by sound waves per unit area in a direction perpendicular to that area. This characteristic of sound can be precisely measured with instruments. The analysis of a project defines the noise environment of the project area in terms of sound pressure level and its effect on adjacent sensitive land uses.

2.1.2 Measurement of Sound

Sound pressure level is measured with the A-weighted decibel scale to correct for the relative frequency response of the human ear. That is, an A-weighted noise level de-emphasizes low and very high frequencies of sound, similar to the human ear's de-emphasis of these frequencies. Decibels, unlike linear units (e.g., inches or pounds), are measured on a logarithmic scale representing points on a sharply rising curve.

For example, 10 decibels (dB) is 10 times more intense than 1 dB, 20 dB is 100 times more intense than 1 dB, and 30 dB is 1,000 times more intense than 1 dB. Thirty decibels (30 dB) represents 1,000 times as much acoustic energy as 1 dB. The decibel scale increases as the square of the change, representing the sound pressure energy. A sound as soft as human breathing is about 10 times greater than 0 dB. The decibel system of measuring sound gives a rough connection between the physical intensity of sound and its perceived loudness to the human ear. A 10 dB increase in sound level is perceived by the human ear as only a doubling of the sound's loudness. Ambient sounds generally range from 30 dB (very quiet) to 100 dB (very loud).

Sound levels are generated from a source, and their decibel level decreases as the distance from that source increases. Sound levels dissipate exponentially with distance from their noise sources.

For a single point source, sound levels decrease approximately 6 dB for each doubling of distance from the source. This drop-off rate is appropriate for noise generated by stationary equipment. If noise is produced by a line source (e.g., highway traffic or railroad operations) the sound decreases 3 dB for each doubling of distance in a hard site environment. Line source sound levels decrease 4.5 dB for each doubling of distance in a relatively flat environment with absorptive vegetation.

There are many ways to rate noise for various time periods, but an appropriate rating of ambient noise affecting humans also accounts for the annoying effects of sound. The equivalent continuous sound level (L_{eq}) is the total sound energy of time-varying noise over a sample period. However, the predominant rating scales for human communities in the State of California are the L_{eq} and Community Noise Equivalent Level (CNEL) or the day-night average noise level (L_{dn}) based on A-weighted decibels (dBA). CNEL is the time-varying noise over a 24-hour period, with a 5 dBA weighting factor applied to the hourly L_{eq} for noise occurring from 7:00 p.m. to 10:00 p.m. (defined as relaxation hours) and a 10 dBA weighting factor applied to noise occurring from 10:00 p.m. to 7:00 a.m. (defined as sleeping hours). L_{dn} is similar to the CNEL scale but without the adjustment for events occurring during the relaxation and sleeping hours. CNEL and L_{dn} are within 1 dBA of each other and are normally interchangeable. The City uses the CNEL noise scale for long-term noise impact assessment.

Other noise rating scales of importance when assessing the annoyance factor include the maximum instantaneous noise level (L_{max}), which is the highest exponential time-averaged sound level that occurs during a stated time period. The noise environments discussed in this analysis for short-term noise impacts are specified in terms of maximum levels denoted by L_{max}, which reflects peak operating conditions and addresses the annoying aspects of intermittent noise. It is often used together with another noise scale, or noise standards in terms of percentile noise levels, in noise ordinances for enforcement purposes. For example, the L_{10} noise level represents the noise level exceeded 10 percent of the time during a stated period. The L_{50} noise level represents the median noise level. Half the time the noise level exceeds this level, and half the time it is less than this level. The L_{90} noise level represents the noise level exceeded 90 percent of the time and is considered the background noise level during a monitoring period. For a relatively constant noise source, the L_{eq} and L_{50} are approximately the same.

Noise impacts can be described in three categories. The first category includes audible impacts that refer to increases in noise levels noticeable to humans. Audible increases in noise levels generally refer to a change of 3 dB or greater because this level has been found to be barely perceptible in exterior environments. Additionally, an increase of more than 5 dBA is typically considered readily perceptible in an exterior environment. The second category, potentially audible, refers to a change in the noise level between 1 dB and 3 dB. This range of noise levels has been found to be noticeable only in laboratory environments. The last category includes changes in noise levels of less than 1 dB, which are inaudible to the human ear. Only audible changes in existing ambient or background noise levels are considered potentially significant.

2.1.3 Physiological Effects of Noise

Physical damage to human hearing begins at prolonged exposure to sound levels higher than 85 dBA. Exposure to high sound levels affects the entire system, with prolonged sound exposure in excess of 75 dBA increasing body tensions, thereby affecting blood pressure and functions of the heart and the nervous system. In comparison, extended periods of sound exposure above 90 dBA would result in permanent cell damage. When the sound level reaches 120 dBA, a tickling sensation occurs in the human ear, even with short-term exposure. This level of sound is called the threshold of feeling. As the sound reaches 140 dBA, the tickling sensation is replaced by a feeling of pain in the ear (i.e., the threshold of pain). A sound level of 160–165 dBA will result in dizziness or a loss of equilibrium. The ambient or background noise problem is widespread and generally more concentrated in urban areas than in outlying, less-developed areas.

Table C lists definitions of acoustical terms, and Table D shows common sound levels and their sources.

Table C: Definitions of Acoustical Terms

Term	Definitions
Decibel, dB	A unit of sound level that denotes the ratio between two quantities that are proportional to power; the number of decibels is 10 times the logarithm (to the base 10) of this ratio.
Frequency, Hz	Of a function periodic in time, the number of times that the quantity repeats itself in 1 second (i.e., the number of cycles per second).
A-Weighted Sound Level, dBA	The sound level obtained by use of A-weighting. The A-weighting filter de-emphasizes the very low and very high-frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. (All sound levels in this report are A-weighted unless reported otherwise.)
L_{01}, L_{10}, L_{50}, L_{90}	The fast A-weighted noise levels that are equaled or exceeded by a fluctuating sound level 1%, 10%, 50%, and 90% of a stated time period, respectively.
Equivalent Continuous Noise Level, L_{eq}	The level of a steady sound that, in a stated time period and at a stated location, has the same A-weighted sound energy as the time varying sound.
Community Noise Equivalent Level, CNEL	The 24-hour A-weighted average sound level from midnight to midnight, obtained after the addition of 5 dBA to sound levels occurring in the evening from 7:00 p.m. to 10:00 p.m. and after the addition of 10 dBA to sound levels occurring in the night between 10:00 p.m. and 7:00 a.m.
Day/Night Noise Level, L_{dn}	The 24-hour A-weighted average sound level from midnight to midnight, obtained after the addition of 10 dBA to sound levels occurring in the night between 10:00 p.m. and 7:00 a.m.
L_{max}, L_{min}	The maximum and minimum A-weighted sound levels measured on a sound level meter, during a designated time interval, using fast time averaging.
Ambient Noise Level	The all-encompassing noise associated with a given environment at a specified time. It is usually a composite of sound from many sources from many directions, near and far; no particular sound is dominant.
Intrusive	The noise that intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content, as well as the prevailing ambient noise level.

Source: *Handbook of Acoustical Measurements and Noise Control* (Harris 1991).

Table D: Common Sound Levels and Their Noise Sources

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	— 110 —	Rock band
Jet fly-over at 1,000 ft		
	— 100 —	
Gas lawn mower at 3 ft		
	— 90 —	
Diesel truck at 50 ft at 50 mph		Food blender at 3 ft
	— 80 —	Garbage disposal at 3 ft
Noisy urban area, daytime		
Gas lawn mower, 100 ft	**— 70 —**	Vacuum cleaner at 10 ft
Commercial area		Normal speech at 3 ft
Heavy traffic at 300 ft	**— 60 —**	
		Large business office
Quiet urban daytime	**— 50 —**	Dishwasher next room
Quiet urban nighttime	**— 40 —**	Theater, large conference room (background)
Quiet suburban nighttime		
	— 30 —	Library
Quiet rural nighttime		Bedroom at night, concert hall (background)
	— 20 —	
		Broadcast/recording studio
	— 10 —	
Lowest threshold of human hearing	**— 0 —**	Lowest threshold of human hearing

Source: *Technical Noise Supplement to the Traffic Noise Analysis Protocol* (Caltrans, September 2013a).
Caltrans = California Department of Transportation
dBA = A-weighted decibels
ft = foot/feet
mph = miles per hour

2.2 FUNDAMENTALS OF VIBRATION

Vibration refers to ground-borne noise and perceptible motion. Ground-borne vibration is almost exclusively a concern inside buildings and is rarely perceived as a problem outdoors, where the motion may be discernible, but without the effects associated with the shaking of a building there is less adverse reaction. Vibration energy propagates from a source through intervening soil and rock layers to the foundations of nearby buildings. The vibration then propagates from the foundation throughout the remainder of the structure. Building vibration may be perceived by occupants as the motion of building surfaces, the rattling of items sitting on shelves or hanging on walls, or a low-frequency rumbling noise. The rumbling noise is caused by the vibration of walls, floors, and ceilings that radiate sound waves. Annoyance from vibration often occurs when the vibration exceeds the threshold of perception by 10 dB or less. This is an order of magnitude below the damage threshold for normal buildings.

Typical sources of ground-borne vibration are construction activities (e.g., blasting, pile-driving, and operating heavy-duty earthmoving equipment), steel-wheeled trains, and occasional traffic on rough roads. Problems with both ground-borne vibration and noise from these sources are usually

localized to areas within approximately 100 ft from the vibration source, although there are examples of ground-borne vibration causing interference out to distances greater than 200 ft (Federal Transit Administration [FTA] 2018). When roadways are smooth, vibration from traffic, even heavy trucks, is rarely perceptible.

Ground-borne noise is not likely to be a problem because noise arriving via the normal airborne path will usually be greater than ground-borne noise.

Ground-borne vibration has the potential to disturb people and damage buildings. Although it is very rare for train-induced ground-borne vibration to cause even cosmetic building damage, it is not uncommon for construction processes such as blasting and pile-driving to cause vibration of sufficient amplitudes to damage nearby buildings (FTA 2018). Ground-borne vibration is usually measured in terms of vibration velocity, either the root-mean-square (RMS) velocity or peak particle velocity (PPV). The RMS is best for characterizing human response to building vibration, and PPV is used to characterize potential for damage. Decibel notation acts to compress the range of numbers required to describe vibration. Vibration velocity level in decibels is defined as:

$$L_v = 20 \log_{10} [V/V_{ref}]$$

where "L_v" is the vibration velocity in decibels (VdB), "V" is the RMS velocity amplitude, and "V_{ref}" is the reference velocity amplitude, or 1 x 10^{-6} inches/second (in/sec) used in the United States.

- **Vibration Source:** Vehicle suspension, wheel types and condition, railroad track/roadway surface, railroad track support system, speed, transit structure, and depth of vibration source.
- **Vibration Path:** Soil type, rock layers, soil layering, depth to water table, and frost depth.
- **Vibration Receiver:** Foundation type, building construction, and acoustical absorption.

Among the factors listed above, there are significant differences in the vibration characteristics when the source is underground compared to at the ground surface. In addition, soil conditions are known to have a strong influence on the levels of ground-borne vibration. Among the most important factors are the stiffness and internal damping of the soil and the depth to bedrock.

Experience with ground-borne vibration indicates that (1) vibration propagation is more efficient in stiff, clay soils than in loose, sandy soils; and (2) shallow rock seems to concentrate the vibration energy close to the surface and can result in ground-borne vibration problems at large distances from a railroad track. Factors such as layering of the soil and the depth to the water table can have significant effects on the propagation of ground-borne vibration. Soft, loose, sandy soils tend to attenuate more vibration energy than hard, rocky materials. Vibration propagation through groundwater is more efficient than through sandy soils.

3.0 REGULATORY SETTING

As an independent water district, RCWD is not subject to County noise criteria; however, it does not have established noise standards. Furthermore, the Project is federally funded; however, the Federal Emergency Management Agency (FEMA), the National Environmental Policy Act (NEPA) lead agency, also does not have established noise standards. The following standards are presented as a guide for determining California Environmental Quality Act (CEQA) significance. As it relates to noise and vibration, the *Local Guidelines For Implementing the California Environmental Quality Act for Rancho California Water District* (Best Best & Krieger 2022) is consistent with the standard CEQA Appendix G Checklist.

3.1 POTENTIAL NOISE STANDARDS

3.1.1 County of Riverside General Plan

The California Government Code requires that a noise element be included in the general plan of each county and city in the State. The Riverside County General Plan Noise Element (Revised December 8, 2015) evaluates the existing noise environment and future noise environment projections as well as identifies noise-sensitive land uses and major noise sources in the County. The Noise Element provides goals, policies, and implementation programs designed to minimize noise conflicts and protect public health and includes the following applicable policies:

N 1.1: Protect noise-sensitive land uses from high levels of noise by restricting noise-producing land uses from these areas. If the noise-producing land use cannot be relocated, then noise buffers such as setbacks, landscaping, or block walls shall be used.

N 1.2: Guide noise-tolerant land uses into areas irrevocably committed to land uses that are noise-producing, such as transportation corridors or within the projected noise contours of any adjacent airports.

N 1.4: Determine if existing land uses will present noise compatibility issues with proposed projects by undertaking site surveys.

N 1.5: Prevent and mitigate the adverse impacts of excessive noise exposure on the residents, employees, visitors, and noise-sensitive uses of Riverside County.

N 1.6: Minimize noise spillover or encroachment from commercial and industrial land uses into adjoining residential neighborhoods or noise-sensitive uses.

N 13.1: Minimize the impacts of construction noise on adjacent uses within acceptable practices.

N 13.2: Ensure that construction activities are regulated to establish hours of operation in order to prevent and/or mitigate the generation of excessive or adverse noise impacts on surrounding areas.

N 13.4: Require that all construction equipment utilizes noise reduction features (e.g., mufflers and engine shrouds) that are no less effective than those originally installed by the manufacturer.

In addition, the Riverside County Noise Element provides the County's noise standards and land use compatibility standards for normally acceptable conditions, based on State recommendations and County land use designations. The County uses the noise/land use compatibility guidelines presented in Table E and Table F, below. The Land Use Compatibility Standards, which use the CNEL noise descriptor, are intended to be applicable for land use designations exposed to noise levels generated by transportation-related sources while the stationary or non-transportation noise standards rely on an average noise level (L_{eq}).

Table E: County of Riverside Land Use Compatibility for Community Noise Exposure

Land Use	Community Noise Exposure (L_{dn} or CNEL)			
	Normally Acceptable	Conditionally Acceptable	Normally Unacceptable	Clearly Unacceptable
Residential[1]	50–60	60–70	70–75	75–85
Transient Lodging–Motel, Hotels	50–60	60–70	70–80	80–85
Schools, Libraries, Churches, Hospitals, Nursing Homes	50–60	60–70	70–80	80–85
Auditoriums, Concert Halls, Amphitheaters[2]	NA	50–70	NA	70–85
Sports Arenas, Outdoor Spectator Sports[2]	NA	50–75	NA	75–85
Playgrounds, Neighborhood Parks	50–70	NA	67.5–75	72.5–85
Golf Courses, Riding Stables, Water Recreation, Cemeteries	50–70	NA	70–80	80–85
Office Buildings, Business Commercial and Professional	50–65	65–75	75–85	NA
Industrial, Manufacturing, Utilities, Agriculture	50–70	70–80	80–85	NA

Source: *County of Riverside General Plan Noise Element* (County of Riverside 2015).
Notes: NA: Not Applicable, L_{dn} = Day-Night Sound Level, CNEL = Community Noise Equivalent Level
[1] Regarding aircraft-related noise, the maximum acceptable exposure for new residential development is 60dB CNEL.
[2] No normally acceptable condition is defined for these uses. Noise studies are required prior to approval.
Normally Acceptable - Specified land use is satisfactory, based upon the assumption that any buildings involved meet conventional Title 24 construction standards. No special noise insulation requirements.
Conditionally Acceptable - New construction or development shall be undertaken only after a detailed noise analysis is made and noise reduction measures are identified and included in the project design.
Normally Unacceptable - New construction or development is discouraged. If new construction is proposed, a detailed analysis is required, noise reduction measures must be identified, and noise insulation features included in the design.
Clearly Unacceptable - New construction or development clearly should not be undertaken.

Table F: Stationary Source Noise Level Standards[1]

Residential Land Use	Interior Standards L_{eq} (dBA)	Exterior Standards L_{eq} (dBA)
10:00 p.m. to 7:00 a.m.	40 (10-minute)	45 (10-minute)
7:00 a.m. to 10:00 p.m.	55 (10-minute)	65 (10-minute)

Source: *County of Riverside General Plan Noise Element* (County of Riverside 2015).
[1] These are considered preferred standards; final decision will be made by the Riverside County Planning Department and Office of Public Health.
dBA = A-weighted decibels
L_{eq} = equivalent continuous sound level

3.1.2 County of Riverside Municipal Code

To control noise impacts associated with the construction of the Proposed Project, the County of Riverside has established limits to the hours of operation. Section 9.52.020 of the County's Noise Ordinance indicates that noise associated with any private construction activity located within 0.25 mile of an inhabited dwelling is considered exempt between the hours of 6:00 a.m. and 6:00 p.m., during the months of June through September, and 7:00 a.m. and 6:00 p.m., during the months of October through May.

3.1.3 Federal Transit Administration

Because RCWD, FEMA, and the County do not have construction noise level limits, construction noise was assessed using criteria from the *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018). Table G shows the FTA's General Assessment Construction Noise Criteria based on the composite noise levels of the two noisiest pieces of equipment per construction phase.

Table G: General Assessment Construction Noise Criteria

Land Use	Daytime 1-hour L_{eq} (dBA)	Nighttime 1-hour L_{eq} (dBA)
Residential	90	80
Commercial	100	100
Industrial	100	100

Source: *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018).
dBA = A-weighted decibels
FTA = Federal Transit Administration
L_{eq} = equivalent continuous sound level

3.2 APPLICABLE VIBRATION STANDARDS

3.2.1 U.S. Department of the Interior Office of Surface Mining Reclamation and Enforcement

The U.S. Department of the Interior Office of Surface Mining Reclamation and Enforcement (OSM) has established guidelines related to blasting for surface mining activities. The OSM guidelines include requirements that the operator distribute a blasting schedule, post blasting signs, and control access within the blasting area. OSM has established air blast and ground vibration limits at the location of any dwelling, public building, school, church, or community building outside the permit area. The standard PPV damage threshold for residential structures is 2.0 inches per second (in/sec). This requirement is based on the findings and recommendations of several reports made by the former U.S. Bureau of Mines.

3.2.2 Federal Transit Administration

The criteria for environmental impact from ground-borne vibration and noise are based on the maximum levels for a single event. Table H lists the potential vibration building damage criteria associated with construction activities, as suggested in the *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018).

Table H: Construction Vibration Damage Criteria

Building Category	PPV (in/sec)
Reinforced concrete, steel, or timber (no plaster)	0.50
Engineered concrete and masonry (no plaster)	0.30
Non-engineered timber and masonry buildings	0.20
Buildings extremely susceptible to vibration damage	0.12

Source: *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018).
FTA = Federal Transit Administration PPV = peak particle velocity
in/sec = inch/inches per second

FTA guidelines shows that a vibration level of up to 0.5 in/sec PPV (FTA 2018) is considered safe for buildings consisting of reinforced concrete, steel, or timber (no plaster) and would not result in any construction vibration damage. For a non-engineered timber and masonry building, the construction building vibration damage criterion is 0.2 in/sec PPV.

4.0 OVERVIEW OF THE EXISTING NOISE ENVIRONMENT

This section describes the existing noise environment in the Project site vicinity. Noise monitoring and traffic noise modeling were used to quantify existing and future noise levels in the Project study area. In the vicinity of the Project, vehicle traffic on De Portola Road is the primary source of noise. Other local noise sources include aircraft flyovers and sporadic agricultural operations.

4.1 EXISTING NOISE LEVEL MEASUREMENTS

To assess existing noise levels, LSA conducted three long-term noise measurements in the vicinity of the Project site. The long-term noise measurements were recorded from April 14 through April 15, 2020. The long-term noise measurements captured data in order to calculate the hourly L_{eq} and CNEL at each location, which incorporate the nighttime hours. Sources that dominate the existing noise environment include traffic on De Portola Road and occasional aircraft. Noise measurement data collected during the long-term noise monitoring are summarized in Table I. Refer to Figure 3, Noise Monitoring Locations. In addition, noise measurement sheets are provided in Appendix A.

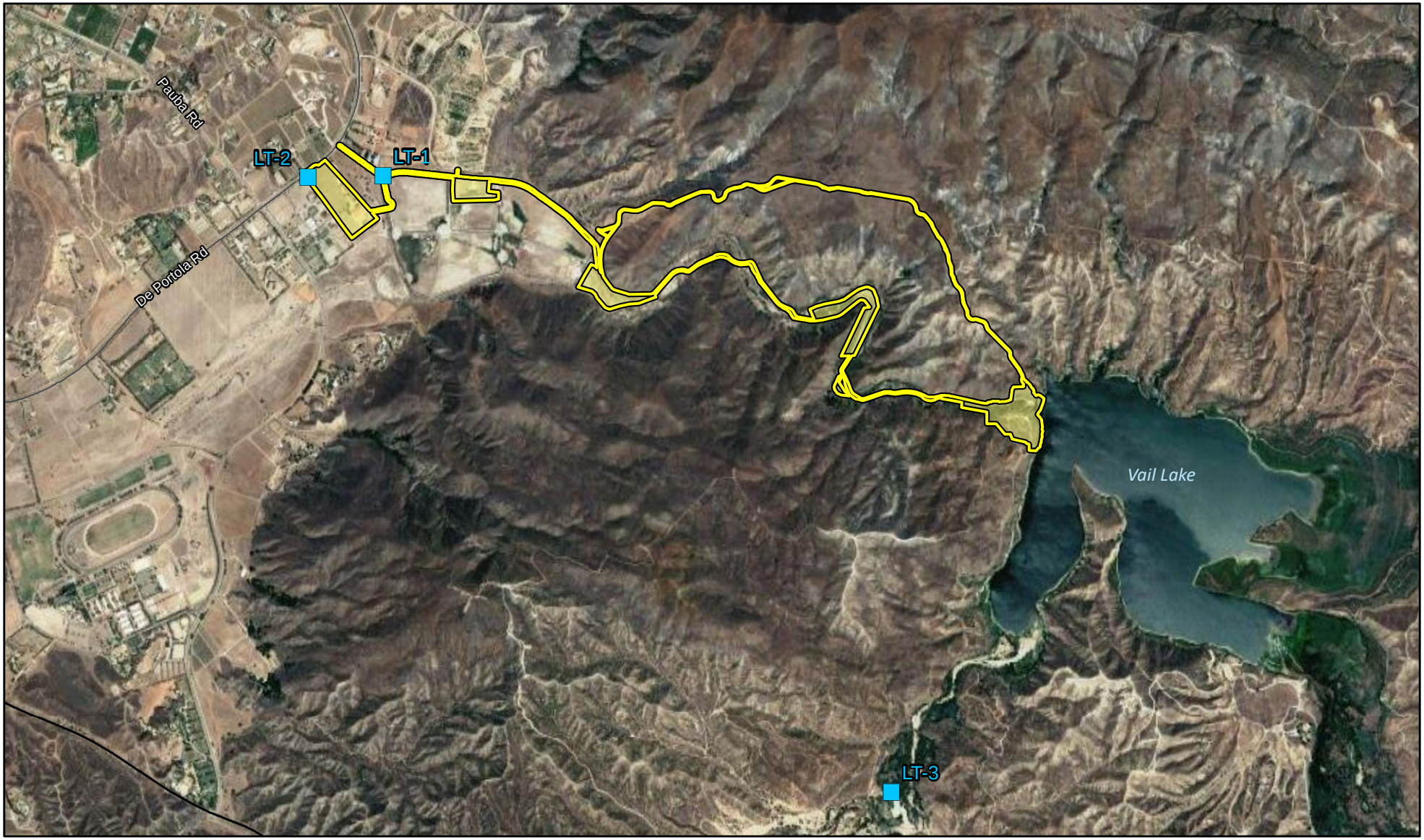
Table I: Existing Noise Level Measurements – Long Term

Location	Description	Daytime Noise Levels[1] (dBA L_{eq})	Evening Noise Levels[2] (dBA L_{eq})	Nighttime Noise Levels[3] (dBA L_{eq})	Daily Noise Levels (dBA CNEL)
LT-1	Located approximately 1,000 ft southeast of De Portola Road near the NexStar Ranch property line	43.8–52.5	44.8–49.9	42.1–51.8	53.3
LT-2	Located approximately 90 ft southeast of De Portola Road and 950 ft northeast of Pauba Road	65.6–70.5	60.1–63.8	49.0–64.8	66.1
LT-3	Located near the northern property line of the existing campground at Vail Lake Resort	39.4–48.2	37.4–41.0	36.3–45.8	46.1

Source: Compiled by LSA (April 14–15, 2020).
[1] Daytime Noise Levels = noise levels during the hours from 7:00 a.m. to 7:00 p.m.
[2] Evening Noise Levels = noise levels during the hours from 7:00 p.m. to 10:00 p.m.
[3] Nighttime Noise Levels = noise levels during the hours from 10:00 p.m. to 7:00 a.m.
CNEL = Community Noise Equivalent Level
dBA = A-weighted decibels
ft = foot/feet
L_{eq} = equivalent continuous sound level

4.2 AIRCRAFT NOISE

Airport-related noise levels are primarily associated with aircraft engine noise made while aircraft are taking off, landing, or running their engines while still on the ground. The closest airport to the Project site is French Valley Airport (RBK), approximately 7.8 miles to the west. The Project site is outside the 60 dBA CNEL (Community Noise Equivalent Level measured in A-weighted decibels) noise contour of RBK based on the *Airport Master Plan for French Valley Airport* (Coffman Associates, Inc. 2009).



LSA

LEGEND

Project Location

Long-term 24 Hour Noise Monitor Location

FIGURE 3

0 1250 2500

FEET

SOURCE: Google Imagery (2021)

I:\RCW1902\GIS\MXD\Noise\NoiseMonitoringLocations.mxd (7/15/2022)

Vail Dam Seismic and Hydrologic Remediation Project

Noise Monitoring Locations

5.0 PROJECT IMPACTS

5.1 SHORT-TERM CONSTRUCTION NOISE IMPACTS

Three types of short-term noise impacts would occur during Project construction: (1) equipment delivery, construction worker commutes, and haul trips; (2) typical project construction operations; and (3) blasting.

5.1.1 Short-Term Construction Traffic Noise Impacts

The first type of short-term construction noise would result from transport of construction equipment and materials to the Project site and construction worker commutes. The range of trips generated would range from 18 average daily traffic (ADT) during the beginning of Phase 1 to 390 ADT during the overlap of Phases 8, 9, and 10 based on the Project trip generation. These transportation activities would incrementally raise noise levels on access roads leading to the site. It is expected that larger trucks used in equipment delivery would generate higher noise impacts than trucks associated with worker commutes. The single-event noise from equipment trucks passing at a distance of 50 ft from a sensitive noise receptor would reach a maximum level of 84 dBA L_{max}. While the total number of daily vehicle trips would be substantially less when compared to the existing traffic volume of 4,140 on De Portola Road, the following equation would be used to determine potential impacts:

$$\text{Change in CNEL} = 10 \log_{10} [V_{e+ht}/V_{existing}]$$

where: $V_{existing}$ = the existing daily volume
V_{e+ht} = existing daily volumes plus haul truck
Change in CNEL = the increase in noise level due to haul truck

The results of the calculations show that an increase of approximately 0.3 dBA CNEL is expected. A noise level increase of less than 1 dBA would not be perceptible to the human ear. Therefore, short-term, construction-related traffic impacts would be less than significant.

5.1.2 Short-Term Construction Operations Stationary Source Noise Impacts

The second type of short-term noise impact is related to noise generated during mobilization, demolition, plant operations, and erection of new facilities. Construction is undertaken in discrete steps, each of which has its own mix of equipment, and consequently, its own noise characteristics. These various sequential phases would change the character of the noise generated on the Project site. Therefore, the noise levels vary as construction progresses. Despite the variety in the types and sizes of construction equipment, similarities in the dominant noise sources and patterns of operation allow construction-related noise ranges to be categorized by work phase. Table J lists the maximum noise levels used for noise impact assessments for the project-specific construction equipment list based on a distance of 50 ft between the equipment and a noise receptor.

Typical operating cycles for these types of construction equipment may involve 1 to 2 minutes of full power operation followed by 3 to 4 minutes at lower power settings.

Table J: Typical Construction Equipment Noise Levels

Equipment Description	Acoustical Usage Factor (%)	Maximum Noise Level (L_{max}) at 50 Ft[1]
Blasting	N/A	94
Compressor	40	80
Concrete Batch Plant	15	83
Cranes	16	85
Dozers	40	85
Drill Rig	20	84
Dump Truck	40	84
Flat Bed Trucks	40	84
Forklift	20	85
Front-end Loaders	40	80
Generator	50	82
Grader	40	85
Man-lift	20	85
Pump	50	77
Rock Crushing Plant	100	89
Rock Drill	20	85
Rollers	20	85
Water Truck	40	84
Welder	40	73

Source: Roadway Construction Noise Model (FHWA 2006).
Note: Noise levels reported in this table are rounded to the nearest whole number.
[1] Maximum noise levels were developed based on Specification 721.560 from the Central Artery/Tunnel program to be consistent with the City of Boston's Noise Code for the "Big Dig" project.
FHWA = Federal Highway Administration
ft = foot/feet
L_{max} = maximum instantaneous sound level
N/A = not applicable

In addition to the reference maximum noise level, the usage factor provided in Table J is used to calculate the hourly noise level impact for each piece of equipment based on the following equation:

$$L_{eq}(equip) = E.L. + 10\log(U.F.) - 20\log\left(\frac{D}{50}\right)$$

where: $L_{eq}(equip)$ = L_{eq} at a receiver resulting from the operation of a single piece of equipment over a specified time period.

E.L. = noise emission level of the particular piece of equipment at a reference distance of 50 ft.

U.F. = usage factor that accounts for the fraction of time that the equipment is in use over the specified period of time.

D = distance from the receiver to the piece of equipment.

Each piece of construction equipment operates as an individual point source. Using the following equation, a composite noise level can be calculated when multiple sources of noise operate simultaneously:

$$Leq\ (composite) = 10 * \log_{10}\left(\sum_{1}^{n} 10^{\frac{Ln}{10}}\right)$$

Using the equations from the methodology above, the reference information in Table J, and the construction equipment list within the *Construction Information Memorandum* (AECOM 2020), the composite noise level of each construction phase was calculated. To provide a conservative assessment, it was assumed that one of each piece of equipment would operate simultaneously in the same area of the construction activity for the duration of an hour.

In order to calculate the noise levels expected at surrounding receptors, the software SoundPLAN was used. SoundPLAN is a noise modeling program that allows 3-D calculations to be made taking into account topography, ground attenuation, and shielding from structures and walls. Within the model, the noise library allows for the input of many noise sources and calculates the composite noise levels experienced at any receptor necessary. The results from any calculation can be presented both in both tabular and graphic formats.

For the 14 phases of construction, the assessment was completed at the nearest sensitive receptor property lines: the campground to the south of Vail Lake and the single-family homes and horse ranches to the north and south of the western portion of the Project site. The results of each of the construction noise estimates during daytime hours are found in Table K, below. These noise level projections are considered conservative as they assume that construction would occur for the duration of a full hour. Appendix B provides the construction noise analysis SoundPLAN graphics.

Table K: Daytime Construction Activities Summary

Construction Activities	Composite Noise Level (dBA L_{eq}) at 50 ft	Noise Level (dBA L_{eq}) at NexStar Ranch - West	Noise Level (dBA L_{eq}) at Rancho Pacifica - West	Noise Level (dBA L_{eq}) at Nearest Receptor - South
Mobilization	84	77[1]	67[1]	25[1]
Site Reclamation and Demobilization	87			
Access Road and Staging Areas	88			
RCC Placement	88			
Demolition of Existing Facilities	85	23	23	30
Dam Found Excavation	92	30	30	37
Dam Found Treatment and Grouting	87	25	25	32
Dam Drain And Instrumentation	86	24	24	31
Temp EDV Vault, Outlet Tower, Permanent EDV	83	21	21	28
Armor Spillway	85	23	23	30

Source: Compiled by LSA (2022).
[1] Noise levels are the composite of activities at the Flyer's Site, 50 Acre Parcel, and Haul Routes.
dBA L_{eq} = average A-weighted hourly noise level
EDV = Energy Dissipater Valve
ft = foot/feet
RCC = roller compacted concrete

It is expected that composite noise levels during construction between the hours of 7:00 a.m. and 6:00 p.m. (daytime hours) at the nearest residential land uses to the west along De Portola Road would range from 60 dBA L_{eq} to 77 dBA L_{eq} when averaged over the areas of construction. It is expected that composite noise levels during construction during daytime hours at the nearest sensitive campground uses to the south would reach 25 dBA L_{eq} to 37 dBA L_{eq}. These predicted noise levels would only occur when all construction equipment is operating simultaneously at the closest point of construction and, therefore, are conservative in nature. These construction-related noise impacts would remain below the 90 dBA L_{eq} 1-hour construction noise level criteria as established by the FTA for residential land uses during daytime hours and, therefore, would be less than significant.

As noted in Section 1.2.2, noise-intensive activities at the Flyers Field include the RCC batch plant, aggregate stockpiling, and trucks hauling RCC and aggregate. To investigate the potential noise reduction provided by temporary construction barriers along the property lines of NexStar Ranch and Rancho Pacifica Ranch, modeling was complete in SoundPLAN. The results of the modeling indicated that the noise reduction provided by the temporary 18 ft high barriers would reduce noise levels by 2 dBA to 12 dBA, depending on the proximity of the receptor to the proposed barriers. Preliminary modeling in SoundPLAN indicated that there was negligible benefit in placing sound walls around the RCC batch plant at the Flyers Field. Due to the distance of the noise source from the nearest sensitive receptors, the level of attenuation was not substantially affected by the addition of sound walls at that location. Refer to Appendix B for the results of the SoundPLAN modeling. As mentioned above, there would be a period of 12 weeks during which nighttime work is expected to occur at the Flyers Field site associated with RCC placement. Because this work would occur outside the allowed hours in the County's Municipal Code, the noise levels generated are compared to the Municipal Code nighttime exterior noise level standard. During the nighttime hours, noise levels at the residential uses to the west would range from 49 to 57 dBA L_{eq} and would exceed the nighttime noise level standard of 45 dBA L_{eq} by 12 dBA. To investigate the potential noise reduction provided by temporary barriers along the property lines of NexStar Ranch and Rancho Pacifica Ranch, modeling was complete in SoundPLAN for various conditions.

Under the assumption that proposed operations would occur near the center of the Flyers Field, with temporary barriers along the property lines of NexStar Ranch and Rancho Pacifica Ranch, construction-related noise levels at residential uses to the west would be reduced by 0 to 9 dBA given the source heights on heavy construction equipment such as batch plants and cranes. It is possible that a temporary construction barrier may provide more reduction to sources with lower source heights that are close to the barrier. Regardless, these construction-related noise impacts would remain above the 45 dBA L_{eq} exterior noise level standard established by the County for residential land uses during nighttime hours. Although RCWD is an independent water district and is not subject to County noise regulations, based on the very perceptible and potentially disruptive increase in nighttime noise levels during this phase of construction, which would potentially be disruptive to nighttime activities (including sleep) at the affected properties, impacts are anticipated to be significant. Mitigation has been identified that would slightly reduce the impacts; however, noise levels would remain substantially elevated and these impacts would be considered significant and unavoidable.

5.1.3 Short-Term Blasting Operations Noise Impacts

The third type of short-term noise impact is related to controlled blasting procedures needed from removal of the moderately weathered rock due to the proximity of the existing dam. Using the equations from the methodology above and the reference information in Table J, the noise level at the nearest receptors was calculated. The nearest receptors to the south, approximately 7,300 ft away, would experience a maximum noise level of 51 dBA L_{max} and an hourly noise level of 31 dBA L_{eq}. The nearest receptors to the west, approximately 12,000 ft away, would experience a maximum noise level of 46 dBA L_{max} and an hourly noise level of 26 dBA L_{eq}. These perceived noise levels would not be significant.

5.1.4 Summary of Construction Noise Impacts

While construction-related short-term noise levels have the potential to be higher than existing ambient noise levels in the Project area under existing conditions, the noise impacts would no longer occur once Project construction is completed. As stated above, noise impacts associated with construction activities are regulated by the County's Noise Ordinance. To control noise impacts associated with the construction of the Proposed Project, the County of Riverside has established limits to the hours of operation. Section 9.52.020 of the County's Noise Ordinance indicates that noise associated with any construction activity located within 0.25 mile of an inhabited dwelling is considered exempt between the hours of 6:00 a.m. and 6:00 p.m., during the months of June through September, and between the hours of 7:00 a.m. and 6:00 p.m., during the months of October through May. Although as an independent water district RCWD is not subject to the County Noise Ordinance, RCWD does not have its own adopted noise standards, so this analysis considers consistency with the County standard as one factor of determining potential significance.

For the majority of the duration of construction, activities would only occur during daytime hours and construction-related noise impacts would remain below the 90 dBA L_{eq} 1-hour construction noise level criteria as established by the FTA for residential land uses. However, during the period of 12 weeks during which nighttime work generating noise levels at NexStar Ranch and Rancho Pacifico Ranch approaching 57 dBA L_{eq} will occur, construction-related noise impacts would be significant and unavoidable.

5.2 SHORT-TERM CONSTRUCTION VIBRATION IMPACTS

Ground-borne noise and vibration from construction activity would be mostly low to moderate with the exception of blasting that would occur sporadically over a 4–5-month period. While there is currently limited information regarding vibration source levels, to provide a comparison of vibration levels expected for a project of this size, as shown in Table L, a large bulldozer would generate approximately 0.089 in/sec PPV of ground-borne vibration and a typical loaded truck would generate 0.076 in/sec PPV of ground-borne vibration when measured at 25 ft, based on the *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018).

Table L: Vibration Source Amplitudes for Construction Equipment

Equipment	Reference PPV (in/sec) at 25 ft
Hoe Ram	0.089
Large Bulldozer	0.089
Caisson Drilling	0.089
Loaded Trucks	0.076
Jackhammer	0.035
Small Bulldozer	0.003

Source: *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018).
ft = foot/feet
in/sec = inches per second
FTA = Federal Transit Administration
PPV = peak particle velocity

The distance to the nearest buildings for vibration impact analysis is measured between the nearest off-site buildings and the Project boundary (assuming the construction equipment would be used at or near the Project boundary) because vibration impacts occur normally within the buildings. The formula for vibration transmission is provided below.

$$PPV_{equip} = PPV_{ref} \times (25/D)^{1.5}$$

Where: PPV_{ref} = reference vibration level in Table J (in/sec)
D = distance to the receptor (ft)

5.2.1 Construction Vibration Damage Potential

As shown above in Table H, it would take vibration impacts having a minimum velocity of 0.2 in/sec PPV at a non-engineered timber or masonry building to result in any construction vibration damage. Other than RCWD facilities, the closest structures to the areas of construction at the Project site are the existing buildings associated with NexStar Ranch to the north, approximately 60 ft from the nearest construction activities. Using the equations above, the operation of a large bulldozer would generate ground-borne vibration levels of 0.014 in/sec PPV. This level would not exceed the 0.2 in/sec PPV guideline and, therefore, impacts would be less than significant.

5.2.2 Blasting Vibration Damage Potential

As shown above in Table H, it would take vibration impacts a minimum velocity of 0.2 in/sec PPV at a non-engineered timber or masonry building to result in any construction vibration damage. Blasting would occur near the existing dam at the eastern end of the Project site. Other than RCWD facilities, the closest structures to the areas of blasting are the existing buildings associated with NexStar Ranch to the north at the western end of the Project site approximately 12,000 ft away (LT-1). Using equation 13 (Eq. 13) from the California Department of Transportation (Caltrans) *Transportation and Construction Vibration Guidance Manual* (2013b) presented below, estimates of typical vibrations can be calculated for the nearest receptors.

$$PPV_{blast} = K \times (D/\sqrt{W})^{-1.6}$$

Where: K = a variable subject to many factors below
D = distance to the receptor (ft)
W= weight of the charge (lbs)

The variable K above is dependent on a number of factors including:

- Confinement of energy
- Elastic moduli of the rock
- Spatial distribution of energy sources
- Time of energy release
- Coupling of energy sources

Because the values of the equation above are not known at this time, a Blasting Plan would be prepared to ensure that damage would not occur as a resulting of blasting activities, including at the existing dam, which will be in close proximity to blasting activities. To provide an estimate of potential impacts, input from the Geotechnical Engineer for the Project along with a range of K values from commonly accepted vibration curves presented in the Caltrans *Transportation and Construction Vibration Guidance Manual* were used. Assuming a charge weighing 1,000 pounds (lbs) and K values ranging from 24 to 242, the estimated vibration impact at the nearest buildings to the west would be 0.002 to 0.018 in/sec PPV, levels that would be well below the criteria for potential building damage. The Blasting Plan shall include provisions to ensure that no damage would occur to the existing dam or ancillary structures during blasting.

5.3 LONG-TERM NOISE IMPACTS

5.3.1 Traffic Noise Impacts to Off-Site Receivers

Once construction is complete, there would be no regular or daily traffic associated with the Proposed Project site. Periodically, maintenance vehicles would access the completed dam, but the number of maintenance vehicles accessing the dam would not change compared to existing conditions. As such, an associated noise level increase would be minimal and, therefore, less than significant.

5.3.2 Operational Noise Impacts to Off-Site Receivers

The Proposed Project would construct facilities to house equipment associated with overhead electrical service provided by SCE. All new electrical utility facilities would be designed per SCE standards. Because all equipment would be housed within a concrete building and the building would be approximately 7,000 ft from the nearest receptor, any noise generated would be imperceptible and would be less than significant.

5.4 LONG-TERM VIBRATION IMPACTS

The Proposed Project would not include any sources of long-term operational vibration associated with the new Project components. Additionally, the streets surrounding the Project area are paved, smooth, and are unlikely to cause significant ground-borne vibration, and the number of maintenance vehicles which would access the Project site in the future would not change compared to existing conditions. It is therefore assumed that there would be no vibration impacts associated with the long-term operation of the Proposed Project.

5.5 CONCLUSION

5.5.1 Off-Site Operations Impacts

The Proposed Project would not result in a substantial increase in traffic volumes or operational noise; therefore, the Proposed Project would not result in or generate a substantial long-term operational noise level increase. Potential operational source noise impacts would be less than significant.

5.5.2 Off-Site Construction Impacts

As described in the analysis above, construction of the Proposed Project would result in short-term, significant, and unavoidable, noise impacts on adjacent sensitive land uses. Project design features should be implemented to reduce noise levels to the extent feasible as listed below. Given the level of information available, and given the proximity of the blasting to the existing dam, a Blasting Plan is required to be completed prior to construction, which would clearly present methods used that would not cause damage to surrounding structures using the standards shown in Table H. The minimum requirements of the Blasting Plan are listed below.

5.5.2.1 Project Design Features

For consistency with County standards, RCWD will implement the following measures during construction of the Proposed Project:

- Prior to the commencement of construction activities, RCWD will incorporate the following measures as noted on the Project plans to ensure that the greatest distance between noise sources and sensitive receptors during construction activities has been achieved.
    - Construction equipment, fixed or mobile, shall be equipped with properly operating and maintained noise mufflers consistent with manufacturers' standards.
    - Operations at construction staging areas shall be located away from off-site sensitive uses to the extent feasible.
    - If acceptable to adjacent property owners, to reduce construction noise, it is recommended that RCWD install temporary noise barriers along the property lines of NexStar Ranch and Rancho Pacifica Ranch as shown on Figures B-2 and B-5 in Appendix B, or identify and implement other measures demonstrated through an acoustical study to provide equivalent or superior noise attenuation. It is recommended that the temporary noise barriers be 18 feet in height and constructed of material with a minimum weight of 2 pounds per square foot with no gaps of perforations. Noise barriers may be constructed of, but are not limited to, 5/8-inch plywood, 5/8-inch oriented strand board, or sound rated blankets. All noise control barrier walls should be designed to preclude structural failure due to such factors as winds, shear, shallow soil failure, earthquakes, and erosion. A typical sound rated blanket support frame would be constructed of steel tubing. The sound rated blankets should have a minimum breaking and tear strength of 120 pounds and 30 pounds, respectively. The sound rated blankets should have a minimum sound transmission classification (STC) of 20 and noise reduction coefficient of 0.70. The sound blankets should be of sufficient length to

extend from the top of the frame and drape on the ground/lower wall or be sealed at the ground/lower wall. The sound blankets will have grommets along the top edge with exterior grade hooks, and loop fasteners along the vertical edges with overlapping seams, with a minimum overlap of 2 inches.

- All stationary construction equipment shall be placed so that emitted noise is directed away from sensitive receptors nearest the Proposed Project site and/or placed in proximity to temporary noise barriers to achieve the greatest noise reduction, whenever feasible.

- Consistent with Section 9.52.020 of the County's noise regulations, construction shall be limited, where possible, to the hours between 6:00 a.m. and 6:00 p.m., during the months of June through September, and 7:00 a.m. and 6:00 p.m., during the months of October through May.

5.5.2.2 Blasting Plan

A Blasting Plan for construction shall be prepared and followed that includes the following related to noise and vibration impacts:

- Type and quantity of explosives and description of detonation device;
- Identification of blast officer;
- Drawings of blast locations, surrounding buildings, and other locations which could be inhabited;
- Blasting notification procedures, lead times, and list of those notified, including public notification to potentially affected vibration and nuisance noise receptors describing the expected extent and duration of the blasting;
- Identification of transportation practices, on-site storage, and security of explosives in accordance with local, State, and federal regulations;
- Acceptable weather conditions for blasting and safety provisions for potential stray current (if electric detonation);
- Procedures for handling, setting, wiring, and firing explosives; and procedures for handling misfires;
- Methods of matting or covering of blast area to prevent flyrock and excessive air blast pressure;
- Description of blast vibration and air blast monitoring programs;
- A sound attenuation plan shall be prepared outlining sound control measures that would include the use of blasting mats or sound walls; and
- The stability of all nearby surrounding structures shall be monitored during all blasting events.

6.0 REFERENCES

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APPENDIX A

LONG-TERM AND SHORT-TERM NOISE MEASUREMENT SHEETS

Noise Measurement Survey – 24 HR

Project Number: RCW1902
Project Name: Vail Dam

Test Personnel: Corey Knips
Equipment: Spark 906RC (SN:18904)

Site Number: LT-1 Date: 4/14/2022

Time: From 3:00 p.m. To 3:00 p.m.

Site Location: Approximately 1,000 feet southeast of De Portola Road near the NexStar Ranch property line. On utility pole.

Primary Noise Sources: Occasional vehicle driving by on access road and at 37115 De Portola Road.

Comments:

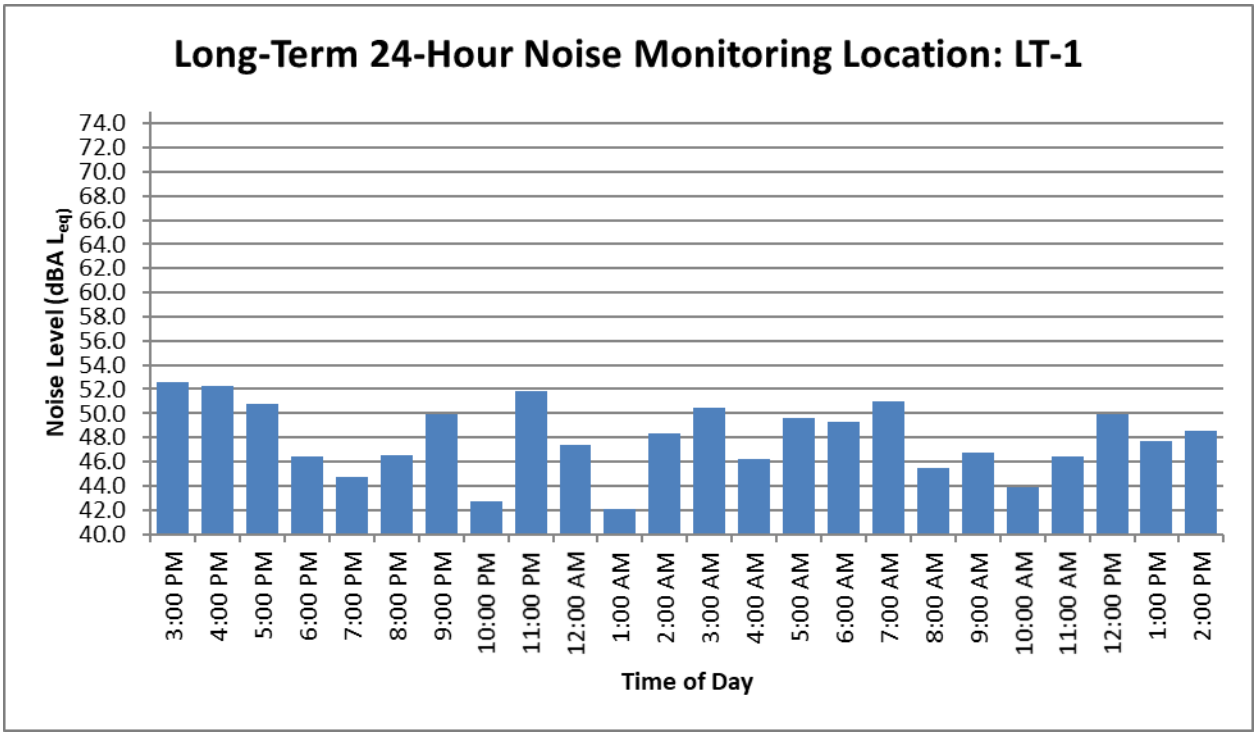
Photo:



Long-Term (24-Hour) Noise Level Measurement Results at LT-1

Start Time	Date	Hourly L_{eq} (dBA)
3:00 PM	4/14/2020	52.5
4:00 PM	4/14/2020	52.2
5:00 PM	4/14/2020	50.7
6:00 PM	4/14/2020	46.4
7:00 PM	4/14/2020	44.8
8:00 PM	4/14/2020	46.5
9:00 PM	4/14/2020	49.9
10:00 PM	4/14/2020	42.7
11:00 PM	4/14/2020	51.8
12:00 AM	4/15/2020	47.3
1:00 AM	4/15/2020	42.1
2:00 AM	4/15/2020	48.3
3:00 AM	4/15/2020	50.5
4:00 AM	4/15/2020	46.2
5:00 AM	4/15/2020	49.6
6:00 AM	4/15/2020	49.3
7:00 AM	4/15/2020	51.0
8:00 AM	4/15/2020	45.4
9:00 AM	4/15/2020	46.7
10:00 AM	4/15/2020	43.8
11:00 AM	4/15/2020	46.4
12:00 PM	4/15/2020	49.9
1:00 PM	4/15/2020	47.7
2:00 PM	4/15/2020	48.5

Source: Compiled by LSA Associates, Inc. (2022).
dBA = A-weighted decibel
L_{eq} = equivalent continuous sound level



Noise Measurement Survey – 24 HR

Project Number: RCW1902
Project Name: Vail Dam

Test Personnel: Corey Knips
Equipment: Spark 906RC (SN:18907)

Site Number: LT-2 Date: 4/14/2022

Time: From 3:00 p.m. To 3:00 p.m.

Site Location: Approximately 90 feet southeast of De Portola Road centerline and 950 feet northeast of Pauba Road. On utility pole.

Primary Noise Sources: Traffic on De Portola Road.

Comments:

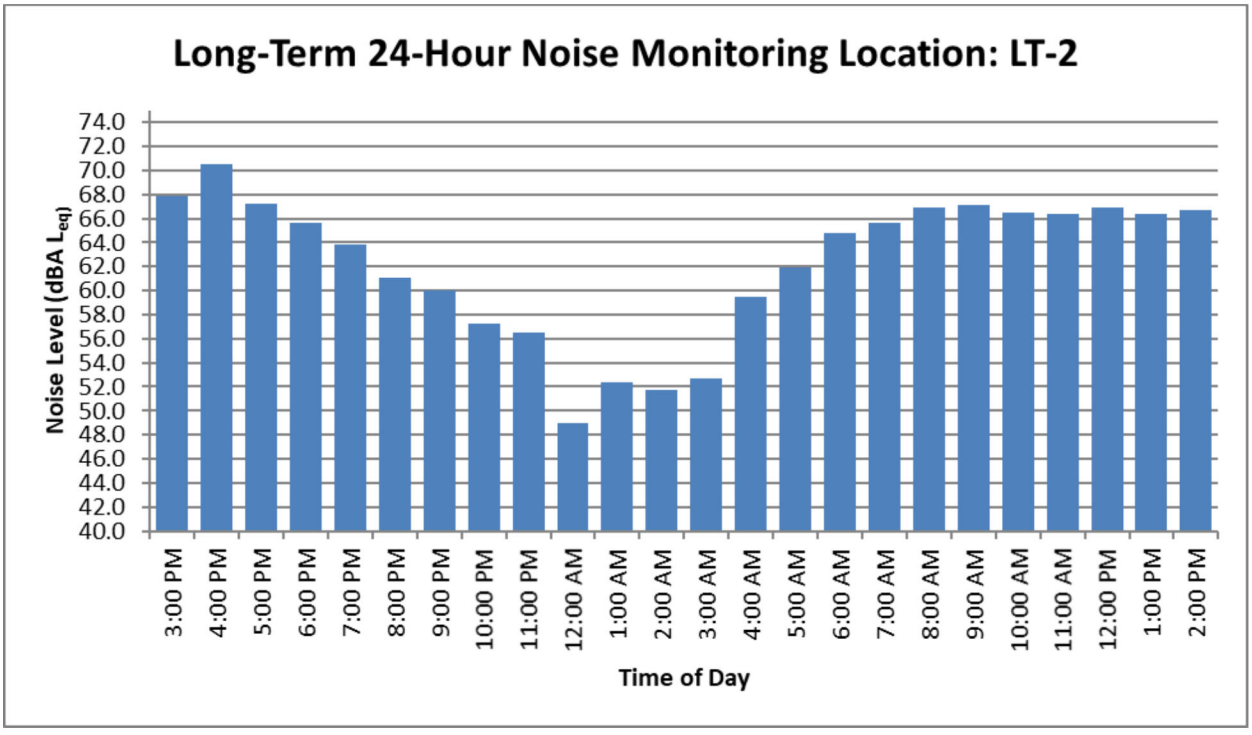
Photo:



Long-Term (24-Hour) Noise Level Measurement Results at LT-2

Start Time	Date	Hourly L_{eq} (dBA)
3:00 PM	4/14/2020	67.8
4:00 PM	4/14/2020	70.5
5:00 PM	4/14/2020	67.2
6:00 PM	4/14/2020	65.7
7:00 PM	4/14/2020	63.8
8:00 PM	4/14/2020	61.1
9:00 PM	4/14/2020	60.1
10:00 PM	4/14/2020	57.2
11:00 PM	4/14/2020	56.5
12:00 AM	4/15/2020	49.0
1:00 AM	4/15/2020	52.3
2:00 AM	4/15/2020	51.7
3:00 AM	4/15/2020	52.7
4:00 AM	4/15/2020	59.5
5:00 AM	4/15/2020	61.9
6:00 AM	4/15/2020	64.8
7:00 AM	4/15/2020	65.6
8:00 AM	4/15/2020	66.9
9:00 AM	4/15/2020	67.1
10:00 AM	4/15/2020	66.5
11:00 AM	4/15/2020	66.4
12:00 PM	4/15/2020	66.9
1:00 PM	4/15/2020	66.4
2:00 PM	4/15/2020	66.7

Source: Compiled by LSA Associates, Inc. (2022).
dBA = A-weighted decibel
L_{eq} = equivalent continuous sound level



Noise Measurement Survey – 24 HR

Project Number: RCW1902
Project Name: Vail Dam

Test Personnel: Corey Knips
Equipment: Spark 906RC (SN:18908)

Site Number: LT-3 Date: 4/14/2022

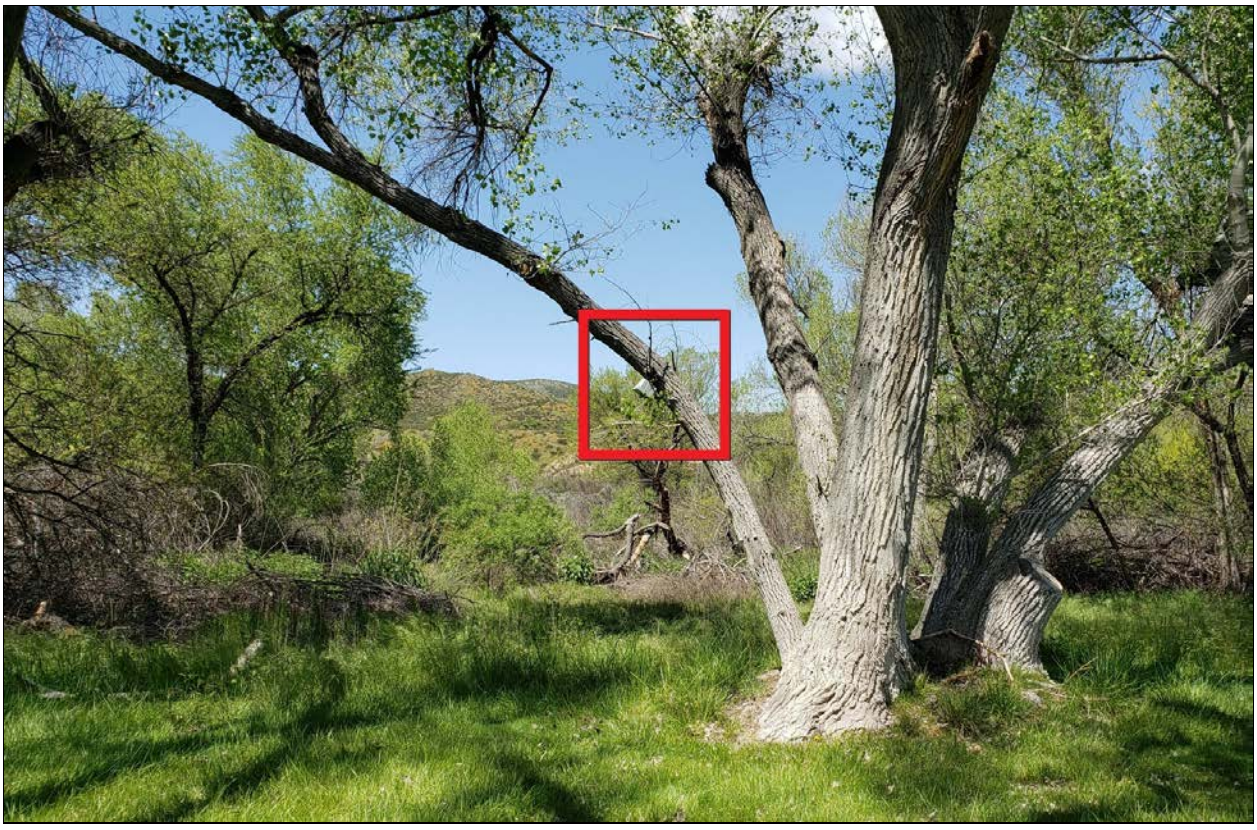
Time: From 3:00 p.m. To 3:00 p.m.

Site Location: Near the northern property line of the existing campground at Vail Lake Resort. O a tree.

Primary Noise Sources: Very quiet, occasional campers walking and talking nearby.

Comments:

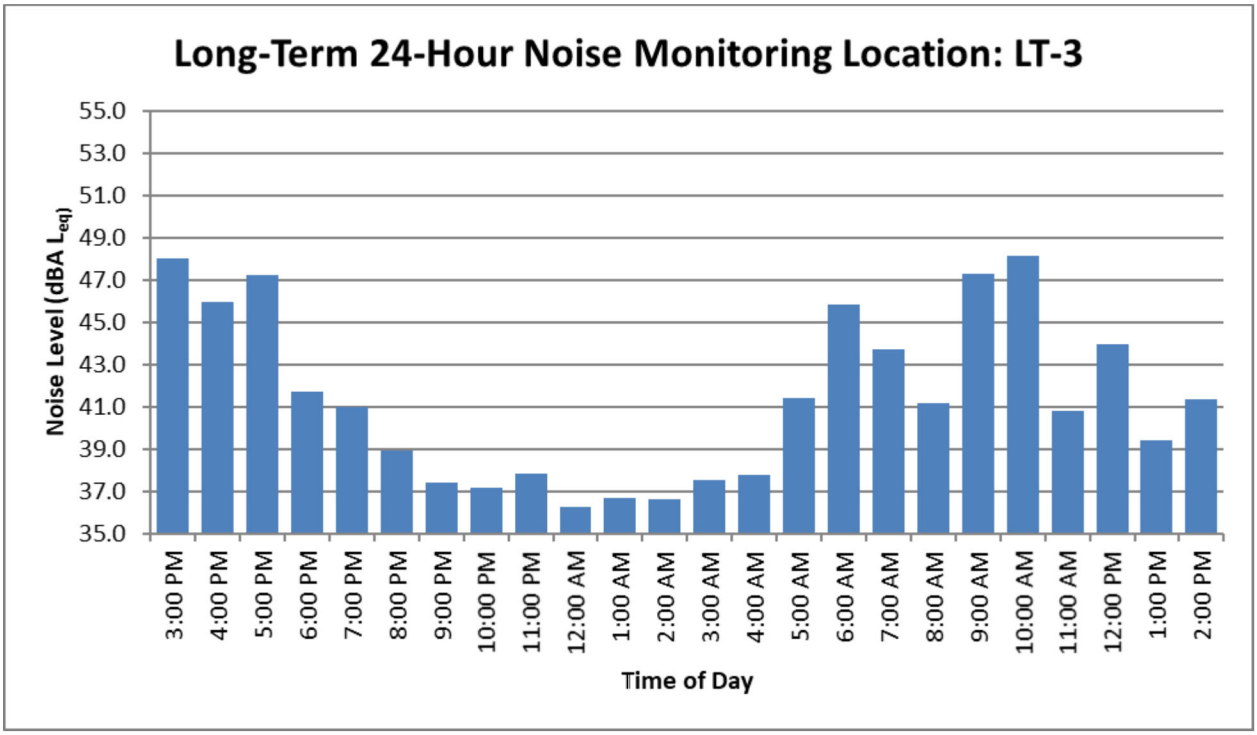
Photo:



Long-Term (24-Hour) Noise Level Measurement Results at LT-3

Start Time	Date	Hourly L_{eq} (dBA)
3:00 PM	4/14/2020	48.0
4:00 PM	4/14/2020	45.9
5:00 PM	4/14/2020	47.3
6:00 PM	4/14/2020	41.7
7:00 PM	4/14/2020	41.0
8:00 PM	4/14/2020	38.9
9:00 PM	4/14/2020	37.4
10:00 PM	4/14/2020	37.1
11:00 PM	4/14/2020	37.8
12:00 AM	4/15/2020	36.3
1:00 AM	4/15/2020	36.6
2:00 AM	4/15/2020	36.6
3:00 AM	4/15/2020	37.5
4:00 AM	4/15/2020	37.8
5:00 AM	4/15/2020	41.4
6:00 AM	4/15/2020	45.8
7:00 AM	4/15/2020	43.7
8:00 AM	4/15/2020	41.1
9:00 AM	4/15/2020	47.3
10:00 AM	4/15/2020	48.2
11:00 AM	4/15/2020	40.8
12:00 PM	4/15/2020	44.0
1:00 PM	4/15/2020	39.4
2:00 PM	4/15/2020	41.3

Source: Compiled by LSA Associates, Inc. (2022).
dBA = A-weighted decibel
L_{eq} = equivalent continuous sound level



APPENDIX B

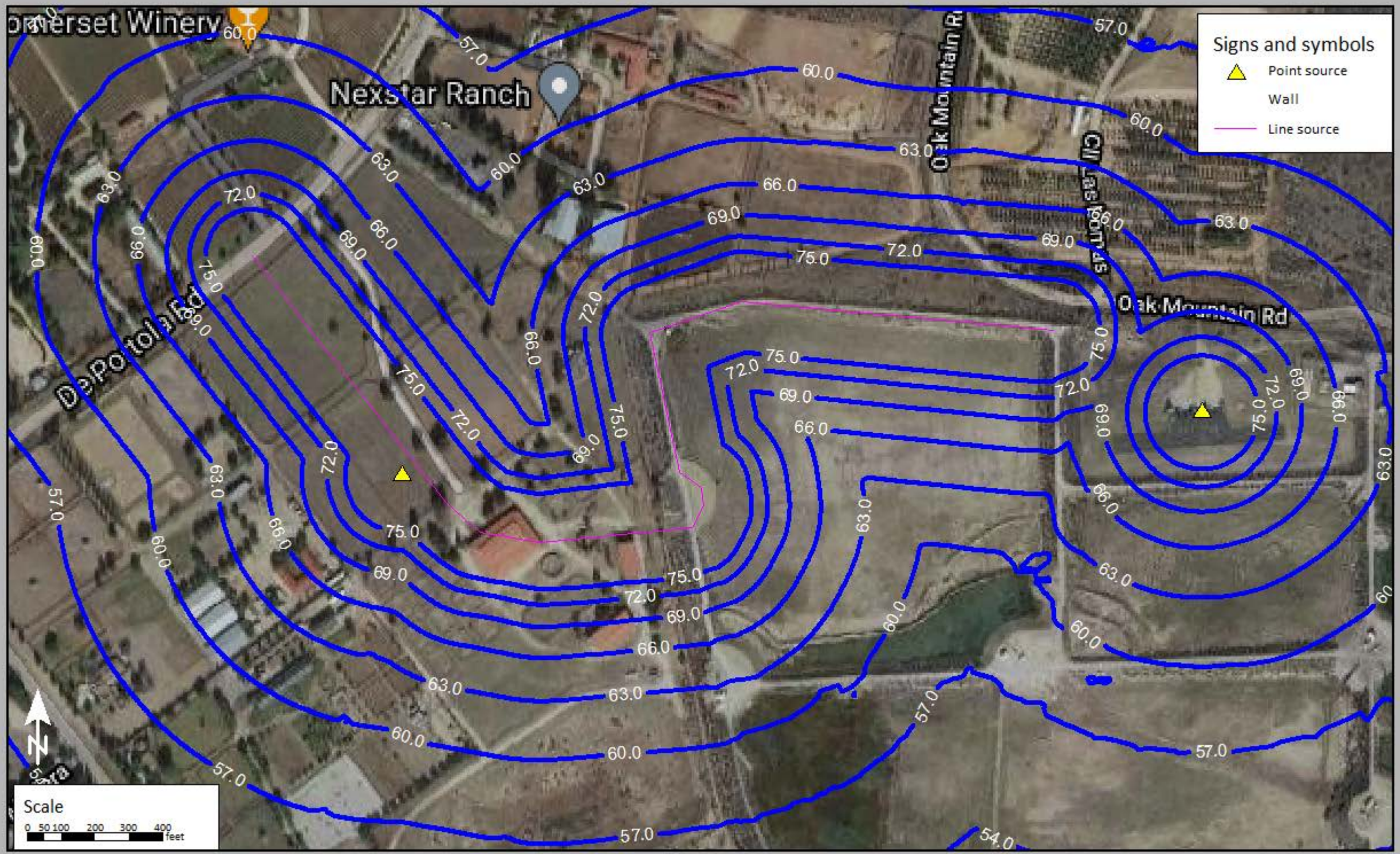
SOUNDPLAN CONSTRUCTION NOISE GRAPHICS

Vail Dam

Project No. RCW1902

All Sources - No Barrier

Figure B-1



Vail Dam

Project No. RCW1902

All Sources - All Barriers

Figure B-2



Vail Dam

Project No. RCW1902

All Sources - No Flyers Barrier

Figure B-3



Vail Dam

Project No. RCW1902

All Sources - No Barrier - Night

Figure B-4

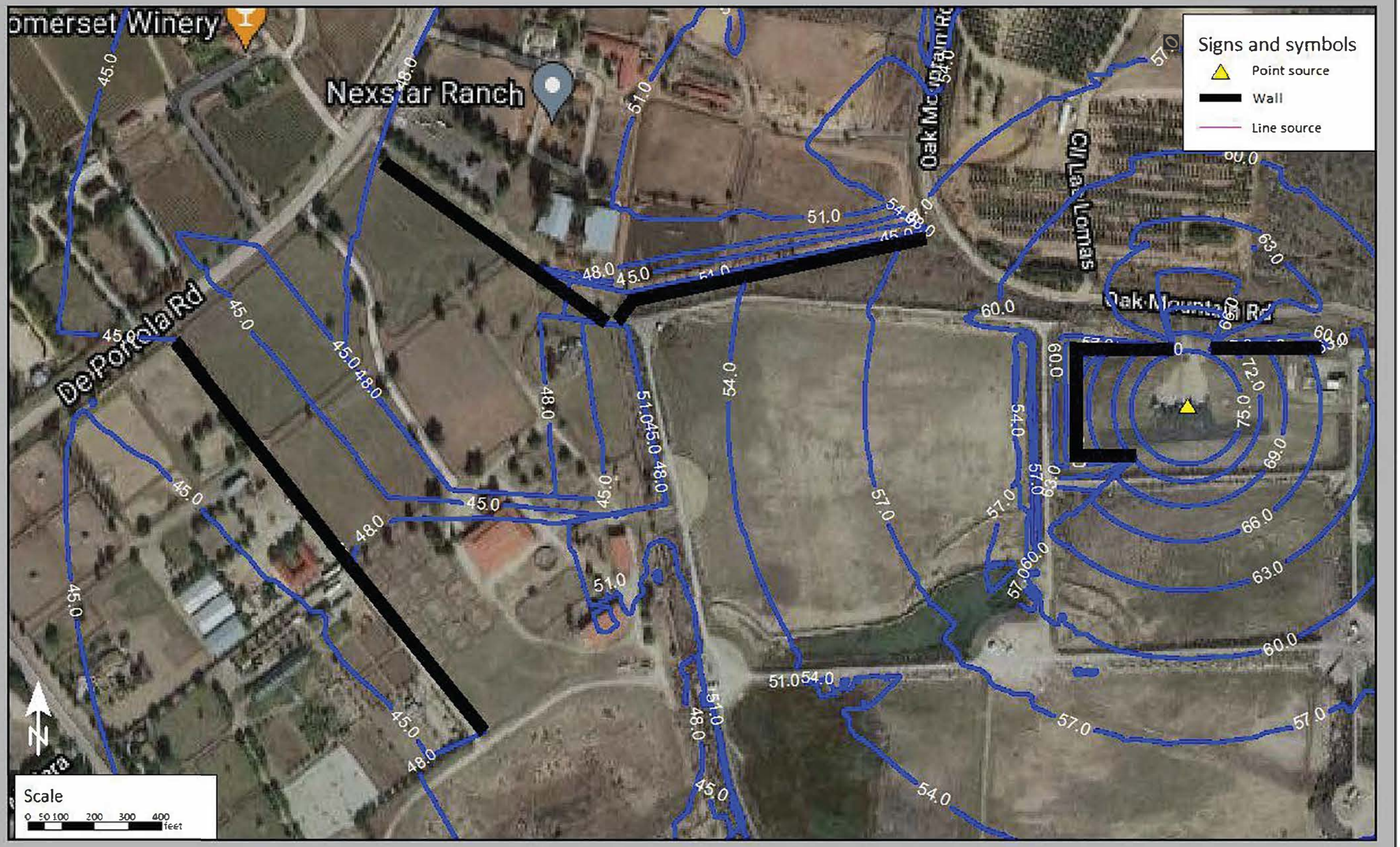


Vail Dam

Project No. RCW1902

All Sources - All Barriers - Night

Figure B-5



Vail Dam

Project No. RCW1902

All Sources - No Flyers Barrier - Night

Figure B-6



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APPENDIX J

TRANSPORTATION REPORT

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CARLSBAD
CLOVIS
IRVINE
LOS ANGELES
PALM SPRINGS
POINT RICHMOND
RIVERSIDE
ROSEVILLE
SAN LUIS OBISPO

MEMORANDUM

DATE: August 19, 2022

TO: Randy Neff, P.E., Rancho California Water District, Principal Engineer

FROM: Dean Arizabal, LSA, Principal Transportation Planner

SUBJECT: Transportation Memorandum for the Vail Dam Seismic and Hydrologic Remediation Project (Project No. D1911)

The purpose of this Transportation Memorandum is to describe and document potential transportation impacts associated with the implementation of the proposed Vail Dam Seismic and Hydrologic Remediation Project (Project). This technical information is provided for project review under the California Environmental Quality Act (CEQA).

PROJECT DESCRIPTION

Vail Lake and Vail Dam are located in unincorporated southwestern Riverside County, east of Temecula, in Southern California. See Figure 1, Project Vicinity (all figures are provided in Attachment A). Vail Lake was created through the construction of the existing Vail Dam by the Vail Company in 1948 and 1949 to store local runoff for irrigation and water supply. The lake and dam were acquired by the Rancho California Water District (RCWD) in 1978 and have been used since that time for water supply and replenishment of RCWD's groundwater basins. In addition, Vail Dam has provided passive downstream flood protection for the City of Temecula and the United States Marine Corps Base Camp Pendleton under more frequently recurring storms. Vail Lake is also utilized for recreation. The watershed for Vail Lake is approximately 318 square miles, and the lake is fed by Temecula Creek, Wilson Creek, Kolb Creek, and Arroyo Seco Creek. Vail Dam spans Temecula Creek, a northwesterly draining tributary of the Santa Margarita River that drains the north side of Palomar Mountain.

RCWD proposes to remediate seismic and hydrologic hazards associated with the existing Vail Dam, a concrete arch dam, by constructing a new straight-axis gravity concrete dam[1] immediately downstream of the existing dam. Hydrologic and seismic evaluations of the existing dam, conducted by the California Department of Water Resources Division of Safety of Dams, indicate that the existing dam's spillway is insufficient to pass the probable maximum flood without overtopping the dam and that the existing dam would not resist the stresses induced by the maximum credible earthquake.

The Proposed Project has multiple benefits, including enhanced regional water supply reliability, groundwater recharge, passive flood protection, and improved water supply reliability. The Proposed

[1] A gravity dam is designed to hold back water primarily by using the weight of the dam material to resist the horizontal water pressure. Each gravity dam section is designed to be stable and independent of any other dam section.

Project is needed to protect residents, structures, transportation infrastructure, and other downstream resources from potential dam failure. Dam failure would result in downstream flooding and the loss of Vail Lake, which would adversely affect water supply throughout RCWD's service area.

The Proposed Project includes improvements to the Vail Lake and Vail Dam access roads (via De Portola Road and State Route 79 [SR-79]), provision for on-site construction staging and material disposal areas, partial demolition of the existing arch dam and demolition debris removal, and a new gravity dam. See Figure 2, Staging/Laydown Areas and Access Roads, for a depiction of the construction areas, as well as Project access. De Portola Road (Primary Entry Road and Secondary Entry Road) and SR-79 (Vail Dam Road) would provide regional and local Project access for construction activities. Construction access from SR-79 is limited to delivery of modular barges to Vail Lake; improvements to the South Access Road would consist of realigning the existing road, and no improvements are proposed to Vail Dam Road or Vail Lake Road. Oak Mountain Road, an existing private dirt road accessed off De Portola Road, would not be used for construction access.

The Proposed Project is anticipated to be initiated in the fall of 2023 and completed in the spring of 2025. The total duration of Project construction is estimated to be 31 months. Once the Project is complete, Vail Lake and Vail Dam would not require any part-time construction workers or full-time, dedicated RCWD staff on site.

ENVIRONMENTAL ANALYSIS

This section includes analysis of environmental parameters based on Appendix G of the *State CEQA Guidelines*. The discussion not only includes the areas for which there is potential for environmental impacts but also provides justification for the conclusions that either no impacts, less than significant impacts, or less than significant impacts with mitigation could occur. The CEQA Analysis Checklist questions and the environmental significance conclusion appear under each environmental parameter, followed by a discussion supporting each conclusion.

Regulatory Setting

The following is a summary of California (State), regional, and County of Riverside (County) regulations that apply to transportation and circulation within the Project study area.

State

Senate Bill 743. On September 27, 2013, Governor Jerry Brown signed Senate Bill (SB) 743 into law and codified a process that revises the approach to determining transportation impacts and mitigation measures under CEQA. SB 743 directed the Governor's Office of Planning and Research (OPR) to administer new CEQA guidance for jurisdictions by replacing the focus on automobile vehicle delay and level of service (LOS) or other similar measures of vehicular capacity or traffic congestion in the transportation impact analysis with vehicle miles traveled (VMT). This change shifts the focus of the transportation impact analysis from measuring impacts to drivers, such as the amount of delay and LOS at an intersection, to measuring the impact of driving on the local, regional, and statewide circulation system and the environment. This shift in focus is expected to better align the transportation impact analysis with the statewide goals related to reducing greenhouse gas emissions, encouraging infill development, and promoting public health through active transportation. As a result of SB 743, the California Office of Administrative Law cleared the revised *State CEQA Guidelines* for use

on December 28, 2018, and the statewide implementation data on July 1, 2020. The OPR *Technical Advisory on Evaluating Transportation Impacts in CEQA* (OPR Technical Advisory) (2018)[1] provides a technical advisory as a resource for agencies to use at their discretion.

Region

Western Riverside Council of Governments. The Western Riverside Council of Governments (WRCOG) is an association of local agencies in Western Riverside County. Its members include the County, the Riverside County Superintendent of Schools, the Eastern Municipal Water District, the Western Municipal Water District, and 18 cities within the County boundaries. The purpose of WRCOG is to unify Western Riverside County so that it can speak with a collective voice on important issues that affect its members such as transportation, environment, energy, economy, and health.

Riverside County Transportation Commission. The Riverside County Transportation Commission (RCTC) is comprised of 29 members, including the County and 28 cities within the County boundaries. RCTC is responsible for overseeing the funding and coordination of all public transportation services within Riverside County. Being the State-mandated Regional Transportation Planning Agency, RCTC prepares and updates the Congestion Management Program in coordination with the Southern California Association of Governments (SCAG) to meet federal and State standards.

Local

Riverside County. The Proposed Project is located in unincorporated Riverside County. As such, the Riverside County Transportation Department's *Traffic Impact Analysis Preparation Guide* (TIA Guide) (2008)[2] is the guidance document for the countywide transportation system. This TIA Guide is intended to ensure that the traffic impacts of proposed development projects, General Plan Amendments, and Specific Plans are addressed in a manner that is consistent with the policies set forth in the Circulation Element of the Riverside County General Plan.

Environmental Setting

Existing Circulation System

The following describes key roadways in the vicinity of the Project.

- **De Portola Road** is an undivided, two-lane Rural Highway west of Vail Lake and Vail Dam that provides direct access to the Project site. The posted speed limit is 55 miles per hour (mph). Sidewalks are not provided on either side of the street. Parking is not permitted along this roadway.
- **Anza Road** is an undivided, two-lane Rural Highway west of the Project site. The posted speed limit is 45 mph. Sidewalks are not provided on either side of the street. Parking is not permitted along this roadway.

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1 Governor's Office of Planning and Research (OPR). 2018. *Technical Advisory on Evaluating Transportation Impacts in CEQA* (OPR Technical Advisory). December. p. 12.

2 Riverside County Transportation Department. 2008. *Traffic Impact Analysis Preparation Guide* (TIA Guide). April.

- **State Route 79 (SR-79)** is an undivided two-lane Rural Highway south of the Project site. The posted speed limit is 50 mph. There are no sidewalks or bike lanes along this roadway in the Project vicinity.

Traffic Impact Analysis Methodology

The Riverside County Transportation Department's 2008 TIA Guide states that certain types of projects, because of their size, nature, or location, are exempt from the requirements of a Traffic Impact Analysis (TIA). In addition, the minimum area to be studied in the TIA shall include any intersection of Collector (or higher classification) Street, with Collector (or higher classification) Street, at which the Proposed Project will add 50 or more peak-hour trips. As required by the 2008 TIA Guide, LSA solicited input from the County prior to preparation of this analysis. Based on this coordination effort, the County determined that a TIA is not required for the Proposed Project.

Impact Analysis

a. Would the project conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?

Less Than Significant Impact with Mitigation. In order to assess the impact of the Proposed Project on the surrounding circulation system, LSA estimated the construction Project trips that would be generated on a temporary basis throughout each phase of construction and based on the number of construction workers and trucks. Once the Proposed Project is complete, Vail Lake and Vail Dam would not require any full-time, dedicated RCWD staff or part-time construction workers for typical day-to-day operations (i.e., no operational vehicle trips).

Based on construction information provided by AECOM (email correspondence dated April 2020), construction of the Project will include the following 14 phases (including phase duration and daily worker and truck estimates) over 31 months between the fall of 2022 and the spring of 2025:

1. Mobilization (16 weeks): 5 workers and 2 trucks per day
2. Access Roads and Staging Areas (24 weeks): 8 workers and 12 trucks per day
3. Demolition of Facilities at Existing Dam (10 weeks): 9 workers and 2 trucks per day
4. Foundation Excavation (48 weeks): 10 workers and 2 trucks per day
5. Temporary Energy Dissipation Vault (18 weeks): 9 workers and 3 trucks per day
6. Armor Spillway (6 weeks): 9 workers and 4 trucks per day
7. Foundation Treatment and Grouting (20 weeks): 8 workers and 2 trucks per day
8. Roller-Compacted Concrete Placement (31 weeks): 18 workers and 86 trucks per day
9. Outlet Tower (28 weeks): 9 workers and 5 trucks per day
10. Dam Drainage (19 weeks): 7 workers per day
11. Dam Instrumentation (10 weeks): 4 workers per day
12. Permanent Energy Dissipation Vault (8 weeks): 9 workers and 4 trucks per day
13. Demolition of Existing Facilities (19 weeks): 16 workers and 4 trucks per day
14. Site Reclamation and Demobilization (6 weeks): 7 workers and 2 trucks per day

Workers are assumed to arrive to the site in the a.m. peak hour and depart from the site during the p.m. peak hour to present a conservative estimate of trip generation. Truck trips are anticipated to occur throughout the day, including both peak hours.

As shown in Table A (Attachment B), the overlap of Phases 8, 9, and 10 would be the most intense period of construction (i.e., the highest construction trip generation). Over approximately 11 weeks, the overlapping construction activities of Phases 8, 9, and 10 are anticipated to generate 250 average daily trips (ADT), including 49 trips (42 inbound and 7 outbound) in the a.m. peak hour and 49 trips (7 inbound and 42 outbound) in the p.m. peak hour. All other individual and overlapping construction phases would generate 42 or fewer peak-hour trips.

The Proposed Project description, location, and construction trip generation were reviewed and discussed with the County prior to preparation of this analysis. County staff determined that a TIA is not required for the Proposed Project for the following reasons:

- The Project would only generate temporary construction trips (a peak of 49 peak-hour trips over 11 weeks) and no operational trips.
- The Project is located in a remote area (low traffic volumes adjacent to Vail Lake and Vail Dam).
- The Project would not add 50 or more peak-hour trips to an intersection of a Collector (or higher classification) Street and a Collector (or higher classification) Street. The primary access intersection for the Project is Anza Road/De Portola Road (i.e., both roadways have a Rural Highway classification, which is a lower classification than Collector Street).

The Proposed Project is not anticipated to result in any LOS or operational deficiencies to the surrounding circulation system and based on low number of trips, low traffic volumes on De Portola Road and SR-79, and sufficient on-site vehicle staging areas, Project vehicles are unlikely to queue[1] onto the public streets. Further, construction traffic would be managed by the construction contractor consistent with the current California Temporary Traffic Control Handbook (CATTCH) (previously known as the California Joint Utility Traffic Control Manual). The CATTCH provides basic standards for the safe movement of all road users (including motorists, bicyclists, and pedestrians on streets, highways, and bikeways) through construction zones in accordance with Section 21400 of the California Vehicle Code and the California Manual on Uniform Traffic Control Devices. While the Proposed Project does not include construction activities on De Portola Road or SR-79, a Construction Traffic Management Plan would further ensure that acceptable intersection LOS are maintained during peak traffic hours and that construction traffic does not queue on public roadways. Compliance with the CATTCH is required by the measure included below.

Construction Traffic Management Plan (CTMP). Prior to commencement of grading activities, the construction contractor shall prepare a CTMP to the satisfaction of Rancho California Water District and shall ensure that the plan is implemented during construction with the goal of maintaining acceptable intersection LOS during peak traffic hours and ensuring that construction

[1] A vehicle queue is a line of vehicles awaiting their turn to proceed. Vehicle queues can occur in construction zones when construction traffic flow is higher than the traffic capacity of the roadway(s).

traffic does not queue on public roadways. The CTMP shall be consistent with the CATTCH. At a minimum, the CTMP shall include, but not be limited to, the following:

- Provisions for temporary traffic control to improve traffic flow on public roadways and ensure the safe access into and out of the site (e.g., warning signs, lights and devices, and flag person).
- Prohibiting construction-related vehicles from parking on public streets.
- Providing safety precautions for pedestrians, equestrians, and bicyclists through such measures as alternate routing and protection barriers.
- Obtaining the required permits for truck haul routes from the City of Temecula and/or the California Department of Transportation (Caltrans).
- All emergency access to the Project site and adjacent areas shall be kept clear and unobstructed during all phases of demolition and construction.
- Flag persons shall be trained to assist in emergency response by restricting or controlling the movement of traffic that could interfere with emergency vehicle access.

Although the Proposed Project would generate temporary trips associated construction activities, it would not preclude alternative modes of transportation or facilities (e.g., transit, bicycle, equestrian, or pedestrian). Therefore, with incorporation of the measure above, the Project would not result in an impact related to a conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle, equestrian, and pedestrian facilities.

b. Would the project conflict or be inconsistent with CEQA Guidelines Section 15064.3 or conflict with an applicable congestion management program, including, but not limited to, level of service standards and travel demand measures, or other standards established by the congestion management agency for designated roads or highways?

Less Than Significant Impact. *State CEQA Guidelines* Section 15064.3, Subdivision (b) states that for land use projects, transportation impacts are to be measured by evaluating the project's VMT, as outlined in the following:

> "Vehicle miles traveled exceeding an applicable threshold of significance may indicate a significant impact. Generally, projects within one-half mile of either an existing major transit stop or a stop along an existing high quality transit corridor should be presumed to cause a less than significant transportation impact. Projects that decrease vehicle miles traveled in the project area compared to existing conditions should be presumed to have a less than significant transportation impact."

VMT is the amount and distance of automobile travel attributable to a project. According to the 2018 OPR Technical Advisory, "automobile" refers to "on-road passenger vehicles, specifically cars and light trucks." Thus, Project construction trucks are not included in the Project VMT assessment.

Additionally, the OPR Technical Advisory recommends VMT screening thresholds for smaller projects. The footnote on page 12 of the OPR Technical Advisory states the following:

> "Screening Thresholds for Small Projects
>
> Many local agencies have developed screening thresholds to indicate when detailed analysis is needed. Absent substantial evidence indicating that a project would generate a potentially significant level of VMT, or inconsistency with a Sustainable Communities Strategy (SCS) or general plan, projects that generate or attract fewer than 110 trips per day generally may be assumed to cause a less-than-significant transportation impact."

The OPR Technical Advisory recommends that a project generating 110 ADT or less be screened out of a VMT analysis due to the presumption of a less than significant impact. The Proposed Project is an improvement project that would generate temporary construction trips over 31 months. During the 11-week peak of construction activities, the Proposed Project would generate 250 total ADT (182 truck ADT and 68 worker ADT). Since the Proposed Project is estimated to generate 68 worker (passenger car) ADT, it is considered a small project for the purposes of this analysis and would not conflict or be inconsistent with *State CEQA Guidelines* Section 15064.3(b). No mitigation is required.

As previously described, the Proposed Project is not anticipated to result in any LOS or operational deficiencies to the surrounding circulation system based on the Project description, location, and temporary construction trip generation (peak of 250 ADT, including 49 trips in the a.m. and p.m. peak hours). Therefore, the Proposed Project would not conflict with any congestion management program, standards, or travel demand measures for roads or highways and no mitigation is required.

Potential impacts would be less than significant, and no mitigation is required.

c. Would the project substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?

Less Than Significant Impact with Mitigation. Improvements would be required to existing on-site access roads to accommodate construction traffic; however, no improvements to public roadways are required. Existing on-site roadways that provide access from De Portola Road to the dam include the Secondary Entry Road (the existing, unpaved access road from De Portola Road to the Pond Access Road), the Pond Access Road, the Canyon Access Road, and the North Access Road. The South Access Road connects to Vail Dam Road, providing access to Vail Lake Road (which connects to SR-79) via the campground area. Construction access from SR-79 is limited to delivery of modular barges to Vail Lake; improvements to the South Access Road would consist of realigning the existing road, and no improvements are proposed to Vail Dam Road or Vail Lake Road. The Primary Entry Road (50 Acre Parcel) is a proposed new access point from De Portola Road which would connect to the Pond Access Road at the edge of the Upper Valle De Los Caballos (VDC) Recharge Basins. Once the Primary Entry Road has been completed, the majority of construction access for the Project area would be provided along that route. The existing Secondary Entry Road at De Portola Road would provide a secondary access point when required. RCWD intends to

maintain both the Primary Entry Road and the Secondary Entry Road after completion of the Proposed Project. Improvements are described in more detail below.

- **Primary Entry Road (50 Acre Parcel).** The proposed Primary Entry Road across the RCWD's 50 acre parcel is a short segment that would connect the Pond Access Road to De Portola Road and would be constructed within property owned by RCWD, south of the future Upper VDC Regional Pump Station and Chlorine Contact Tank Project (RCWD Project No. D1903) to avoid conflict with that project. The Primary Entry Road (50 Acre Parcel) would provide two travel lanes (25 ft total width) and include gravel surfacing, and it would also provide access to one of the construction staging areas.

- **Secondary Entry Road.** Initially, for approximately the first 4 weeks of construction, site access to the north side of the Upper VDC recharge basins would be provided via an existing unpaved access road from De Portola Road located adjacent to the RCWD's Los Caballos Pump Station. This unpaved roadway is 20 ft wide in the existing condition; improvements would be limited to scraping the surface and placing a 4-inch gravel wear surface within the existing road limits. This road would be used during daytime hours for equipment delivery and worker access and for delivery of road aggregate for use in constructing the Primary Entry Road (50 Acre Parcel). Upon completion of the Primary Entry Road (50 Acre Parcel), the Secondary Entry Road would no longer be used for routine construction access.

- **North Access Road.** There is an existing unimproved North Access Road that traverses approximately 2 miles from the northeast corner of the Upper VDC percolation ponds to the right abutment of the existing dam. The proposed connection between the North Access Road and the Pond Access Road would be constructed to facilitate the turning radius of a truck with a 40-foot wheelbase. The details of the proposed improvement to this area are shown on Figure 2. The existing North Access Road would be improved to provide vehicular access to the crest of the new dam. The North Access Road would be the primary vehicular access route to the crest of the new dam after Project completion. Vehicular access is not feasible from the left abutment due to the height of the existing left gravity abutment. Project improvements would include gravel surfacing and improvement of drainage. The road would remain a single-lane road. As shown on Figure 2, realignment would be needed where the road is outside of the property boundary and where excavation through a rock knob would be required. In addition, RCWD identified a design alternative in the event it is needed to avoid an existing road depression that provides habitat for fairy shrimp. As no evidence of special-status fairy shrimp was identified during focused surveys, it is not anticipated that this option would be needed; however, it has been retained pending coordination with the Wildlife Agencies. The North Access Road realignment design alternative is shown on Figure 2.

- **Canyon Access Road.** The existing unpaved access road through the canyon below the dam is approximately 2 miles long. It is currently a single-lane road bound on both sides by vegetation with limited sight lines. This access road would need to be widened to two lanes (25 feet [ft] total width) for construction traffic, with several turnouts to allow vehicles to pass. Widening would be accomplished through removal of the existing vegetation on both sides of the existing road. This widening is only for construction purposes and the sides of the access road would be revegetated and restored to its existing single-lane configuration after construction

of the dam is complete. Other improvements to the Canyon Access Road would include gravel surfacing, which would remain within the single-lane road following construction. The existing five Arizona type crossings of the creek would remain. However, temporary culverts or placement of clean rock may be required during construction at the five Arizona crossings to provide construction vehicle crossings. Any temporary culverts or fill would be removed following completion of construction, and the creek would be restored to approximate pre-Project contours and habitat conditions or better. Within approximately 550 ft of the new dam, the elevation of the Canyon Access Road would be raised by up to 7 ft to avoid overtopping during high-volume lake water release. Vegetated riprap would be placed within the Temecula Creek channel along the southern side of the raised road portion to reduce potential erosion.

- **Pond Access Road.** The existing Pond Access Road is 20 to 25 ft wide in the existing condition. The roadway surface would be scraped or lightly graded to smooth the roadway surface and vegetation that has encroached onto the roadway from the slopes of the road would be removed as part of the Proposed Project. Vegetated roadway shoulders will not be scraped or graded. The Pond Access Road would not be widened as part of the Proposed Project with the exception of three turnouts to allow trucks to pass and a small area near the northeast corner of the ponds where there is insufficient turning radius for the larger trucks. At the maximum curve, this area would be widened from approximately 25 ft (including shoulders) to 50 ft as part of the Proposed Project; the location of the widening is shown on Figure 2. The Pond Access Road would provide two travel lanes for light utility vehicles and one travel lane for the heavy hauling trucks. During construction, an on-site construction flag persons may be required to facilitate heavy hauling truck use of the Pond Access Roads.

- **South Access Road.** The existing South Access Road begins at the base of the dam and connects to Vail Dam Road, which is a gravel one-lane roadway used by RCWD service vehicles that connects to Vail Lake Road via the campground (this route would not be used except as a possible delivery route for the modular barge system). The current South Access Road would need to be relocated as it is within the footprint of the foundation excavation of the new dam. A new roadway embankment would be constructed along the north-facing slope of the canyon, approximately 150 ft downstream of the existing access road. The alignment of the new South Access Road is shown on Figure 2. This location was selected to provide access from the spillway area and to provide some construction staging area immediately downstream of the new dam. After relocation, the South Access Road would maintain a connection to Vail Dam Road for use by RCWD service vehicles. Following construction, the graded slopes on the side of the South Access Road would be revegetated with appropriate native vegetation. Vegetated riprap would be placed at the foot of the embankment along Temecula Creek to reduce potential erosion. It is anticipated that the South Access Road embankment would be constructed using materials excavated from the new dam foundation. This road would also have gravel surfacing and drainage improvements. The South Access Road would be inundated in the event the reservoir spills; therefore, during operation, major erosion would need to be repaired on this road after spill events. However, upon completion of the Project, the likelihood of spill events occurring will be substantially decreased due to the improvements to RCWD's emergency release options, which would allow reducing the lake water level in a shorter time frame than under existing conditions.

As described in Response a, above, based on low number of trips, low traffic volumes on De Portola Road and SR-79, and sufficient on-site vehicle staging areas, Project vehicles are unlikely to queue onto public streets (De Portola Road or SR-79). In addition, adequate site distance (without any sight obstructions) is currently provided along De Portola Road and SR-79 at the Project site access locations. Further, as required by the measure above, construction traffic would be managed by the construction contractor consistent with the current CATTCH (previously known as the California Joint Utility Traffic Control Manual). The CATTCH provides basic standards for the safe movement of all road users (including motorists, bicyclists, and pedestrians on streets, highways, and bikeways) through construction zones in accordance with Section 21400 of the California Vehicle Code and the California Manual on Uniform Traffic Control Devices. While the Proposed Project does not include construction activities on De Portola Road or SR-79, a CTMP would further ensure that construction traffic does not queue on public roadways and that construction traffic does not create any hazards for vehicles on these roadways. Therefore, with incorporation of the measure above, the Proposed Project would not substantially increase hazards for vehicles due to a geometric design feature or incompatible uses.

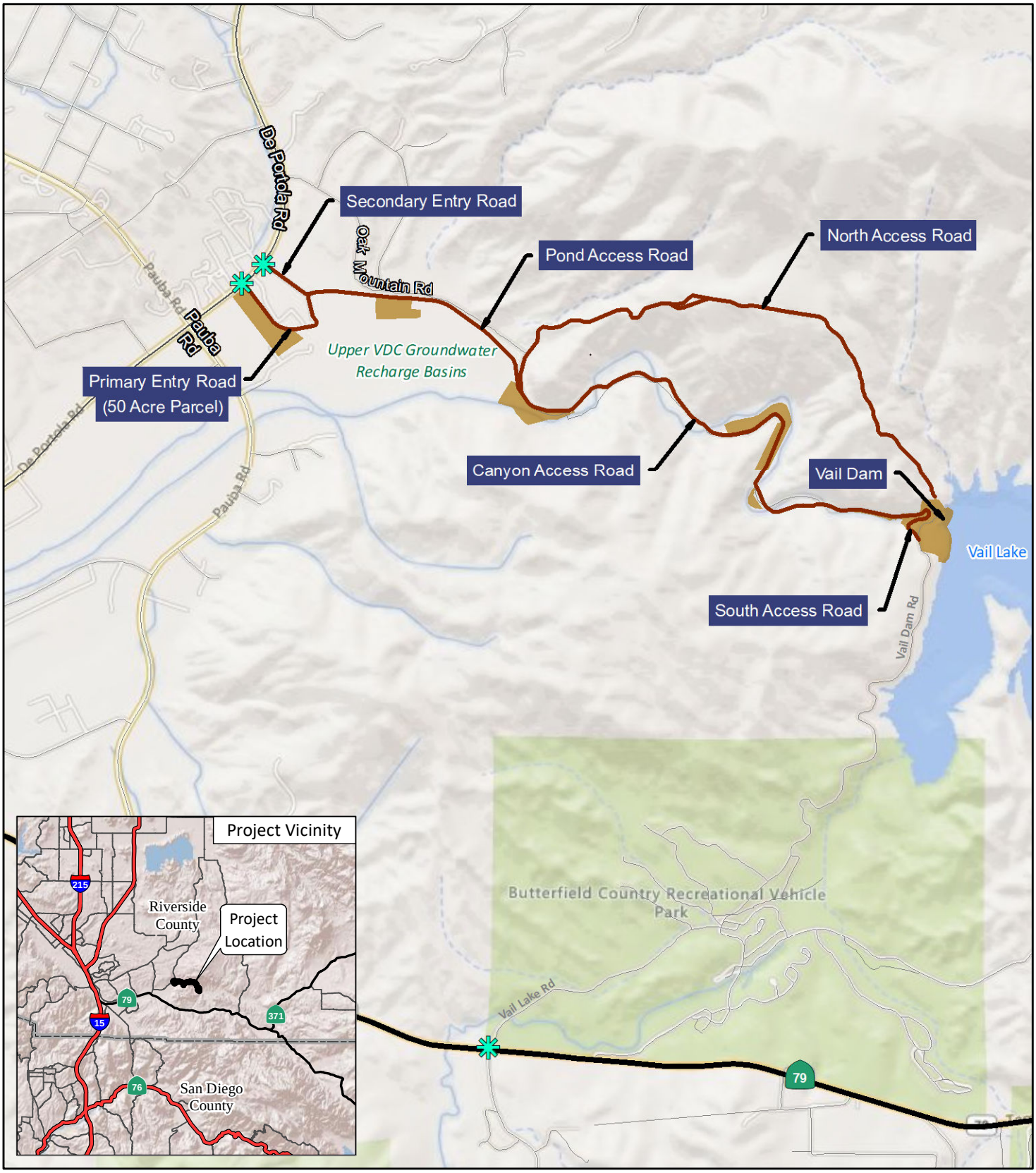
d. Would the project result in inadequate emergency access?

Less Than Significant Impact. The Proposed Project would provide improvements to the on-site access roads for temporary construction traffic as well as post-Project access to the crest of the new dam as described above. These improvements would be designed consistent with relevant design standards and would allow for adequate emergency access. All emergency access routes to the Project site and adjacent areas would be kept clear and unobstructed during all phases of demolition and construction. No street closures or lane closures are anticipated as part of Project construction, and traffic volumes resulting from construction vehicles would not impede traffic flow on surrounding streets. Therefore, the Proposed Project would not result in inadequate emergency access, and no mitigation is required.

Attachments: A: Figures 1 and 2
B: Table A

ATTACHMENT A

FIGURES 1 AND 2



LSA

LEGEND

- Project Feature Access Roads
- Project Feature Areas
- Site Access Point

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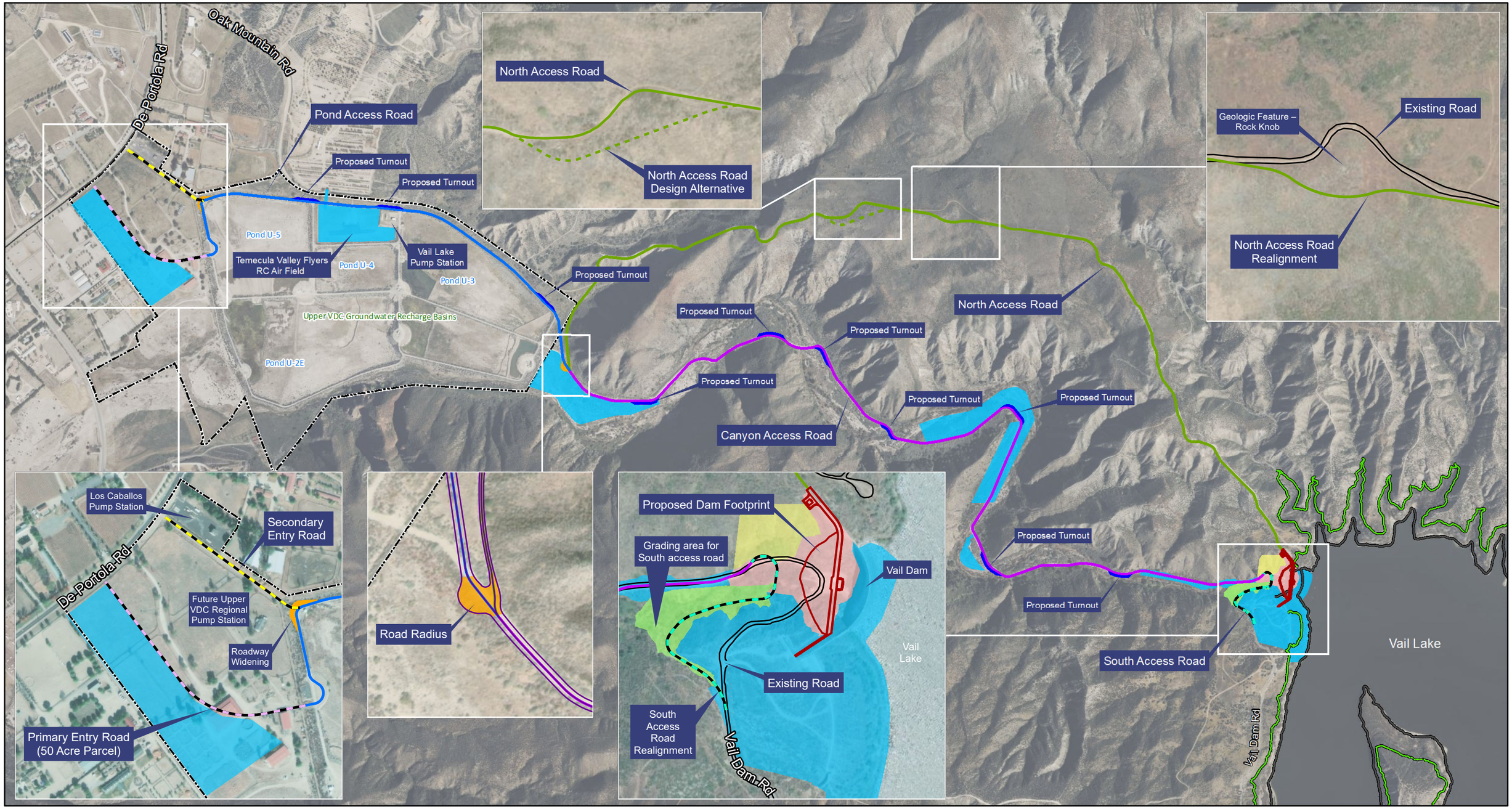
FIGURE 1

Vail Dam Seismic and Hydrologic Remediation Project

Project Vicinity

SOURCE: Bing Maps (2018); AECOM (6/2022)

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LSA

LEGEND

- Canyon Access Road
- North Access Road
- North Access Road Design Alternative
- Primary Entry Road (50 Acre Parcel)
- Secondary Entry Road
- Pond Access Road
- Realigned South Access Road
- Proposed Truck Turnout
- Roadway Radius
- Proposed Dam Footprint
- Property Boundary
- Dam Construction Area
- South Access Road Construction Area
- Staging and Laydown Area
- Temporary Construction Area
- Spillway Crest Elevation (1472.6' NAVD88)
- Current Water Level (1428.2' NAVD88)

0 500 1000
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SOURCE: Bing Maps (2020); AECOM (6/2022)

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FIGURE 2

Vail Dam Seismic and Hydrologic Remediation Project

Staging/Laydown Areas and Access Roads

ATTACHMENT B

TABLE A

LSA

Table A: Construction Trip Generation Summary

Phase			Vehicles			Carpool/Transit					AM Peak Hour			PM Peak Hour		
	Description	Duration	Description[1,2]	Quantity	Roundtrips	Reduction%	Hours	Type	PCE	ADT	in	out	total	in	out	total
			Workers	5	1		-	Passenger	1	10	5	0	5	0	5	5
		16 Weeks	Trucks (Equipment/Materials)	2	1	-	10	Large Truck	2	4	1	1	2	1	1	2
1	Mobilization	(Months 1-4)	***Total***							***14***	***6***	***1***	***7***	***1***	***6***	***7***
			Workers	8	1		-	Passenger	1	16	8	0	8	0	8	8
	Access Roads	24 Weeks	Trucks (Aggregates)	12	1	-	10	Large Truck	2	24	2	2	4	2	2	4
2	and Staging Areas	(Months 2-8)	***Total***							***40***	***10***	***2***	***12***	***2***	***10***	***12***
			Workers	9	1		-	Passenger	1	18	9	0	9	0	9	9
	Demolition of	10 Weeks	Trucks (Equipment/Materials)	2	1	-	10	Large Truck	2	4	1	1	2	1	1	2
3	Facilities at New Dam	(Months 5-9)	***Total***							***22***	***10***	***1***	***11***	***1***	***10***	***11***
			Workers	10	1		-	Passenger	1	20	10	0	10	0	10	10
		48 Weeks	Trucks (Ready-Mix Concrete)	2	1	-	10	Large Truck	2	4	1	1	2	1	1	2
4	Foundation Excavation	(Months 5-16)	***Total***							***24***	***11***	***1***	***12***	***1***	***11***	***12***
			Workers	9	1		-	Passenger	1	18	9	0	9	0	9	9
			Trucks (Equipment/Materials)	1	1	-	10	Large Truck	2	2	1	0	1	0	1	1
	Temporary Energy	18 Weeks	Trucks (Ready-Mix Concrete)	2	1	-	10	Large Truck	2	4	1	1	2	1	1	2
5	Dissipation Vault	(Months 5-9)	***Total***							***24***	***11***	***1***	***12***	***1***	***11***	***12***
			Workers	9	1		-	Passenger	1	18	9	0	9	0	9	9
			Trucks (Equipment/Materials)	1	1	-	10	Large Truck	2	2	1	1	2	1	1	2
		6 Weeks	Trucks (Ready-Mix Concrete)	3	1	-	10	Large Truck	2	6	1	1	2	1	1	2
6	Armor Spillway	(Months 8-10)	***Total***							***26***	***11***	***2***	***13***	***2***	***11***	***13***
			Workers	8	1		-	Passenger	1	16	8	0	8	0	8	8
	Foundation Treatment	20 Weeks	Trucks (Equipment/Materials)	2	1	-	10	Large Truck	2	4	1	0	1	0	1	1
7	and Grouting	(Months 10-15)	***Total***							***20***	***9***	***0***	***9***	***0***	***9***	***9***
			Workers	18	1		-	Passenger	1	36	18	0	18	0	18	18
			Trucks (Equipment/Materials)	2	1	-	10	Large Truck	2	4	1	1	2	1	1	2
			Trucks (Aggregates)	35	2	-	10	Large Truck	2	140	4	4	8	4	4	8
	Roller-Compacted	31 Weeks	Trucks (Cement/Flyash)	14	1	-	10	Large Truck	2	28	1	1	2	1	1	2
8	Concrete Placement	(Months 13-20)	***Total***							***208***	***24***	***6***	***30***	***6***	***24***	***30***
			Workers	9	1		-	Passenger	1	18	9	0	9	0	9	9
			Trucks (Equipment/Materials)	1	1	-	10	Large Truck	2	2	1	0	1	0	1	1
		28 Weeks	Trucks (Ready-Mix Concrete)	4	1	-	10	Large Truck	2	8	1	1	2	1	1	2
9	Outlet Tower	(Months 17-23)	***Total***							***28***	***11***	***1***	***12***	***1***	***11***	***12***
		19 Weeks	Workers	7	1		-	Passenger	1	14	7	0	7	0	7	7
10	Dam Drainage	(Months 18-22)	***Total***							***14***	***7***	***0***	***7***	***0***	***7***	***7***
		10 Weeks	Workers	4	1		-	Passenger	1	8	4	0	4	0	4	4
11	Dam Instrumentation	(Months 22-24)	***Total***							***8***	***4***	***0***	***4***	***0***	***4***	***4***
			Workers	9	1		-	Passenger	1	18	9	0	9	0	9	9
			Trucks (Equipment/Materials)	1	1	-	10	Large Truck	2	2	1	0	1	0	1	1
	Permanent Energy	8 Weeks	Trucks (Ready-Mix Concrete)	3	1	-	10	Large Truck	2	6	1	1	2	1	1	2
12	Dissipation Vault	(Months 23-25)	***Total***							***26***	***11***	***1***	***12***	***1***	***11***	***12***
			Workers	16	1		-	Passenger	1	32	16	0	16	0	16	16
			Trucks (Equipment/Materials)	2	1	-	10	Large Truck	2	4	1	1	2	1	1	2
	Demolition of	19 Weeks	Trucks (Debris)	2	1	-	10	Large Truck	2	4	1	1	2	1	1	2
13	Existing Facilities	(Months 25-29)	***Total***							***40***	***18***	***2***	***20***	***2***	***18***	***20***
			Workers	7	1		-	Passenger	1	14	7	0	7	0	7	7
	Site Reclamation	6 Weeks	Trucks (Equipment/Materials)	2	1	-	10	Large Truck	2	4	1	1	2	1	1	2
14	and Demobilization	(Months 30-31)	***Total***							***18***	***8***	***1***	***9***	***1***	***8***	***9***

Overlapping Phases	Duration	Vehicles	ADT	AM Peak Hour			PM Peak Hour		
				in	out	total	in	out	total
1 and 2	10 Weeks (Months 2-4)	Workers and Trucks	54	16	3	19	3	16	19
3, 4, and 5	6 Weeks (Months 5-6)	Workers and Trucks	70	32	3	35	3	32	35
7 and 8	8 Weeks (Months 13-15)	Workers and Trucks	228	33	6	39	6	33	39
8 and 9	4 weeks (Months 17-18)	Workers and Trucks	236	35	7	42	7	35	42
8, 9, and 10	11 Weeks (Months 18-20)	Workers and Trucks	250	42	7	49	7	42	49
9 and 10	5 Weeks (Months 21-22)	Workers and Trucks	42	18	1	19	1	18	19
9, 10, and 11	2 Weeks (Month 22)	Workers and Trucks	50	22	1	23	1	22	23
9 and 11	4 Weeks (Months 22-23)	Workers and Trucks	36	15	1	16	1	15	16
11 and 12	7 Weeks (Months 23-24)	Workers and Trucks	34	15	1	16	1	15	16

= most intense period of construction activities (i.e., highest trip generation)

[1] Workers are assumed to arrive in the a.m. peak hour and depart during the p.m. peak hour.

[2] Truck trips are assumed to occur throughout the day, including the a.m. and p.m. peak hours.

ADT = average daily traffic

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APPENDIX K

NATIVE AMERICAN CONSULTATION RECORDS

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NAHC Consultation

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Local Government Tribal Consultation List Request

Native American Heritage Commission
1550 Harbor Blvd, Suite 100
West Sacramento, CA 95691
916-373-3710
916-373-5471 – Fax
nahc@nahc.ca.gov

Type of List Requested

■ **CEQA Tribal Consultation List (AB 52)** – ***Per Public Resources Code § 21080.3.1, subs. (b), (d), (e) and 21080.3.2***

☐ **General Plan (SB 18)** - ***Per Government Code § 65352.3.***

Local Action Type:

☐ **General Plan** ☐ **General Plan Element** ☐ **General Plan Amendment**

☐ **Specific Plan** ☐ **Specific Plan Amendment** ☐ **Pre-planning Outreach Activity**

Required Information

Project Title: Vail Dam Seismic and Hydrologic Remediation Project

Local Government/Lead Agency: Rancho California Water District (RCWD)

Contact Person: Jake Wiley

Street Address: 42135 Winchester Road

City: Temecula **Zip:** 92590

Phone: (951) 296-6900 **Fax:**

Email: wileyj@ranchowater.com

Specific Area Subject to Proposed Action

County: Riverside **City/Community:** near Temecula

Project Description:

RCWD proposes to remediate seismic and hydrologic hazards associated with the existing Vail Dam, an arch dam, by constructing a new straight-axis gravity concrete dam immediately downstream of the existing dam.

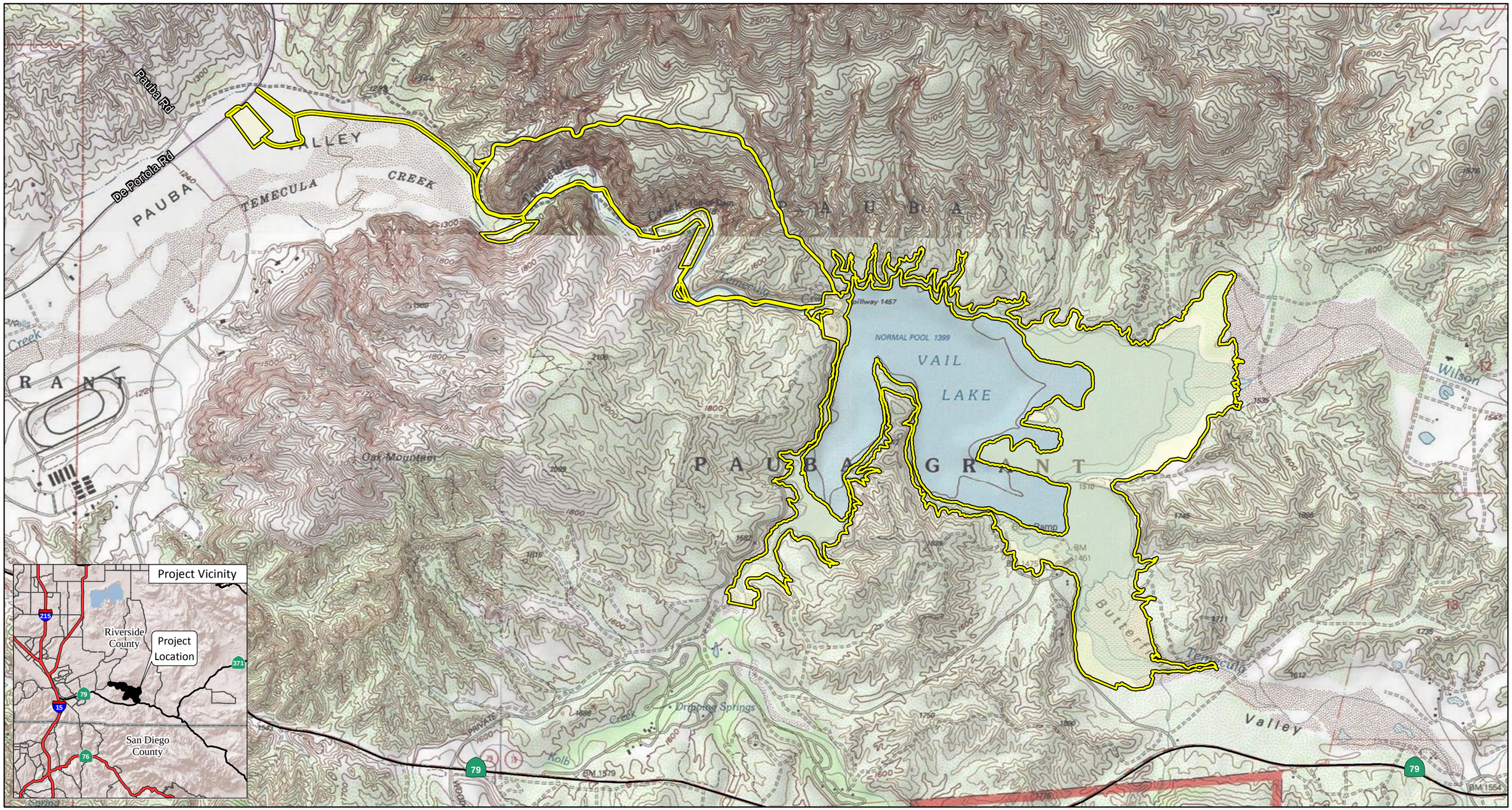
Additional Request

■ **Sacred Lands File Search** - ***Required Information:***

USGS Quadrangle Name(s): Vail Lake; Pechanga; Sage; Bachelor Mtn

Township: 8 South **Range:** 1 West **Section(s):** unsectioned

(Pauba Land Grant)



LSA

LEGEND

Project Location

0 1000 2000
FEET

FIGURE 1

Vail Dam Seismic and Hydrologic Remediation Project

Project Location and Vicinity

SOURCE: USGS 7.5' Quad - *Bachelor Mtn, CA* (1978), *Pechanga, CA* (1988), *Sage, CA* (1954), and *Vail Lake, CA* (1988)

I:\RCW1902\GIS\MXD\ProjectLocation_USGS.mxd (3/23/2020)

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[Vacant]

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NAHC HEADQUARTERS
1550 Harbor Boulevard
Suite 100
West Sacramento,
California 95691
(916) 373-3710
nahc@nahc.ca.gov
NAHC.ca.gov

April 29, 2020

Jake Wiley
Rancho California Water District

Via Email to: wileyj@ranchowater.com

Re: Native American Tribal Consultation, Pursuant to the Assembly Bill 52 (AB 52), Amendments to the California Environmental Quality Act (CEQA) (Chapter 532, Statutes of 2014), Public Resources Code Sections 5097.94 (m), 21073, 21074, 21080.3.1, 21080.3.2, 21082.3, 21083.09, 21084.2 and 21084.3, Vail Dam Seismic and Hydrologic Remediation Project, Riverside County

Dear Mr. Wiley:

Pursuant to Public Resources Code section 21080.3.1 (c), attached is a consultation list of tribes that are traditionally and culturally affiliated with the geographic area of the above-listed project. Please note that the intent of the AB 52 amendments to CEQA is to avoid and/or mitigate impacts to tribal cultural resources, (Pub. Resources Code §21084.3 (a)) ("Public agencies shall, when feasible, avoid damaging effects to any tribal cultural resource.")

Public Resources Code sections 21080.3.1 and 21084.3(c) require CEQA lead agencies to consult with California Native American tribes that have requested notice from such agencies of proposed projects in the geographic area that are traditionally and culturally affiliated with the tribes on projects for which a Notice of Preparation or Notice of Negative Declaration or Mitigated Negative Declaration has been filed on or after July 1, 2015. Specifically, Public Resources Code section 21080.3.1 (d) provides:

Within 14 days of determining that an application for a project is complete or a decision by a public agency to undertake a project, the lead agency shall provide formal notification to the designated contact of, or a tribal representative of, traditionally and culturally affiliated California Native American tribes that have requested notice, which shall be accomplished by means of at least one written notification that includes a brief description of the proposed project and its location, the lead agency contact information, and a notification that the California Native American tribe has 30 days to request consultation pursuant to this section.

The AB 52 amendments to CEQA law does not preclude initiating consultation with the tribes that are culturally and traditionally affiliated within your jurisdiction prior to receiving requests for notification of projects in the tribe's areas of traditional and cultural affiliation. The Native American Heritage Commission (NAHC) recommends, but does not require, early consultation as a best practice to ensure that lead agencies receive sufficient information about cultural resources in a project area to avoid damaging effects to tribal cultural resources.

The NAHC also recommends, but does not require that agencies should also include with their notification letters, information regarding any cultural resources assessment that has been completed on the area of potential effect (APE), such as:

1. The results of any record search that may have been conducted at an Information Center of the California Historical Resources Information System (CHRIS), including, but not limited to:

- A listing of any and all known cultural resources that have already been recorded on or adjacent to the APE, such as known archaeological sites;
- Copies of any and all cultural resource records and study reports that may have been provided by the Information Center as part of the records search response;
- Whether the records search indicates a low, moderate, or high probability that unrecorded cultural resources are located in the APE; and
- If a survey is recommended by the Information Center to determine whether previously unrecorded cultural resources are present.

2. The results of any archaeological inventory survey that was conducted, including:

    - Any report that may contain site forms, site significance, and suggested mitigation measures.

      All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum, and not be made available for public disclosure in accordance with Government Code section 6254.10.

3. The result of any Sacred Lands File (SLF) check conducted through the Native American Heritage Commission was positive. Please contact the Pechanga Band of Luiseno Indians on the attached list for more information.

4. Any ethnographic studies conducted for any area including all or part of the APE; and

5. Any geotechnical reports regarding all or part of the APE.

Lead agencies should be aware that records maintained by the NAHC and CHRIS are not exhaustive and a negative response to these searches does not preclude the existence of a tribal cultural resource. A tribe may be the only source of information regarding the existence of a tribal cultural resource.

This information will aid tribes in determining whether to request formal consultation. In the event that they do, having the information beforehand will help to facilitate the consultation process.

If you receive notification of change of addresses and phone numbers from tribes, please notify the NAHC. With your assistance, we can assure that our consultation list remains current.

If you have any questions, please contact me at my email address: Andrew.Green@nahc.ca.gov.

Sincerely,

Andrew Green

Andrew Green
Cultural Resources Analyst

Attachment

Native American Heritage Commission
Tribal Consultation List
Riverside County
4/29/2020

Agua Caliente Band of Cahuilla Indians
Jeff Grubbe, Chairperson
5401 Dinah Shore Drive — Cahuilla
Palm Springs, CA, 92264
Phone: (760) 699 - 6800
Fax: (760) 699-6919

Augustine Band of Cahuilla Mission Indians
Amanda Vance, Chairperson
P.O. Box 846 — Cahuilla
Coachella, CA, 92236
Phone: (760) 398 - 4722
Fax: (760) 369-7161
hhaines@augustinetribe.com

Cabazon Band of Mission Indians
Doug Welmas, Chairperson
84-245 Indio Springs Parkway — Cahuilla
Indio, CA, 92203
Phone: (760) 342 - 2593
Fax: (760) 347-7880
jstapp@cabazonindians-nsn.gov

Cahuilla Band of Indians
Daniel Salgado, Chairperson
52701 U.S. Highway 371 — Cahuilla
Anza, CA, 92539
Phone: (951) 763 - 5549
Fax: (951) 763-2808
Chairman@cahuilla.net

Campo Band of Diegueno Mission Indians
Ralph Goff, Chairperson
36190 Church Road, Suite 1 — Diegueno
Campo, CA, 91906
Phone: (619) 478 - 9046
Fax: (619) 478-5818
rgoff@campo-nsn.gov

Ewiiaapaayp Band of Kumeyaay Indians
Michael Garcia, Vice Chairperson
4054 Willows Road — Diegueno
Alpine, CA, 91901
Phone: (619) 445 - 6315
Fax: (619) 445-9126
michaelg@leaningrock.net

Ewiiaapaayp Band of Kumeyaay Indians
Robert Pinto, Chairperson
4054 Willows Road — Diegueno
Alpine, CA, 91901
Phone: (619) 445 - 6315
Fax: (619) 445-9126
wmicklin@leaningrock.net

Jamul Indian Village
Lisa Cumper, Tribal Historic Preservation Officer
P.O. Box 612 — Diegueno
Jamul, CA, 91935
Phone: (619) 669 - 4855
lcumper@jiv-nsn.gov

Jamul Indian Village
Erica Pinto, Chairperson
P.O. Box 612 — Diegueno
Jamul, CA, 91935
Phone: (619) 669 - 4785
Fax: (619) 669-4817
epinto@jiv-nsn.gov

La Jolla Band of Luiseno Indians
Fred Nelson, Chairperson
22000 Highway 76 — Luiseno
Pauma Valley, CA, 92061
Phone: (760) 742 - 3771

La Posta Band of Diegueno Mission Indians
Gwendolyn Parada, Chairperson
8 Crestwood Road — Diegueno
Boulevard, CA, 91905
Phone: (619) 478 - 2113
Fax: (619) 478-2125
LP13boots@aol.com

This list is current only as of the date of this document. Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and section 5097.98 of the Public Resources Code.

This list is only applicable for consultation with Native American tribes under Public Resources Code Sections 21080.3.1 for the proposed Vail Dam Seismic and Hydrologic Remediation Project, Riverside County.

Native American Heritage Commission
Tribal Consultation List
Riverside County
4/29/2020

La Posta Band of Diegueno Mission Indians
Javaughn Miller, Tribal Administrator
8 Crestwood Road — Diegueno
Boulevard, CA, 91905
Phone: (619) 478 - 2113
Fax: (619) 478-2125
jmiller@LPtribe.net

Los Coyotes Band of Cahuilla and Cupeño Indians
Shane Chapparosa, Chairperson
P.O. Box 189 — Cahuilla
Warner Springs, CA, 92086-0189
Phone: (760) 782 - 0711
Fax: (760) 782-0712

Manzanita Band of Kumeyaay Nation
Angela Elliott Santos, Chairperson
P.O. Box 1302 — Diegueno
Boulevard, CA, 91905
Phone: (619) 766 - 4930
Fax: (619) 766-4957

Mesa Grande Band of Diegueno Mission Indians
Michael Linton, Chairperson
P.O Box 270 — Diegueno
Santa Ysabel, CA, 92070
Phone: (760) 782 - 3818
Fax: (760) 782-9092
mesagrandeband@msn.com

Morongo Band of Mission Indians
Robert Martin, Chairperson
12700 Pumarra Road — Cahuilla
Banning, CA, 92220 — Serrano
Phone: (951) 849 - 8807
Fax: (951) 922-8146
dtorres@morongo-nsn.gov

Pala Band of Mission Indians
Shasta Gaughen, Tribal Historic Preservation Officer
PMB 50, 35008 Pala Temecula Rd. — Cupeno, Luiseno
Pala, CA, 92059
Phone: (760) 891 - 3515
Fax: (760) 742-3189
sgaughen@palatribe.com

Pauma Band of Luiseno Indians
Temet Aguilar, Chairperson
P.O. Box 369 — Luiseno
Pauma Valley, CA, 92061
Phone: (760) 742 - 1289
Fax: (760) 742-3422
bennaecalac@aol.com

Pechanga Band of Luiseno Indians
Mark Macarro, Chairperson
P.O. Box 1477 — Luiseno
Temecula, CA, 92593
Phone: (951) 770 - 6000
Fax: (951) 695-1778
epreston@pechanga-nsn.gov

Quechan Tribe of the Fort Yuma Reservation
Jill McCormick, Historic Preservation Officer
P.O. Box 1899 — Quechan
Yuma, AZ, 85366
Phone: (760) 572 - 2423
historicpreservation@quechantribe.com

Ramona Band of Cahuilla
Joseph Hamilton, Chairperson
P.O. Box 391670 — Cahuilla
Anza, CA, 92539
Phone: (951) 763 - 4105
Fax: (951) 763-4325
admin@ramona-nsn.gov

This list is current only as of the date of this document. Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and section 5097.98 of the Public Resources Code.

This list is only applicable for consultation with Native American tribes under Public Resources Code Sections 21080.3.1 for the proposed Vail Dam Seismic and Hydrologic Remediation Project, Riverside County.

Native American Heritage Commission
Tribal Consultation List
Riverside County
4/29/2020

Rincon Band of Luiseno Indians
Cheryl Madrigal, Tribal Historic Preservation Officer
One Government Center Lane — Luiseno
Valley Center, CA, 92082
Phone: (760) 297 - 2635
crd@rincon-nsn.gov

Rincon Band of Luiseno Indians
Bo Mazzetti, Chairperson
One Government Center Lane — Luiseno
Valley Center, CA, 92082
Phone: (760) 749 - 1051
Fax: (760) 749-5144
bomazzetti@aol.com

San Luis Rey Band of Mission Indians
San Luis Rey, Tribal Council
1889 Sunset Drive — Luiseno
Vista, CA, 92081
Phone: (760) 724 - 8505
Fax: (760) 724-2172
cjmojado@slrmissionindians.org

Santa Rosa Band of Cahuilla Indians
Steven Estrada, Chairperson
P.O. Box 391820 — Cahuilla
Anza, CA, 92539
Phone: (951) 659 - 2700
Fax: (951) 659-2228
mflaxbeard@santarosacahuilla-nsn.gov

Soboba Band of Luiseno Indians
Scott Cozart, Chairperson
P. O. Box 487 — Cahuilla
San Jacinto, CA, 92583 — Luiseno
Phone: (951) 654 - 2765
Fax: (951) 654-4198
jontiveros@soboba-nsn.gov

Sycuan Band of the Kumeyaay Nation
Cody Martinez, Chairperson
1 Kwaaypaay Court — Kumeyaay
El Cajon, CA, 92019
Phone: (619) 445 - 2613
Fax: (619) 445-1927
ssilva@sycuan-nsn.gov

Torres-Martinez Desert Cahuilla Indians
Thomas Tortez, Chairperson
P.O. Box 1160 — Cahuilla
Thermal, CA, 92274
Phone: (760) 397 - 0300
Fax: (760) 397-8146
tmchair@torresmartinez.org

Viejas Band of Kumeyaay Indians
John Christman, Chairperson
1 Viejas Grade Road — Diegueno
Alpine, CA, 91901
Phone: (619) 445 - 3810
Fax: (619) 445-5337

This list is current only as of the date of this document. Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and section 5097.98 of the Public Resources Code.

This list is only applicable for consultation with Native American tribes under Public Resources Code Sections 21080.3.1 for the proposed Vail Dam Seismic and Hydrologic Remediation Project, Riverside County.

RCW1902 Vail Dam

Native American Contact List for Consultation (AB52)

Raymond Huaute
Cultural Resource Specialist
Morongo Band of Mission Indians
12700 Pumarra Road
Banning, CA 92220

Patricia Garcia
Director of Tribal Historic Preservation Office
Agua Caliente Band of Cahuilla Indians
5401 Dinah Shore Drive
Palm Springs, CA 92264

Destiny Colocho, Manager
Cultural Resources Department
Rincon Band of Luiseño Indians
1 West Tribal Road
Valley Center, CA 92082

Ebru T. Ozdil, Cultural Analyst
Pechanga Band of Luiseño Mission Indians
Post Office Box 2183
Temecula, CA 92593

Sample AB 52 Letter

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Engineering and Operations

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Director of Administration

Eileen Dienzo
Director of Human Resources

Kelli E. Garcia
District Secretary

James B. Gilpin
Best Best & Krieger LLP
General Counsel

June 26, 2020

Via USPS Mail and Email: eozdil@pechanga-nsn.gov

Mark Macarro, Chairperson;
Ebru T. Ozdil, Cultural Analyst;
Juan Ochoa, Assistant Tribal Historic Preservation Officer
Pechanga Band of Luiseño Mission Indians
Post Office Box 2183
Temecula, CA 92593

SUBJECT: **AB52 NATIVE AMERICAN CONSULTATION AND PROJECT NOTIFICATION; VAIL DAM SEISMIC AND HYDROLOGIC REMEDIATION PROJECT [PROJECT NO. D1911] TEMECULA, RIVERSIDE COUNTY, CALIFORNIA**

Dear Mr. Macarro, Ms. Ozdil, and Mr. Ochoa:

Please consider this letter as formal notification of a proposed project, as required under the California Environmental Quality Act (CEQA), specifically Public Resources Code (PRC), Section 21080.3.1 and Chapter 532, Statutes of 2014 (i.e., Assembly Bill 52). Pursuant to PRC, Section 21080.3.1(d), you and your tribe have thirty (30) days from receipt of this letter to request consultation on this project in writing. Please provide a designated lead contact person, if you have not provided that information to us already.

Rancho California Water District (Rancho Water/District/Lead Agency) proposes to remediate seismic and hydrologic hazards associated with the existing Vail Dam, an arch dam, by constructing a new straight-axis gravity concrete dam immediately downstream of the existing dam (Proposed Project). The Proposed Project also includes partial demolition of the existing dam. The new dam would be 6.8 feet higher than the original dam and would connect to the existing abutments. The new dam would include new outlet works that would be designed to meet the emergency reservoir drawdown requirements. Until the hydrologic and seismic deficiencies are remediated, the California Department of Water Resources Division of Safety of Dams (DSOD) is restricting the operating water levels of the reservoir. As a result of new dam installation, the operating restrictions would be removed. Additional project work would include improvements to access roads in order to accommodate construction traffic, as well as site development to support construction and demolition activities in the form of construction staging and material disposal areas. Figure 1 (enclosed) shows the location of the Proposed Project. Figure 2 (enclosed) shows details of the construction impacts areas.

A record search for the Proposed Project at the Eastern Information Center of the California Historical Resources Information System at University of California, Riverside, is pending due to closures associated with COVID-19. A Sacred Lands file search requested from the Native American Heritage Commission resulted in positive findings.

If you have any questions or concerns about the project, please contact me via email at wileyj@ranchowater.com or by phone at the District office at (951) 296-6900. Alternatively, you may also send a response via mail to:

Jake Wiley, P.E.
Engineering Manager-CIP & Development
Rancho California Water District
42135 Winchester Road
Temecula, CA 92590

If you do not wish to consult for the Proposed Project, a written response indicating your declination to consult would be greatly appreciated. Thank you for your participation in this process.

Sincerely,

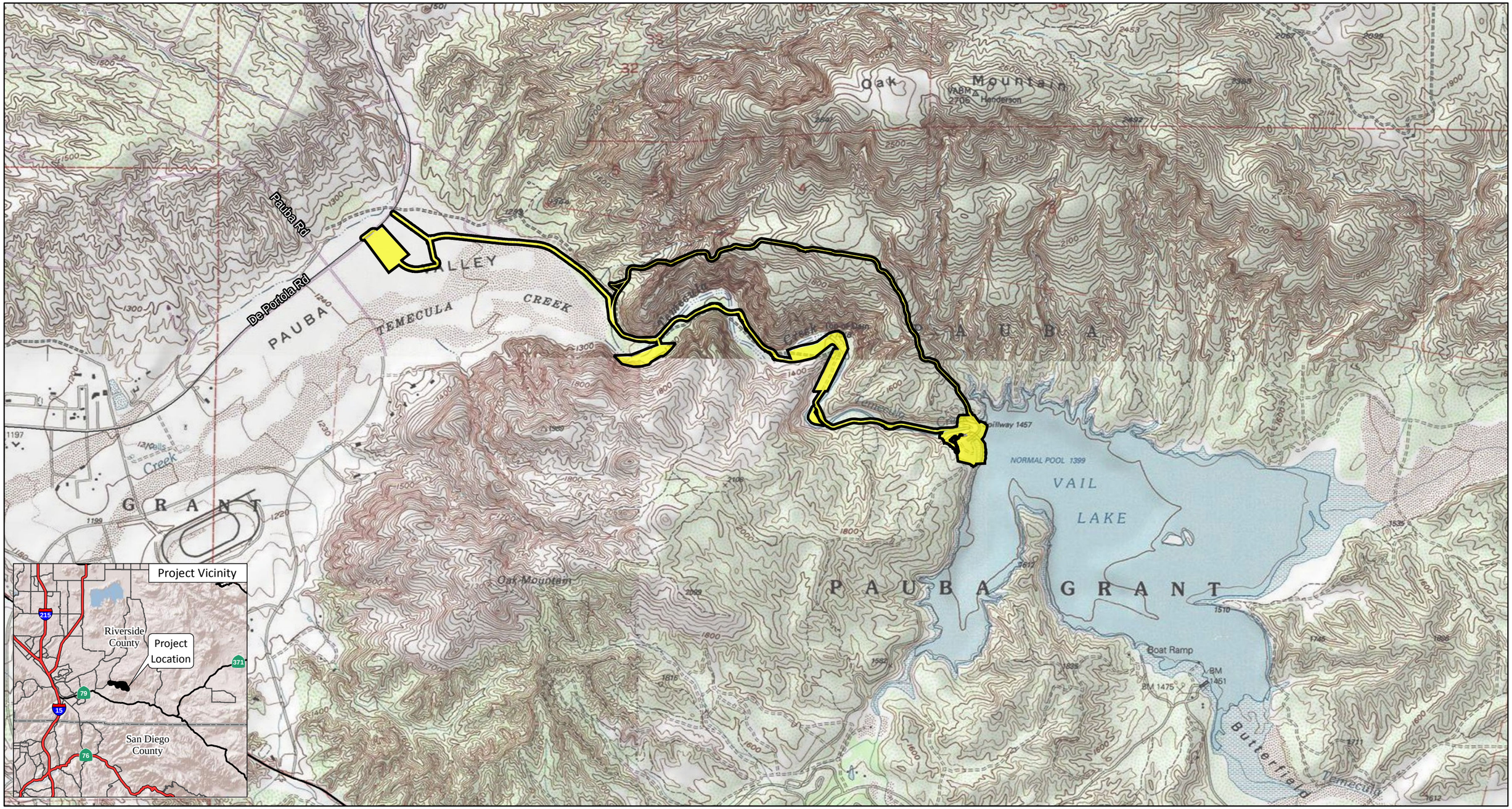
RANCHO CALIFORNIA WATER DISTRICT

Jake Wiley. P.E.
Engineering Management – CIP & Development

Enclosures: Figure 1 – Project Location and Vicinity
Figure 2 – Project Construction Areas

cc: Jeffrey D. Armstrong, General Manager

20\JW:hab048\F475\AB52\D1911



LEGEND

Project Location

Project Construction Area

FIGURE 1

0 1000 2000

FEET

SOURCE: USGS 7.5' Quad - *Bachelor Mtn, CA* (1978), *Pechanga, CA* (1988), *Sage, CA* (1954), and *Vail Lake, CA* (1988)

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Vail Dam Seismic and Hydrologic Remediation Project

Project Location and Vicinity

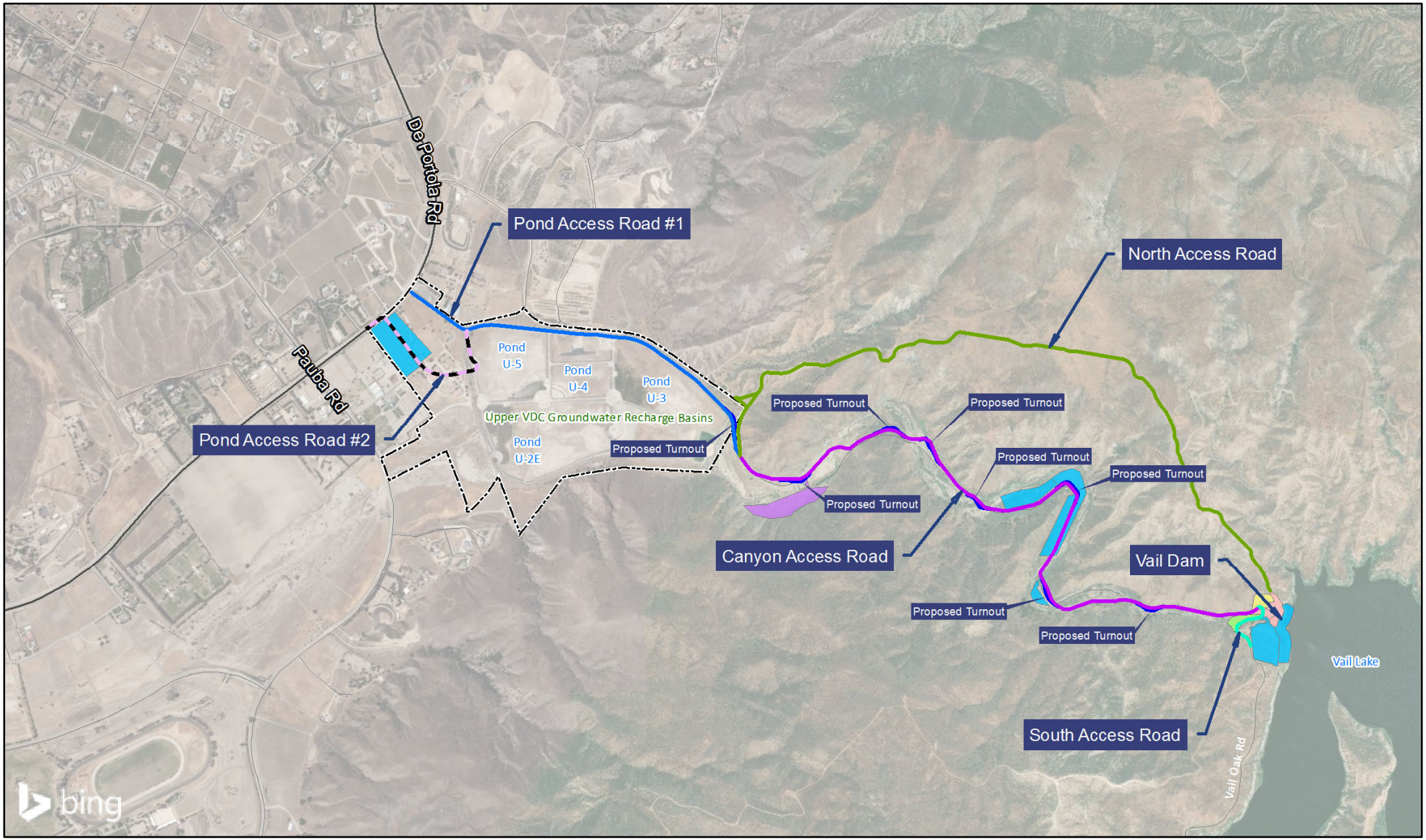


FIGURE 2

LEGEND

- Canyon Access Road
- North Access Road
- Pond Access Road #1
- Pond Access Road #2
- South Access Road
- Proposed Truck Turnout
- Property Boundary
- Dam Construction Area
- Disposal Area
- South Access Road Construction Area
- Staging and Laydown Area
- Temporary Construction Area

0 1000 2000
FEET

Vail Dam Seismic and Hydrologic Remediation Project

Project Construction Areas

SOURCE: Bing Maps (2018); AECOM (1/2020)

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AB 52 Consultation Responses

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Rincon Band of Luiseño Indians
CULTURAL RESOURCES DEPARTMENT

One Government Center Lane | Valley Center | CA 92082
(760) 749-1051 | Fax: (760) 749-8901 | rincon-nsn.gov

June 30, 2020

Sent via email: wileyj@ranchowater.com
Jake Wiley, P.E.
Engineering Manager –CIP & Development
Rancho California Water District
42135 Winchester Road
Temecula, CA 92590

Re: Vail Dam Seismic and Hydrologic Remediation Project

Dear Mr. Wiley,

This letter is written on behalf of the Rincon Band of Luiseño Indians ("Rincon Band" or "Band"), a federally recognized Indian Tribe and sovereign government. We have received your notification regarding the above referenced project and we thank you for the opportunity to consult on the project. The identified location is within the Territory of the Luiseño people and within the Band's specific Area of Historic Interest (AHI). As such, Rincon is traditionally and culturally affiliated to the project area.

Embedded in the Luiseño territory are Rincon's history, culture and identity. We kindly ask to be provided with copies of existing documents pertaining to the project such as the cultural survey including the archaeological site records, shape files, archaeological record search results, geotechnical report, and the grading plans. Upon receipt and review, the Band requests AB52 Consultation on the project in order to learn more about any potential impacts to cultural resources.

If you have additional questions or concerns, please do not hesitate to contact our office at your convenience at (760) 297-2635 or via electronic mail at cmadrigal@rincon-nsn.gov. We look forward to working together to protect and preserve our cultural assets.

Sincerely,

Cheryl Madrigal
Tribal Historic Preservation Officer
Cultural Resources Manager

Bo Mazzetti, Chairman | Tishmall Turner, Vice Chair | Laurie E. Gonzalez, Council Member | Alfonso Kolb, Sr., Council Member | John Constantino, Council Member

Kerrie Collison

From: Nicole West
Sent: Thursday, July 2, 2020 10:01 AM
To: Kerrie Collison
Cc: Nicole Dubois
Subject: FW: Pechanga Tribe AB52 Comments on Vail Dam Seismic and Hydrologic Remediation Project [Project No. D1911]
Attachments: Ele - Vail Dam Seismic and Hydrologic Remediation Project, AB 52, Rancho....pdf

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From: Jacob Wiley <wileyj@ranchowater.com>
Sent: Thursday, July 2, 2020 9:44 AM
To: Nicole West <Nicole.West@lsa.net>
Cc: Randy Neff <neffr@ranchowater.com>
Subject: FW: Pechanga Tribe AB52 Comments on Vail Dam Seismic and Hydrologic Remediation Project [Project No. D1911]

From: Juan Ochoa [mailto:jochoa@pechanga-nsn.gov]
Sent: Thursday, July 2, 2020 9:29 AM
To: Jacob Wiley <wileyj@ranchowater.com>
Cc: Andrea Fernandez <afernandez@pechanga-nsn.gov>; Ebru Ozdil <eozdil@pechanga-nsn.gov>; Tina Thompson Mendoza <tmendoza@pechanga-nsn.gov>
Subject: Pechanga Tribe AB52 Comments on Vail Dam Seismic and Hydrologic Remediation Project [Project No. D1911]

Dear Jake Wiley,

This letter is written on behalf of the Pechanga Band of Luiseño Indians (hereinafter, "the Tribe") a federally recognized Indian tribe and sovereign government in response to the AB 52 notice provided by the Rancho California Water District (District).

This email serves as the Tribe's formal request to begin consultation under AB 52 for this Project. Per AB 52, we intend to assist the District in determining the type of environmental document that should be prepared for this Project (i.e. EIR, MND, ND); with identifying potential tribal cultural resources (TCRs); determining whether potential substantial adverse effects will occur to them; and to develop appropriate preservation, avoidance and/or mitigation measures, as appropriate. CEQA, as amended by AB 52, requires the County to avoid damaging effects to the significance of a tribal cultural resource. As such, the preferred TCR mitigation is complete avoidance and knowing that this Project is within a Traditional Cultural Property and contains additional TCRs, the Tribe requests that all efforts to preserve sensitive TCRs be made as early in the development process as possible.

Please add the Tribe to your distribution list(s) for public notices and circulation of all documents, including environmental review documents, archaeological reports, development plans, conceptual grading plans (if available), and all other applicable documents pertaining to this Project. The Tribe further requests to be directly notified of all public hearings and scheduled approvals concerning this Project, and that these comments be incorporated into the record of approval for this Project.

The Pechanga Tribe asserts that the Project area is part of *'Ataaxum* (Luiseño), and therefore the Tribe's, aboriginal territory as evidenced by the existence of cultural resources, named places, *tóota yixélval* (rock art, pictographs, petroglyphs), and an extensive *'Ataaxum* artifact record in the vicinity of the Project. This culturally sensitive area is affiliated with the Pechanga Band of Luiseño Indians because of the Tribe's cultural ties to this area as well as our extensive history with the District and other projects within the area.

The Tribe hereby informs the County that the Project site is located within a Traditional Cultural Property (TCP). We will provide additional information regarding tribal affiliation and the TCP in our consultation as well as provide more specific, confidential information on potential TCRs that may be impacted by the proposed Project. Additionally, the Tribe requests that no Phase II testing or other ground-disturbing archaeological activities be conducted on the site until after the Tribe and the County consult about the TCRs in our government-to-government consultation.

As you know, the AB 52 consultation process is ongoing and continues until appropriate mitigation has been agreed upon for the TCRs that may be impacted by the Project. As such, under both AB 52 and CEQA, we look forward to working closely with the District on ensuring that a full, comprehensive environmental review of the Project's impacts is completed.

In addition to those rights granted to the Tribe under AB 52, the Tribe reserves the right to fully participate in the environmental review process, as well as to provide further comment on the Project's impacts to cultural resources and potential mitigation for such impacts.

The Pechanga Tribe looks forward to working together with the Rancho California Water District in protecting the invaluable Pechanga cultural resources found in the Project area. The formal contact person for this Project will be Ebru Ozdil. Please contact her at 951-770-6313 or at eozdil@pechanga-nsn.gov within 30 days of receiving this consultation request so that we can begin the consultation process. Thank you.

Juan Ochoa, MLIS
Assistant Tribal Historic Preservation Officer
Pechanga Cultural Resources Department
P.O. Box 2183
Temecula, CA 92593
Office:(951)-770-6308
jochoa@pechanga-nsn.gov
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VAIL DAM SEISMIC AND HYDROLOGIC REMEDIATION PROJECT (PROJECT NO. D1911) ASSEMBLY BILL 52 NATIVE AMERICAN CONSULTATION MEETING SUMMARY FRIDAY, AUGUST 7, 2020, 10:00 AM

Attendees

Rancho California Water District Staff: Jacob Wiley

Rincon Band of Luiseño Indians Staff: Cheryl Madrigal

LSA Staff: Kerrie Collison
Nicole West

Meeting Summary

From 10:00 a.m. to 10:30 a.m. on August 7, 2020, the Rincon Band of Luiseño Indians (Rincon) and Rancho California Water District (RCWD) held a virtual Assembly Bill (AB) 52 consultation meeting for the Vail Dam Seismic and Hydrologic Remediation Project (proposed project). Those in attendance included Cheryl Madrigal (Tribal Historic Preservation Officer for Rincon), Jacob Wiley (engineer for RCWD), Kerrie Collison (archaeologist for LSA), and Nicole West (environmental planner for LSA).

The call began with Mr. Wiley presenting a project overview and project description. Mr. Wiley discussed the history of Vail Dam and the need for the proposed project, and provided a description of the construction plans for the proposed dam. Mr. Wiley will send an electronic version of the proposed project's 30 percent plans to Ms. Madrigal. Ms. Madrigal asked about the removal of the existing dam and what type of impact to subsurface deposits it will have. Mr. Wiley responded that there will be no subsurface disturbance for the removal of the existing dam, but there will be excavation for installation of the new dam. Ms. Madrigal asked if the excavation will occur in native or fill soils, and Mr. Wiley responded that there is fill in front of the dam, but that there is a detailed geotechnical report that he will send to her with the proposed project's 30 percent plans so that she can look at the subsurface conditions of the proposed new dam construction site.

Ms. Madrigal asked if there is any proposed mitigation for the project and whether any other tribes have been consulted with on the proposed project. Mr. Wiley responded that there is no mitigation developed yet since the environmental document is still being prepared, but that the Pechanga Band of Luiseño Indians (Pechanga) has also requested consultation under AB 52 and has requested to review the draft version of the cultural resources survey report. Ms. Madrigal responded that Rincon will let Pechanga take the lead in terms of mitigation, potential construction monitoring, and report review since Pechanga is more local to the project site. Ms. Madrigal also requested that Rincon be provided the final PDF of the cultural resources report after it is finalized, as well as a copy of the Environmental Impact Report (EIR), and that Rincon be notified of any significant archaeological finds during the project. Ms. Madrigal stated that they do not need to receive the Draft EIR prior to public circulation but that they would like to receive a copy during the public circulation period. Ms. Collison confirmed that in the event that human remains are found, Rincon will certainly be notified if the Native American Heritage Commission identifies Rincon as the Most Likely Descendant.

Ms. Collison provided a summary of the status of the cultural resources study (noting that record search results from the Eastern Information Center are still pending) and provided a brief overview of the field survey results. Ms. Madrigal asked that mitigation measures be suggested in the cultural resources report and asked that Rincon be provided with relevant archaeological site records. Ms. Collison responded that site records will be included as a confidential appendix to the cultural resources report. Ms. Madrigal asked about the timing of the upcoming environmental document, and Ms. West responded that the goal for circulation is late fall of 2020.

The call concluded with Ms. Madrigal stating that she has no further comments at this time, and Mr. Wiley said that he will send Ms. Madrigal the geotechnical report and 30 percent project plans electronically.

Action Items

RCWD will provide Ms. Madrigal with the following documents:

- 30 percent plans
- Geotechnical Report
- Cultural Resources Report, with archaeological site records as an appendix (when available)
- Draft EIR (when circulated for public review)

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